BOSTON UNIVERSITY

Boston University College of Engineering
Department of Biomedical Engineering

37th ANNUAL

Biomedical Engineering

Senior Design Projects Conference

2022

May 6, 2022

Boston University Photonics Center

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Department of Biomedical Engineering

37th Annual
Senior Design Projects 2022

Department of Biomedical Engineering
Boston University College of Engineering
Conference Friday May 6, 2022

John H. White
Professor and Chair,
Department of Biomedical Engineering

Diane Joseph-McCarthy
Executive Director, BTEC
Professor of the Practice, BME

Darren Roblyer
Associate Professor, BME

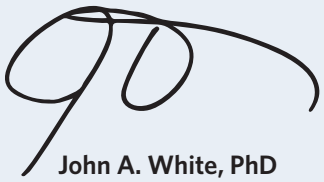
WELCOME FROM THE CHAIR

It is my great pleasure to welcome our guests, our alumni, our industry representatives, our faculty and our students to **Boston University's 37th Annual Biomedical Engineering Senior Design Projects Conference.** This conference is an annual rite of passage for all BU BME seniors, and culminates our year-long Senior Design Project Program. Our Senior Design program is recognized as a national model for the capstone independent design and communication experience for BME undergraduates. To maintain our high standards while staying safe, this year's conference will be virtual with live presentations followed by interactive question-and-answer periods. Over the course of the day, our talented students will present their state-of-the-art designs through oral presentations, as they complete their BS degrees from one of the top Biomedical Engineering programs.

Biomedical Engineering synthesizes engineering, computation, math and physical sciences with the life sciences to advance our understanding of biology, physiology and the medical sciences. This knowledge is then leveraged to develop new devices and methods to improve healthcare, and accelerate cutting-edge research. Our ABET-accredited BS degree program in Biomedical Engineering is one of the oldest such programs in the country, and is designed to provide integrated training in life, physical, and engineering sciences as preparation for a variety of careers in bioengineering, applied biotechnology, and medicine. Engineering design is woven through each year of our curriculum. Earlier design courses complement the senior design experience and help us train the future leaders and innovators in biomedical engineering.

This year's senior design project program was directed by Professors **Diane Joseph-McCarthy** and **Darren Roblyer**. This team invested much energy and organizational skills to sustain the level of excellence and impact for which this program is renowned. They were assisted by a very talented team of technical advisors from Boston University, BU Medical and Dental Schools, the Harvard hospitals, and medtech, pharma, and biotech industries. These technical advisors met regularly with their teams to guide the work, and grade and comment on assignments including proposal drafts, progress reports, and oral presentations. Their efforts helped ensure that the program continues to sustain its high level of distinction. I served as part of this team and was fortunate to enjoy the program in all of its dimensions. We were able to increase our enagement with industry partners, including sponsors of the new Bioengineering Technology & Entrepreneurship Center (BTEC) at BU. Many students utilized the state-of-the-art BTEC facilities to carry out their design and experimentation. Interactions with industry were facilitated with the help of BU's General Counsel, Martin Oppenheimer. I also want to acknowledge the assistance of David Shawn, Adam Kane, and Carroll Beauvais from the BU Writing Program, as well as the six guest lecturers who educated students on topics ranging from professional development to intellectual property to entrepreneurship and regulatory affairs. Finally, a very special thank you to John Benducci for his sustained support of the Senior Design Program this year.

Our students are remarkable at rising to the challenge, and I have no doubt that their presentations today will impress, inform and entertain you. Enjoy!



John A. White, PhD
Professor and Chair, Department of Biomedical Engineering

Primary Faculty

IRVING J. BIGIO

Professor, Biomedical Engineering;
Electrical and Computer Engineering; Physics; Medicine

PhD, Physics, University of Michigan

Medical applications of optics, lasers and spectroscopy; biomedical optics and biophotonics; biomolecular dynamics; applied spectroscopy, especially to biomedical problems; nonlinear optics; quantum electronics and laser physics.

DAVID BOAS

Professor, Biomedical Engineering;
Electrical and Computer Engineering;
Director, Neurophotonics Center

PhD, Physics, University of Pennsylvania

Neurophotonics; biomedical optics; functional near infrared spectroscopy; microscopy methods; oxygen delivery and consumption; neuro-vascular coupling; physiological modeling.

CHRISTOPHER S. CHEN

Professor, Biomedical Engineering;
Director, Biological Design Center

MD, Harvard University; *PhD, Medical Engineering, MIT*

My laboratory seeks to understand how cells interact with their environment, and to use this knowledge to control cell function. In particular, we are studying the cooperation between adhesive, mechanical and biochemical signaling in the regulation of angiogenesis and stem cell biology.

JI-XIN CHENG

Professor, Biomedical Engineering;
Electrical and Computer Engineering; Chemistry; Physics;
Moustakas Chair Professor in Photonics and Optoelectronics

PhD, Chemical Physics, University of Science and Technology of China

Molecular spectroscopic imaging technologies; label-free microscopy; medical photonics; neurophotonics; cancer metabolism; photonics for infectious diseases.

BRIANNE CONNIZZO

Assistant Professor, Biomedical Engineering

PhD, Bioengineering, University of Pennsylvania

Aging, orthopaedic and soft tissues, mechanobiology, multiscale biomechanics, extracellular matrix assembly and remodeling.

EDWARD DAMIANO

Professor, Biomedical Engineering

PhD, Applied Mechanics, RPI

Integrated cellular and extracellular biomechanics; biofluid dynamics; microhemofluidics; microcirculation; vestibular biomechanics; non-Newtonian rheology; closed-loop blood-glucose regulation.

CHARLES DELISI

Metcalf Professor of Science and Engineering;
Dean Emeritus, College of Engineering

PhD, Physics, New York University

Developing and applying computational/mathematical methods, and high throughput experimental methods for inferring the structure and function of protein networks.

ALLISON M. DENNIS

Assistant Professor, Biomedical Engineering

PhD, Bioengineering, Georgia Institute of Technology

Nanobiotechnology; fluorescent biosensing; fluorescence resonance energy transfer (FRET); quantum dot chemistry; fluorescence microscopy; single molecule sensing/imaging.

ANNA DEVOR

Associate Professor, Biomedical Engineering

PhD, Hebrew University of Jerusalem, Israel

Cellular and systems-level neuroscience, microscopy, physiological underpinning of noninvasive imaging.

MARY DUNLOP

Associate Professor, Biomedical Engineering

PhD, Mechanical Engineering,
California Institute of Technology

Understanding how microorganisms use feedback to respond to changes in their environment, studying naturally occurring examples of feedback to understand their implications for survival in changing conditions, and engineering novel, synthetic feedback control systems.

MICHAEL ECONOMO

Assistant Professor, Biomedical Engineering

PhD, Biomedical Engineering, Boston University

Systems neuroscience, motor control, long-range neural circuits, computational neuroscience, neurotechnology.

SOLOMON EISENBERG

Professor, Biomedical Engineering;
Electrical and Computer Engineering;
Senior Associate Dean for Academic Programs,
College of Engineering

ScD, Electrical Engineering, MIT

Electrically mediated phenomena in tissues and biopolymers; cartilage biomechanics; computational modeling of electric field distributions in the human thorax and heart during defibrillation; transcranial magnetic stimulation.

JAMES GALAGAN

Professor, Biomedical Engineering;
Microbiology, BUSM

PhD, Computational Neuroscience, MIT

Biosensor Development, Computational Biology, Systems Biology, Genomics.

ALEXANDER GREEN

Assistant Professor, Biomedical Engineering

PhD, Materials Science and Engineering, Northwestern University

Synthetic biology, nucleic acid nanotechnology, low-cost diagnostics, nanomaterials.

MARK GRINSTAFF

Professor, Biomedical Engineering; Chemistry;
Director, Nanotechnology Innovation Center

PhD, Chemistry, University of Illinois Urbana-Champaign

Biomaterials; tissue engineering; drug delivery; macromolecular chemistry and engineering, self-assembly; nanodevices.

XUE HAN

Professor, Biomedical Engineering

PhD, Physiology, University of Wisconsin-Madison

Neurotechnology; optical neural modulation; optogenetics; neural prosthetics; neural network dynamics; brain rhythms; neurological and psychiatric diseases; cognition.

Primary Faculty Cont.

DIANE JOSEPH-MCCARTHY
Professor of the Practice,
Biomedical Engineering;
Executive Director, Bioengineering Technology & Entrepreneurship Center
PhD, Physical Chemistry, MIT

Chemical Biology, Biophysics, Computational Science, Drug Discovery & Development.

SIMON KASIF
Professor, Biomedical Engineering
PhD, Computer Science,
University of Maryland

Genomic systems biology, P4 medicine, wellness and disease prevention, medical bioinformatics, artificial intelligence, machine learning, high performance systems, reproducibility and science informatics.

AHMAD (MO) KHALIL
Associate Professor, Biomedical Engineering;
Associate Director, Biological Design Center
PhD, Mechanical Engineering, MIT

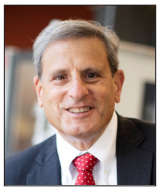
Synthetic & systems biology; gene regulation; protein aggregation; microbial communities; laboratory evolution.

CATHERINE KLAPPERICH
Professor, Biomedical Engineering;
Director, Precision Diagnostics Center;
PhD, Mechanical Engineering,
University of California, Berkeley

Design of new molecular diagnostics and appropriate technologies for healthcare.

LAURA LEWIS
Assistant Professor, Biomedical Engineering;
PhD, Neuroscience,
Massachusetts Institute of Technology

Brain imaging; neural dynamics; computational neuroscience and signal processing; neural circuits underlying sleep and attention; decoding and predicting brain activity; neurovascular coupling; psychiatric and neurodegenerative disorders.



KENNETH R. LUTCHEN
Professor, Biomedical Engineering;
Dean, College of Engineering
PhD, Biomedical Engineering, Case Western

Airway and lung tissue mechanics and ventilation; Computational modeling of structure-function relations in the lung; Mechanical ventilation; Integrated biomechanics of the lung; linear and nonlinear systems identification; blood-glucose regulation.

JEROME MERTZ
Professor, Biomedical Engineering; Physics
PhD, Physics, Université Paris VI and
University of California, Santa Barbara

Development and application of new optical microscopy techniques to biological imaging.

JOHN NGO
Assistant Professor, Biomedical Engineering
PhD, Biochemistry and Molecular Biophysics,
California Institute of Technology

Protein structure and engineering; molecular and cellular engineering; single-molecule biophysics; cell signaling; fluorescence and electron microscopy.

HADI T. NIA
Assistant Professor, Biomedical Engineering
PhD, Mechanical Engineering, MIT

Tumor microenvironment; physical sciences of cancer; intravital imaging and animal models of cancer; mechanobiology and biomechanics.

TIMOTHY O'SHEA
Assistant Professor, Biomedical Engineering
PhD, Medical Engineering and Medical Physics, MIT

Glia Engineering, Biomaterials, Neural Engineering, Spinal Cord Injury, Stroke, Glial neurobiology, regenerative medicine, cell transplantation.

ERICA D. PRATT
Assistant Professor, Biomedical Engineering
PhD, Biomedical Engineering, Cornell University

Engineering-focused cancer research, Liquid biopsy and rare cell detection, Multi-Omics in oncology, Microfluidics and microfabrication, Pancreatic Cancer

DARREN ROBLYER
Associate Professor, Biomedical Engineering
Director of PhD Program Admissions
PhD, Bioengineering, Rice University

Optical functional imaging; diffuse optics; near infrared spectroscopy; monitoring of emerging targeted and cytotoxic therapies in oncology; non-invasive monitoring of tumor metabolism.

KAMAL SEN
Associate Professor, Biomedical Engineering
Director of Master's Program Admissions
PhD, Physics, Brandeis University

Electrophysiological recording of neural responses in auditory processing; theoretical methods to characterize neuronal encoding; computational models of natural sound processing.

ALLYSON SGRO
Assistant Professor, Biomedical Engineering
PhD, Chemistry, University of Washington

Developing a quantitative and predictive understanding of how cells coordinate their behavior and organize themselves as part of collectives by directly controlling cellular behavior and signaling.

MICHAEL L. SMITH
Associate Professor, Biomedical Engineering
PhD, Biomedical Engineering,
University of Virginia

Cellular mechanotransduction through the extracellular matrix; fibronectin structural biology; and microfabricated surfaces for engineering cell function.

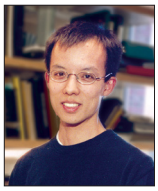
DIMITRIJE STAMENOVIĆ
Professor, Biomedical Engineering
PhD, Mechanics, University of Minnesota

Respiratory mechanics; cell mechanics; rheology of soft tissues; mechanics of foam-like structures.

Primary Faculty Cont.

BÉLA SUKI
Professor, Biomedical Engineering
PhD, Biomechanics, Jozsef Attila University, Szeged (Hungary)

Mechanical properties of living tissues; modeling the dynamic and nonlinear behavior of complex biological systems; pulmonary physiology.



JOE TIEN
Associate Professor, Biomedical Engineering
PhD, Physics, Harvard University

Vascularization of biomaterials; quantitative physiology of engineered tissues; biomaterials for microsurgical applications; lymphatics; interstitial transport; inverse problems in vascular imaging.

LUCIA M. VAINA
Professor, Biomedical Engineering; Neurology
PhD, Mathematical Logic, Sorbonne; Doctorat d'Etat ès Sciences and in Médecine (MD PhD); Institut National Toulouse, France

Behavioral, functional imaging (fMRI and MEG) and theoretical & computational approaches to study the neural basis and the plasticity of high-level visual functions in the human brain.

SANDOR VAJDA
Professor, Biomedical Engineering;
Director, Biomolecular Engineering Research Center
PhD, Chemistry, Hungarian Academy of Science

Scientific computing applied to problems in engineering, biochemistry, and biology, with focus on molecular mechanics, protein structure determination, protein-ligand interactions, docking, and drug design.

JOHN WHITE
Professor and Chair, Biomedical Engineering
PhD, Biomedical Engineering, Johns Hopkins University

Mechanisms of episodic memory; pathophysiology of epilepsy; computational neuroscience; design of real-time instrumentation; imaging of activity in neurons and astrocytes.

JOYCE WONG
Professor, Biomedical Engineering
PhD, Materials Science and Engineering, Program in Polymer Science and Technology, MIT

Biomaterials, tailoring cell-material interfaces for drug delivery and tissue engineering applications; direct, quantitative measurement of biological interactions.

WILSON WONG
Associate Professor, Biomedical Engineering
PhD, Chemical Engineering, UCLA

Synthetic and systems biology in immune cells.

MUHAMMAD ZAMAN
Professor and Vice Chair, Biomedical Engineering
PhD, Physical Chemistry University of Chicago

Comprehensive and quantitative approaches to develop a multiscale understanding of cell-matrix interactions for fundamental biological and applied clinical research.

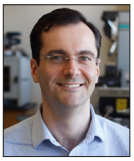
Lecturers

OUSAMA M. A'AMAR
Lecturer,
Biomedical Engineering
Ph.D., with Distinction, Electrical Engineering, The National Polytechnic Institute of Lorraine (INPL), France

EK131, EK210

XIN BROWN
Lecturer,
Biomedical Engineering;
Biointerface Technologies Facility Manager
PhD, Boston University School of Medicine

BE209, BE605, BE726, BE727



MARIO CABODI
Master Lecturer,
Biomedical Engineering
Director of Professional Master's Programs
PhD, Cornell University

BE694, BE695

ANDERSON (ICHUN) CHEN
Lecturer,
Biomedical Engineering;
Micro Nano Imaging Facility Manager
PhD, Applied Physics, Stevens Institute of Technology

BE517

WYNTER J. DUNCANSON
Lecturer,
Biomedical Engineering;
Assistant Dean of Outreach and Diversity
PhD, Biomedical Engineering, Boston University

BE465, BE466

ANDY FAN
Lecturer,
Biomedical Engineering
PhD, Electrical Engineering, MIT

BE403, EK103, BE601, BE601, BE603, BE604, Mathematical Methods for Biomedical Engineering

KAVON KARROBI
Lecturer,
Biomedical Engineering
BTEC Manager
Ph.D. Biomedical Engineering, Boston University

BE492, BE465, BE466

ALEKSANDRS ZOSULS
Instructor,
Biomedical Engineering
BS, Biomedical Engineering, Boston University

EK210, EK307, BE491, BE492

Research Faculty

ELIZABETH BARTOLAK-SUKI
Research Assistant Professor, Biomedical Engineering
MD, General Medicine, Szent-Gyorgyi Medical School, Szegred, Hungary; DSc, Molecular Cell biology, Semmelweis Medical School, Budapest, Hungary
Inter/intracellular signaling and molecular/ medical pathology.

DIMITRI BEGLOV
Research Assistant Professor, Biomedical Engineering
PhD, Molecular Biophysics, Moscow Physical and Technical Institute
Computational chemistry and biology; protein structure and function; computational characterization and prediction of biomolecular interactions.

AARON COLBY
Research Assistant Professor, Biomedical Engineering
PhD, Biomedical Engineering, Boston University
Developing novel delivery systems including nanoparticles and drug concentrating devices as tools for treating cancer.

AURELIE EDWARDS
Research Professor, Biomedical Engineering
PhD, Chemical Engineering, MIT
Developing mathematical models of water and solute transport in the kidney, at different scales, to address physiological and pathological questions.

JEROEN EYCKMANS
Research Assistant Professor, Biomedical Engineering
PhD, Medical Sciences, KULeuven, Leuven, Belgium
Tissue repair and regeneration, wound healing biomechanics, biomimetic tissue-on-chip models, skeletal organoid biology, reverse tissue engineering, fibrosis.

FERNANDO FERNANDEZ
Research Assistant Professor, Biomedical Engineering
PhD, Neuroscience, University of Calgary
Electrophysiology, biophysics and computational neuroscience; understanding the underlying mechanisms of neuronal electrical activity and its implications for synaptic integration and spike output modulation in cortical circuits.

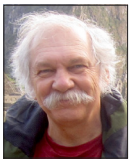
ODED GHITZA
Research Professor, Biomedical Engineering
PhD, Electrical Engineering, Tel Aviv Univ.
Formulation of cortical computation principles that underlie the speech decoding process and that are capable of predicting human performance in speech perception tasks.

DMYTRO KOZAKOV
Research Associate Professor, Biomedical Engineering
PhD, Biomedical Engineering, Boston Univ.
Development of protein-protein and protein-ligand docking algorithms, fast and efficient scoring functions for screening large number of potential docked complexes, protein homology models suitable for docking.

NESE LORTLAR-ÜNLÜ, MD
Visiting Research Associate Professor, Biomedical Engineering
MD, Hacettepe University, Ankara, Turkey
Optical characterization and nanophotonics.

BARBARA G. SHINN-CUNNINGHAM
Research Professor, Biomedical Engineering
PhD, EE and Computer Science, MIT
Auditory neuroscience - binaural and spatial hearing.

BRIAN SNYDER
Research Professor, Biomedical Engineering
MD and PhD, Biomechanics, University of Pennsylvania
Basic and applied research in musculoskeletal biomechanics, cellular processes, and gene expression.



THOMAS L. SZABO
Research Professor, Biomedical Engineering
PhD, Physics, University of Bath, UK
Medical imaging, diagnostic ultrasound, tissue characterization, transduction, biomedical signal processing, wave propagation, nonlinear acoustics.

MARTIN THUNEMANN
Research Assistant Professor, Biomedical Engineering
Eberhard-Karls-Universität Tübingen, Germany, Biochemistry, Dr. rer. nat.
Cellular and systems-level neuroscience, microscopy, electrophysiology, preclinical imaging.

MERYEM YUCEL
Research Assistant Professor, Biomedical Engineering
PhD, Biomedical Engineering, Boğaziçi University, Istanbul, Turkey
Functional neuroimaging (fNIRS, fMRI, EEG), fNIRS signal processing, cognitive neuroscience.

Emeritus

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tsmith@bu.edu

Adjunct Faculty

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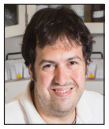
Adjunct Associate Professor, Biomedical Engineering; Associate Professor of Radiology, BUSM

JOSEPH LEHÁR, PHD
Adjunct Research Professor, Biomedical Engineering

JULIO COLLADO VIDES, PHD
Adjunct Research Professor, Biomedical Engineering

CHRISTINE MCBETH, PHD
Adjunct Research Assistant Professor, Biomedical Engineering

Affiliated Faculty



MICHAEL ALBRO, PHD
Assistant Professor,
Mechanical Engineering

MARGRIT BETKE, PHD
Professor,
College and Grad School of Arts & Sciences,
Computer Science

THOMAS BIFANO, PHD
Professor,
Mechanical Engineering;
Materials Science & Engineering;
Director, Photonics Center

DAVID BISHOP, PHD
Professor, Electrical and Computer Engineering; Physics; Materials Science & Engineering; Mechanical Engineering;
Head, Div. of Materials Science & Engineering;
Director, CELL-MET Engineering Research Ctr.

DAVID CENTER, MD
Professor of Pulmonary Medicine,
Medicine, and Biochemistry;
Chief of Allergy, Pulmonary and Critical Care Medicine
BUSM

CHANDRAMOULI CHANDRASEKARAN, PHD
Assistant Professor,
Anatomy & Neurobiology; Psychological and Brain Sciences; Center for Systems Neuroscience

JERRY CHEN, PHD
Assistant Professor,
Biology

CHRISTOPHER CONNOR, MD, PHD
Assistant Professor,
Anesthesiology
BUSM

QIANG CUI, PHD
Professor,
Chemistry

DOUGLAS DENSMORE, PHD
Professor,
Electrical and Computer Engineering

ANDREW EMILI, PHD
Professor,
Biology; Biochemistry;
Director, Center for Network Systems Biology

SHYAMSUNDER ERRAMILLI, PHD
Professor,
Physics

JEFFREY GAVORNIK, PHD
Associate Professor,
Biology

LEE GOLDSTEIN, MD, PHD
Associate Professor,
Psychiatry; Neurology; Opthalmology; Pathology and Laboratory Medicine
BUSM

FRANK GUENTHER, MS, PHD
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Sargent College,
Speech Language and Hearing Science

JAMES A. HAMILTON, PHD
Professor,
Physiology and Biophysics
BUSM

MICHAEL HASSELMO, PHD
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Biology;
Director, Center for Systems Neuroscience

LAERTIS IKONOMOU, PHD
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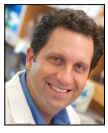
W. CLEMENT KARL, PHD
Professor,
Electrical and Computer Engineering

NANCY KOPELL, PHD
Professor,
Mathematics



DARRELL N. KOTTEN MD
Professor,
Medicine, BUSM
Director, Center for Regenerative Medicine

ANN MCKEE, MD
Professor,
Neurology & Pathology, BUSM

PANKAJ MEHTA, PHD
Professor,
Physics

ELISE F. MORGAN, PHD
Professor,
Mechanical Engineering

S. HAMID NAWAB, PHD
Professor,
Electrical and Computer Engineering

ELAINE O. NSOESIE, PHD
Assistant Professor,
School of Public Health

PIETER NOORDZIJ, MD
Professor,
Medicine
BUSM

GEORGE O'CONNOR, MD, MS
Professor,
Medicine
BUSM

IOANNIS PASCHALIDIS, PHD
Professor,
Electrical and Computer Engineering

TYLER PERRACHIONE, PHD
Associate Professor,
Sargent College: Speech, Language & Hearing Sciences

STEVE RAMIREZ, PHD
Assistant Professor,
Psychological & Brain Sciences

TOMMASO RANZANI, PHD
Assistant Professor,
Psychological & Brain Sciences
Assistant Professor,
Mechanical Engineering;
Materials Science & Engineering

ROBERT M. G. REINHART, PHD
Assistant Professor,
Psychological & Brain Sciences;
Director, Cognitive & Clinical Neuroscience Laboratory

MICHELLE SANDER, PHD
Associate Professor,
Electrical and Computer Engineering,
Materials Science & Engineering

BENJAMIN SCOTT, PHD
Assistant Professor,
Psychological and Brain Sciences

DANIEL SEGRÈ, PHD
Associate Professor,
Biology

Affiliated Faculty Cont.

SATISH K. SINGH, MD
Associate Professor, Gastroenterology BUSM

CARA STEPP, PHD
Professor, Sargent College, Speech, Language & Hearing Science

ROBERT A. STERN, PHD
Professor, Neurology, Neurosurgery, and Anatomy; Neurobiology BUSM

LEI TIAN, PHD
Assistant Professor, Electrical and Computer Engineering

M. SELIM ÜNLÜ, PHD
Professor, Electrical and Computer Engineering

ARTURO VEGAS, PHD
Assistant Professor, Chemistry

DAVID WAXMAN, PHD
Professor, Biology; BioInformatics; Medicine

ALICE WHITE, PHD
Professor and Chair, Mechanical Engineering

ZEBA WUNDERLICH, PHD
Assistant Professor, Biology

JI YI, PHD
Assistant Professor, Medicine BUSM

KATHERINE YANHANG ZHANG, PHD
Professor, Mechanical Engineering

XIN ZHANG, PHD
Professor, Mechanical Engineering; Electrical and Computer Engineering; Materials Science & Engineering

Postdocs

SENIOR POSTDOCTORAL ASSOCIATES

Afzal, Muhammad Imran *(Devor)*
Li, Huishan *(Wong W)*

POSTDOCTORAL ASSOCIATES

Alnahhas, Razan *(Dunlop)*
Andreadni, Virgile *(Dunlop)*
Angstman, James *(Khalil)*
Bays, Jennifer *(Chen)*
Beldzik, Ewa *(Lewis)*
Bowal, Kimberly *(Larkin)*
Cheng, Xiaojun *(Boas)*
Chiesa, Guilio *(Khalil)*
Ching, Meining Carley *(Zaman)*
Drain, Allison *(Chen)*
Fomin-Thunmann, Natalie *(Devor)*
Frostig, Hadas *(Mertz)*
Gao, Yuanyua *(Boas)*
Hager, Emily *(Sgro)*
Herrmann, Jacob *(Suki)*
Jacob, Len *(Lewis)*
Jaswal, Rajneesh *(Galagan)*
Karrobi, Kavon *(Roblyer)*
Kays, Joshua *(Dennis)*
Kinstlinger, Ian *(Wong W)*
Klumpe, Heidi *(Chen)*
Kureli, Gulce *(Boas)*
Liang, Yong *(Wong W)*
Lowet, Eric *(Han)*
Lugagne, Jean-Baptiste *(Dunlop)*
McLellan, Micheal *(Chen)*
Moussa, Hagar *(Khalil)*
Moya, Maria *(Economo)*
Ngo, Mai *(Chen)*
Orubu, Ebiowei *(Zaman)*
Parate, Kshama *(Galagan)*
Pham, Thao *(Roblyer)*
Ravikumar, Arjun *(Khalil)*
Raymond, Michael *(Khalil)*
Ricci-Tam, Chiara *(Sgro)*
Ristori, Tomasso *(Chen)*
Rosenbohm, Justin *(Cobodi)*
Shaw, William *(Khalil)*
Sundaram, Subramanian (Chen)
Teo, Jessica *(Chen)*
Tierrafria, Victor *(Galagan)*
Uroz, Marina *(Chen)*
Vayisoglu, Tugberk *(Devor)*
Wong, Brandon *(Khalil)*

Research Staff

SENIOR RESEARCH SCIENTISTS

Desai, Darash *(Zaman)*
Finkelstein, Joshua *(Chen)*
Kim, Jae *(Vajda)*
Kilic, Kivilcim *(Devor)*

RESEARCH SCIENTISTS

Buczek-Thomas, Joann *(Wong, J)*
Jiang, John *(Boas)*
Kim, Sudong *(Chen)*
Kondabolu, Krishnakanth *(Han)*
Tseng, Hua-an *(Han)*
Xiao, Sheng *(Mertz)*
Zimmerman, Bernhard *(Boas)*

RESEARCH TECHNICIANS

Charles, Roger *(Galagan)*
Cheung, Cyrus *(Han)*
Diamandis, Zachary *(Lewis)*
Dubb, Jay *(Boas)*
Farzam, Parya *(Boas)*
Fuzail, Ahsan *(Zaman)*
Jadeja, Rohan *(Bigio)*
Kelleher-Tang, Laurie *(Chen)*
Kura, Sreekanth *(Boas)*
Lin, Wei *(Roblyer)*
Mlawer, Samuel *(Connizzo)*
Morales, Christian *(J Wong)*
Tucker, Stephen *(Boas)*
Williams, Stephanie *(Lewis)*
Yee, Jessica *(Lewis)*
Zimmerman, Dabriel *(Lewis)*
Zhou, Samuel *(Han)*

BIOENGINEERING TECHNOLOGY & ENTREPRENEURSHIP CENTER

AT BOSTON UNIVERSITY'S COLLEGE OF ENGINEERING

The Bioengineering Technology & Entrepreneurship Center (BTEC) is designed to transform education and innovation for bioengineering students through hands-on learning. BTEC is a 5000-square-foot, bioengineering "maker space" with a Molecular, Cellular, and Tissue Engineering Suite, a BioSensors and Instrumentation Suite, and the eClinicalWorks Digital and Predictive Medicine Design Suite.

BTEC advances corporate-academic partnerships which include industry-mentored student projects. These partnerships are realized through an extraordinary advisory board made up of leaders in the biotechnology, pharmaceutical, and medical technology industries. Board companies gain early insights into faculty research and activities while providing explicit input on educational program content at the consortium-level to best prepare students for the workforce.

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BU's Biomedical Engineering Department is among the largest of its kind in the US, and is home to numerous research labs:

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Biomedical Optical Technologies Laboratory (BOTLab)
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Brain and Vision Laboratory
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BU RESEARCH CENTERS

BU has six interdisciplinary **research centers** that are directed by BME faculty:

BDC

Biological Design Center

To rigorously understand life's design principles and re-engineer them to revolutionize our approach to addressing critical challenges in human health and the environment

BMERC

Biomolecular Engineering Research Center

Developing and applying computational methods for the analysis and design of structures, functions, interactions, regulation and evolution of biological macromolecules

CELL-MET

NSF Engineering Research Center in Cellular Metamaterials

Developing tissue-engineering principles to create scalable, low-cost technologies for growing clinically significant cardiac tissues from cell-level building blocks

BUnano

Nanotechnology Innovation Center

Where nanomaterials intersect medicine and energy through collaborative interdisciplinary research

NPC

Neurophotonics Center

Advancing our understanding and treatment of brain disorders through advanced optical science and photonic systems

PDC

Precision Diagnostics Center

Discovery, design and development and clinical translation of technology for disease screening and monitoring, treatment management and health maintenance

SENIOR DESIGN GUEST LECTURERS 2021-2022

Ray Han*, Managing Director, Accenture

Sarah Cardozo-Duncan, Consultant/Owner, Career Strategist

Thomas P. McNulty*, Counsel, Lando & Anastasi (**BTEC Sponsor**)

Colin Brenan, PhD, Founder/CEO, 1CellBiO/HiFiBiO

Nicole Wagner, PhD, CEO, LambdaVision

Roger White, President/Vice President, Phiama/Cerapedics

David Shawn, Associate Director for Writing in the Disciplines, Boston University

**BU Alum*

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Senior Design Projects Conference

2022

Conference Agenda

BU Department of Biomedical Engineering

Conference Agenda

May 6, 2022 9:30am - 4:30pm
Track 1 PHO 203 | Track 2 PHO 206
Reception to follow at the COM Lawn Tent

9:00 - 9:30 Continental Breakfast and Check-in **Atrium**

Track 1 - PHO 203

9:30 - 9:35 WELCOME Prof. Darren Roblyer

Affiliations not specified are BU BME

Session A

Neuroengineering 1 PHO 203

Session Chair: Prof. Anna Devor

10:35 - 11:00 Coffee Break **Atrium**

Session B

Neuroengineering 2 PHO 203

Session Chair: Prof. Laura Lewis

12:00 - 1:00 Lunch **Atrium**

Session C

Devices PHO 203

Session Chair: Prof. Irving Bigio

2:15 - 2:40 Coffee Break **Atrium**

Session D

Biomechanics **PHO 203**

Session Chair: Prof. Hadi Nia

Track 2 - PHO 206

9:30 - 9:35 WELCOME Prof. Diane Joseph-McCarthy

Session A

Nanoscience & Synthetic Biology PHO 206

Session Chair: Prof. Wilson Wong

10:35 - 11:00 Coffee Break **Atrium**

Session B

Apps & Diagnostics PHO 206

Session Chair: Prof. Erica Pratt

12:00 - 1:00 Lunch **Atrium**

Session C

Digital & Predictive Medicine **PHO 206**

Session Chair: Prof. Dimitrije Stamenovic

2:15 - 2:40 Coffee Break **Atrium**

Session D

Cell & Tissue Engineering **PHO 206**

Session Chair: Prof. Michael Smith

3:10 - 3:25 **Microfluidic Pump Optimizes Sample Transport In Integrated Bioreactor** 77
Team 28: Cassidy Balboa, Austin Cozzone, Kian Patton
Advisors: Nate Fullam (Bitome), Herb Ryan (Bitome)

3:25 - 3:40 **Breaking Barriers in Bioprinting** 78
Team 10: Thang Le, Tiffany Lukmantara
Advisors: Seung-Schik Yoo (BWH & Harvard Medical School), Kavin Kowsari (BWH & Harvard Medical School)

3:40 - 3:55 **A Long-lived Organ-on-chip Model of the Human Vasculature** 79
Team 18: Tyler Crawford, Krishna Kotak, Vien Tran
Advisors: Robert Gaibler (Draper), Corin Williams (Draper)

3:55 - 4:30 Awards and Closing Remarks **PHO 206**
Prof. Diane Joseph-McCarthy, Prof. Darren Roblyer, Prof. John White

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Projects Previously Presented

Projects containing confidential information (private presentations)

Development of a Dynamic Cushioning System with Continuous Piezoresistive Sensor Feedback for Pressure Injury Prevention and Treatment
Team 12: Harin Lee, Irving Li (ME), Jessica Man (ME), Dhvanil Nanshah, Cooper Shifrin
INTERDISCIPLINARY
Advisor: Paul Barbone (BU ME/MSE)

Attachable Intraoral Camera for Dental Handpieces
Team 13: Isabelle Goode, Megan Lee, Avani Sheth, Rishi Vaidya
Advisors: Roxana Hashemian (BU Goldman School of Dental Medicine & Prep Eye, LLC), Kavon Karrobi

Improving Management, Detection, and Treatment of Iron-Deficiency Anemia With Rapid, Portable, and Affordable Next-Generation Point-of-Care Diagnostic Technology 83
Team 27: Andrew Chan, Parth Jalihal, Sahil Mohanty, Rohun Yarala
Advisors: Heather Fraser (Synthera Health), Javier Fernandez-Juarez (Synthera Health), Preeti Putcha (Synthera Health)

Characterization of a Subcutaneous Bleb model 84
Team 29: Jordan Barker, Thomas Settelmayer
Advisor: Edward Tang (Takeda Pharmaceuticals)

Perfect Pessary
Team 32: Lauren Caruso, Tiana Jazirian, Hayden Myers
Advisors: Mallika Anand (BIDMC), Ara Nazarian (BIDMC & Harvard Medical School)

Implantable Microdevice for Drug Efficacy Testing in Tumors 85
Team 35: Samantha Downing, Rebecca Janes, Maria Merhej
Advisors: Oliver Jonas (BWH & Harvard Medical School), Kyle Deans (BWH), Sebastian Ahn (BWH), Sharath Bhagavtula (BWH)

Microneedle Blood Draw Device for Point-of-Care Anemia Diagnostic Test
Team 39: Garrett Greaves, Safin Rouf, William Swift
Advisors: Heather Fraser (Synthera Health), Javier Fernandez-Juarez (Synthera Health), Preeti Putcha (Synthera Health)

Track 1

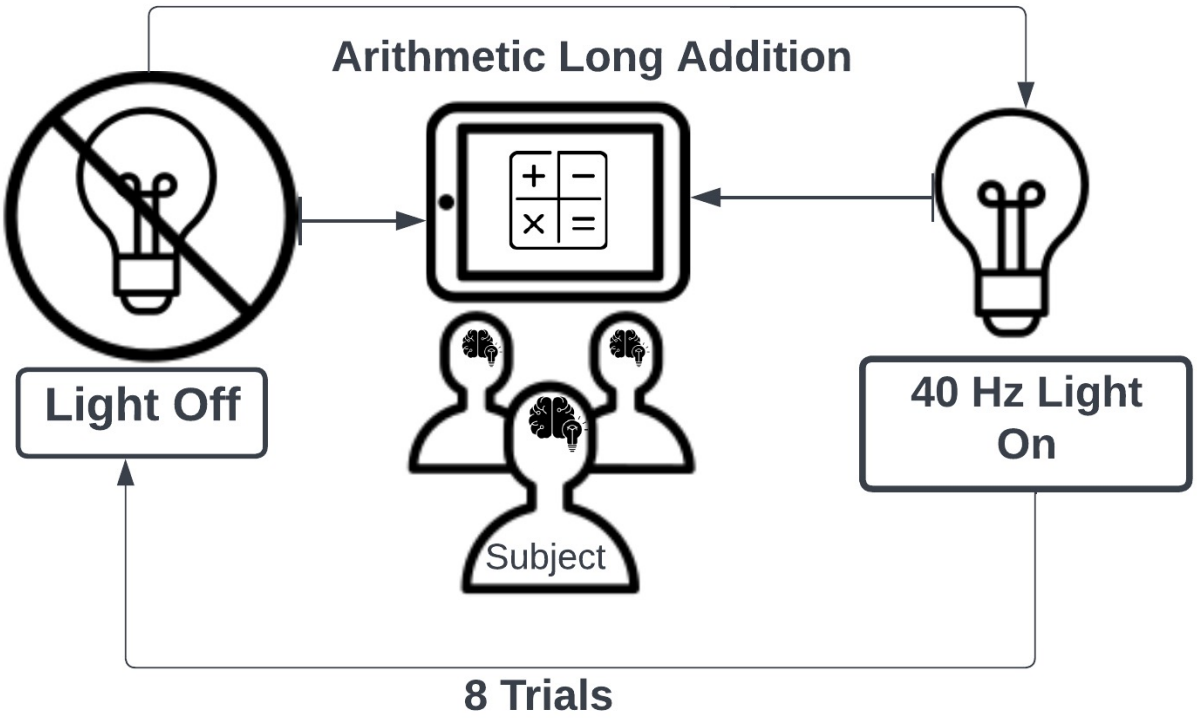
Session A

Neuroengineering 1

40 Hz Light Enhancement Study

Team 19: **Noah Abrha, Anton Homenuik, Eden Gideon, Jed Lartey, Medua Nwokolo**
Technical Advisor: **Andrey Vyshedskiy (ImagiRation, LLC & BU MET)**

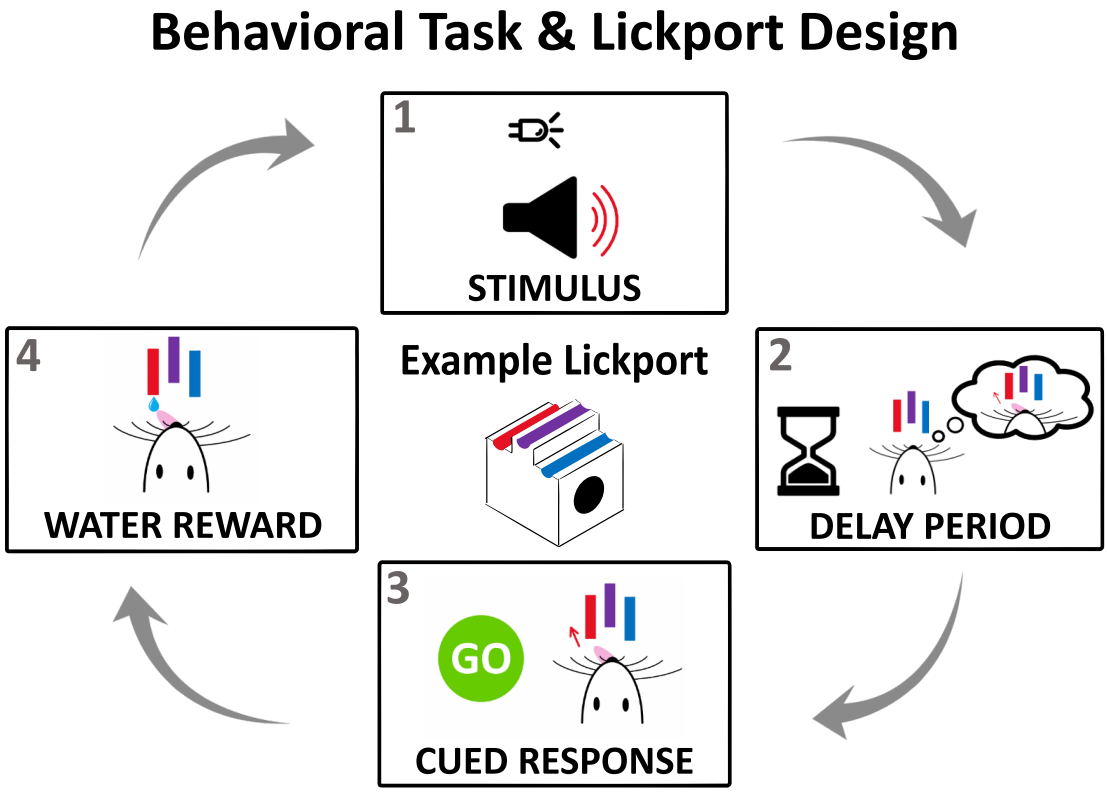
Cognitive impairment affects over 16 million people in the US. The current gold standards of treatment for most cognition impairing conditions are prescribed psychostimulants. These medications come with multiple side effects and leave room for misuse leading to addiction and pose other health risks. An alternative non-intrusive, safe, and accessible method of improving cognitive performance can contribute to solving this problem. The brain produces electrical activities, known as gamma waves, which are essential for processing and connecting information. Light delivered at 40 flashes per second has been shown to restart the natural 40Hz gamma rhythm of the brain. These gamma waves are associated with memory and cognition, which are affected as a result of cognitive impairments. We ran a study using 40 Hz light stimuli administered through an iPad pro. The participants consisted of a group of college students with conditions affecting their cognition or in a state of fatigue to closely resemble individuals with cognitive disabilities. Subjects were made to take a 10 question arithmetic long addition test with 40 Hz light constantly on or off to determine the effect of light on their performance. Our findings showed a jump in performance from the first trial to the second when light was administered. However, this was attributed to the effect of practice and not a consequence of the 40 Hz light. Although, there has been an overall trend of improvement across subjects, the results thus far show no statistical significance in the effect of 40 Hz light on cognition.



Development of Behavioral Task to Study Motor Control in Mice

Team 20: **Antoine Baize, Rachel Ferrigno, Sydney Holder, Zenia Valdiviezo**
Technical Advisors: **Michael Economo, Munib Hasnain**

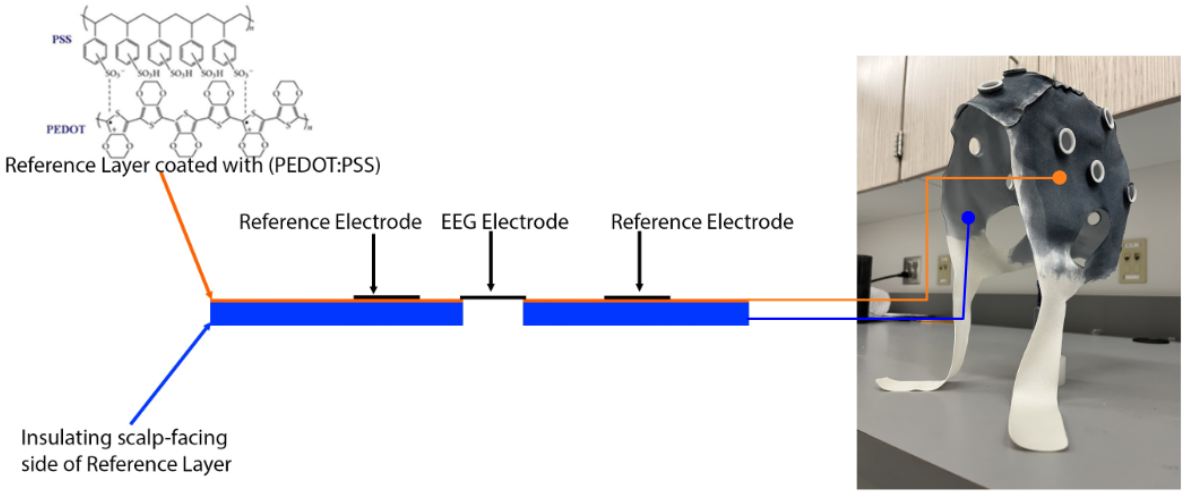
The motor cortex of the brain has been shown to exhibit preparatory, or planning, activity before the execution of a movement. However, much is still unknown about the selective activation of regions of the brain corresponding to motor planning and motor execution. Current motor control studies that observe preparatory signals in the anterolateral motor cortex (ALM) in mice are constrained by a two-directional task paradigm (2AFC) in which a mouse licks one of two lick-sites for a water reward. Implementing a delay period in a 2AFC task allows for the isolation of the preparation and execution activity signals associated with distinct movements. We aimed to expand this paradigm by designing a new task in which mice will be trained to plan three directional movements (right-lick, left-lick, or center-lick) based on unique instructional tones and an enforced delay period. Central to our task was the design of a "lickport" to house the three straws that the mouse licks as the motor task. We tested the feasibility of each lickport design by determining whether the mouse could lick each site individually (i.e. they were not too close or too far apart). We also explored the selection and placement of speakers and LEDs as auditory and visual cues within our task. In the future, the mice trained to perform this task will exhibit an increased number of unique directional licking movements in the experiment. This will allow more complex neural activity patterns to be studied and may eventually expose more spatial and temporal correlations between movement preparation and execution signals.



Optimization of Electroencephalography Reference Layer

Team 23: **Allan Garcia, Stefan Lütschg**
Technical Advisors: **Laura Lewis, Joshua Levitt**

Simultaneous Electroencephalography & Functional Magnetic Resonance Imaging, (EEG-fMRI), is a brain imaging technique that combines the high spatial resolution of fMRI with the high temporal resolution of EEG. However, the usage of magnets in fMRI induces electrical currents which are also picked up by the EEG scalp electrodes, this is an effect of Faraday's Law which creates electrical noise. Inside the magnetic field the cardiovascular system of the human skull also creates artifacts known as Ballistocardiogram (BCG) noise and this reduces the clarity of EEG data. Researchers try to remove these artifacts by designing and producing reference layers which consist of insulating and conductive pieces of fabric that collect BCG noise, allowing for the reduction of artifacts in post-hoc analysis. These Reference Layers tend to be crudely made to fit researchers' specific needs. In the Lewis Lab, we've created a standardized design for a double-sided Reference Cap, consisting of a single fabric that has holes cut out for EEG Scalp Electrodes. This fabric has an insulating spandex side that makes contact with the scalp and a nylon fabric side that makes contact with EEG Reference Electrodes. This nylon fabric is coated in poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS), an electrically conductive polymer that is safe for usage in MRI machines. With this design, we are able to provide a design that is easy to replicate and assemble in any lab. This design functions well as a reference layer, allowing researchers to attenuate noise found during EEG-fMRI imaging.

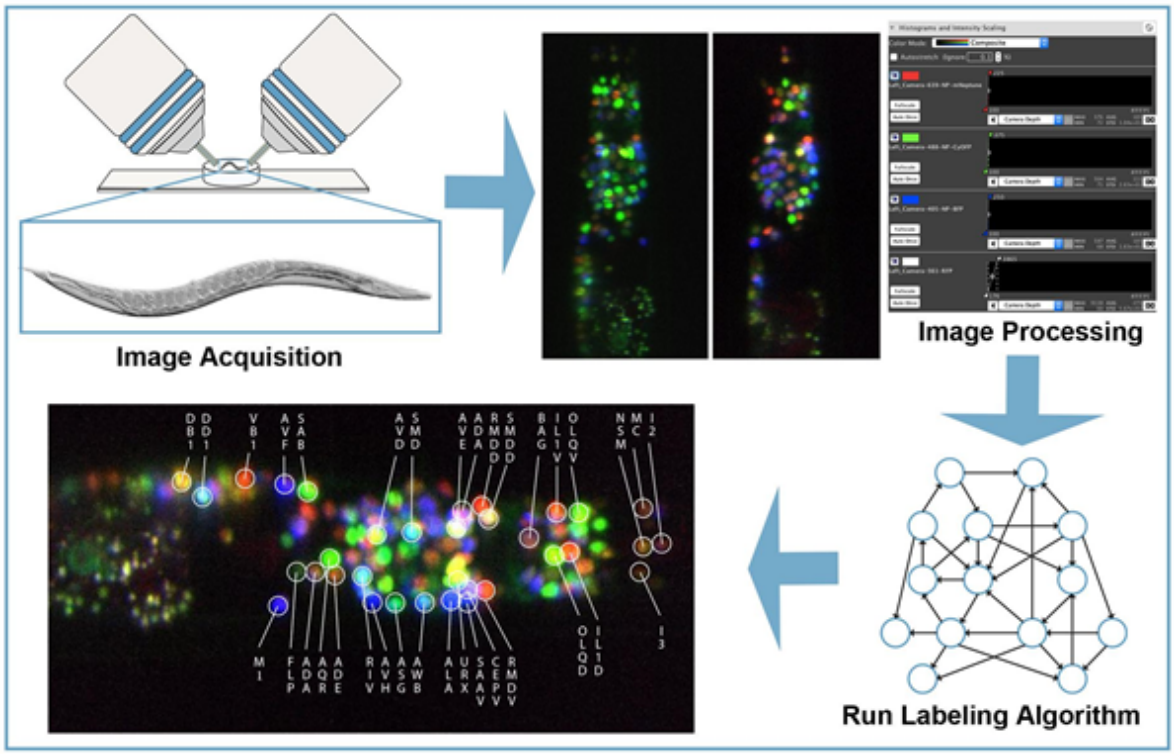


Computer Automated Neuron Identification in Functional Microscopy for *C. elegans*

Team 34: **Jun Young Choi, Laura Mazuera**

Technical Advisors: **Andrew Chang (BU School of Medicine), Christopher Connor (BWH & BU School of Medicine), Christopher Gabel (BU School of Medicine)**

Current neuroimaging techniques are capable of capturing real-time neuronal activities, indicating areas of neuronal stimulation. However, state-of-art microscopes have compromised resolution, capturing the average neuronal activities of thousands of neurons in a single voxel. Due to this resolution limitation, the activities and interactions between individual neurons can only be inferred. To overcome the limitation, we have chosen hermaphrodite C. elegans with GCaMP and NeuroPAL transgene as our specimen. Hermaphrodite C. elegans' neuronal system consists of stereotyped 302 neurons. The GCaMP transgene allows for fluorescence in response to calcium levels, which serves as a proxy of neuronal activity. Calcium levels alone are insufficient to map individual neuronal activity because each neuron is susceptible to positional changes. To accurately locate individual neurons, neuroPAL transgene is implemented. NeuroPAL transgene is designed to characterize neurons with a unique fluorescence color, providing a means to differentiate neurons by its fluorescence coupled with approximate location. To accurately capture the positional and fluorescence data, images are acquired with Dual Inverted Selective Plane Illumination Microscope (DiSPIM). DiSPIM microscope has isotropic resolution, compared to the conventional confocal microscope which has compromised z-direction resolution. The acquired images are then processed with an automatic neuron labeling algorithm that labels each neuron with the be both position and color. Altogether, this algorithm allows tracing neuronal activity of individual neurons in real-time, which can be utilized to examine the effect of various stimuli on neuronal activity and interactions in a single neuron resolution.



Track 1

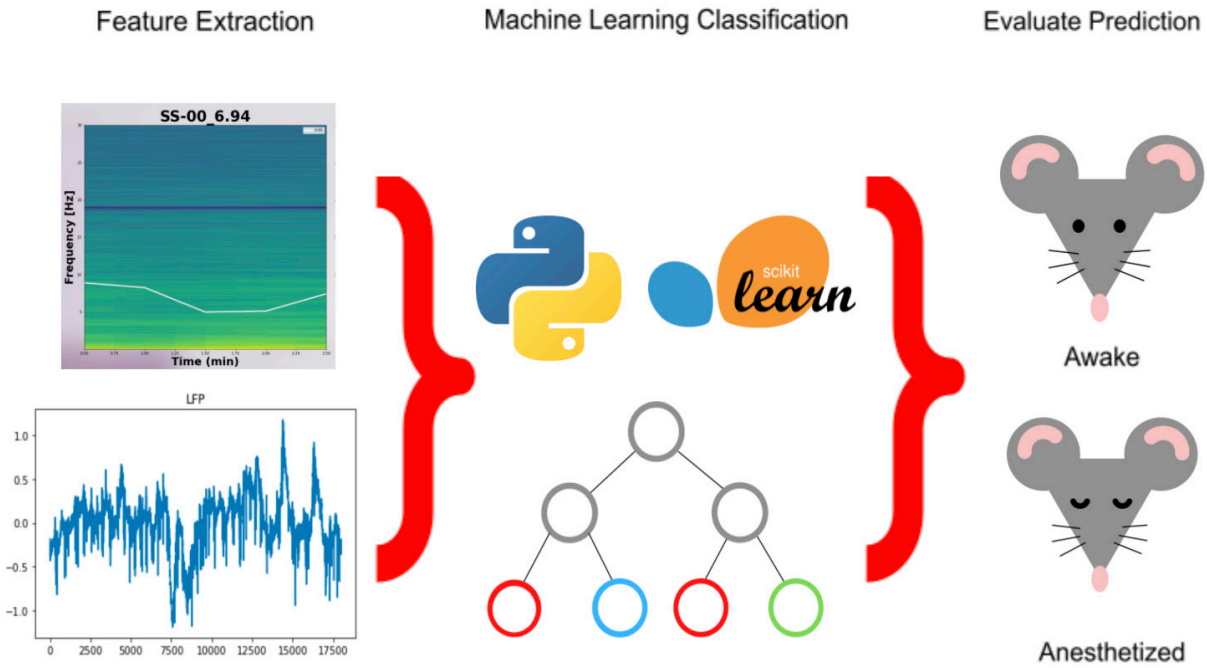
Session B

Neuroengineering 2

A Classifier for Predicting Depth of Anesthesia Using Multimodal Cortical Recordings

Team 1: **Vian Ambar Agustono, Elisa Cordeiro Lopes**
Technical Advisors: **John A. White, Daniel Carbonero, Jad Noueihed**

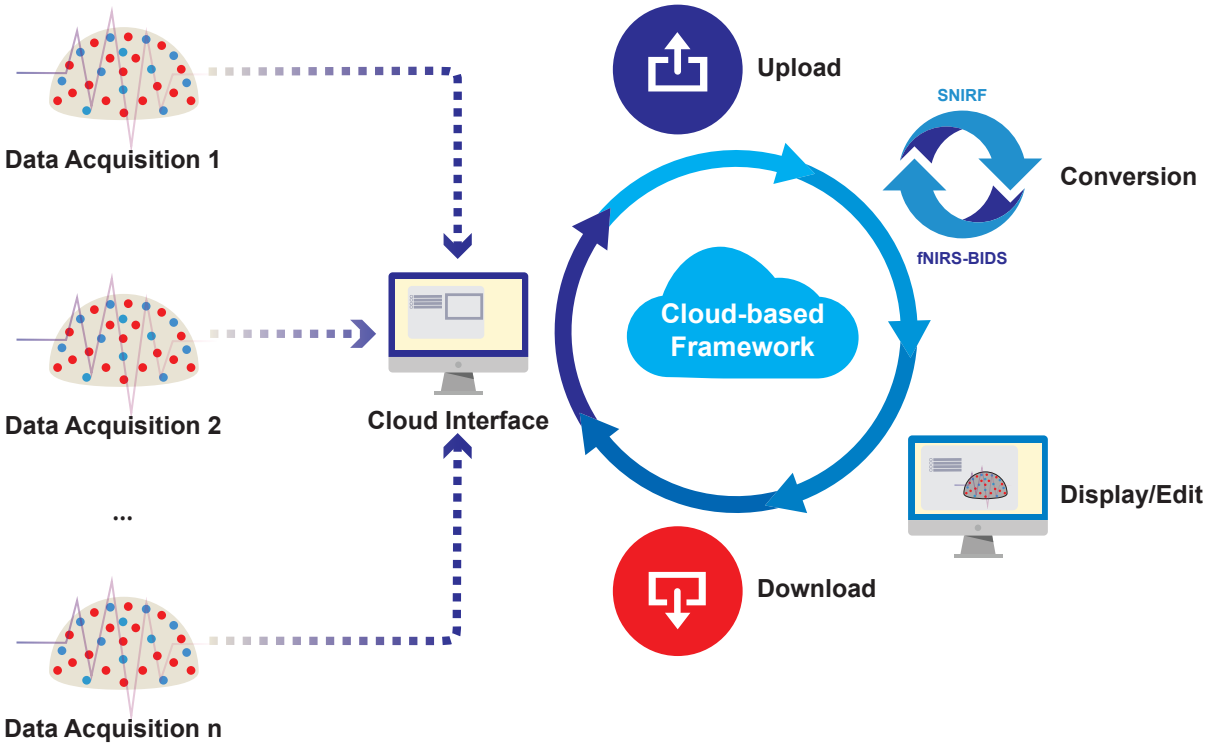
Anesthetics are widely used in modern medicine to induce loss of consciousness and henceforth allow painless performance of medical procedures that would be otherwise unbearable. Therefore, anesthetics have proven useful for surgeries and invasive clinical procedures in all populations. Because anesthetic response is not uniform across patients, it's crucial to have an objective measure of depth, other than behavioral response Empirical measurements of anesthetic depth are difficult to take and are sometimes unavailable altogether. Hence, we propose a machine learning classifier to discern the level of anesthesia in mice using local field potential (LFP) and two-photon calcium imaging recordings. The voltage recordings are automatically preprocessed to extract burst suppression activity, as well as filter and identify artifacts. Recurrence rate and burst suppression rate are features chosen to characterize the nonlinear nature of burst suppression events which occur only in the anesthetized state. When a subject is anesthetized, neuronal signals shift in power from high to low frequencies, which is quantified as a feature by spectral edge frequency. These features were used in two classification models: random forest and support vector machine. The former is robust, flexible and offers greater accuracy due to its collection of prediction trees, while the latter is versatile and matches with the brain because the brain is highly nonlinear. We cross validate both models, to demonstrate both classification models are effective at predicting the depth of anesthesia in mice.



A Cloud-Based Framework for Organizing and Analyzing fNIRS Datasets

Team 3: **Christian Arthur, Jeonghoon Choi, Jiazhen Liu, Juncheng Zhang**
Technical Advisors: **David Boas, Stephen Tucker**

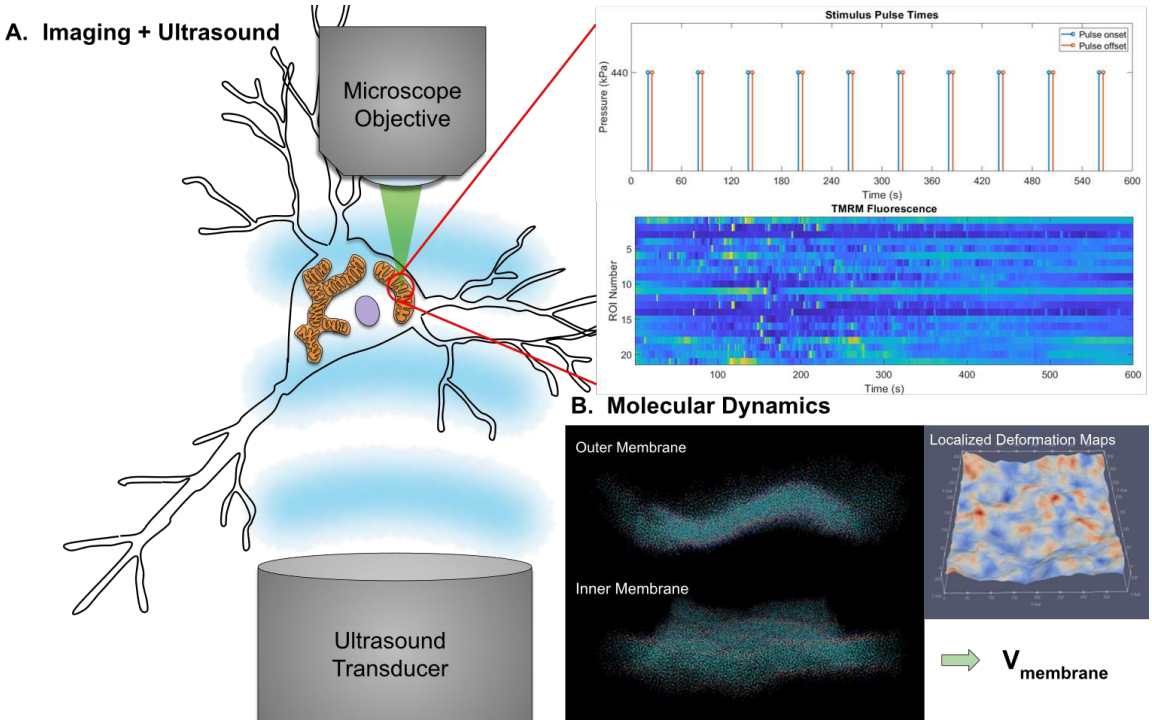
Functional near-infrared spectroscopy (fNIRS) is a fast, safe and non-invasive neuroimaging technique that uses interaction between light and matter to study the brain and neural activity. Currently, fNIRS researchers use various available databases to store and share the data. In this project, we propose a cloud-based user interface that helps users in organizing their data and sharing methods in a standardized format. This framework utilizes a proposed fNIRS-BIDS data structure based on the Brain Imaging Data Structure (BIDS). This project includes the design and development of a front-end user interface along with the back-end Python packages for handling shared near infrared spectroscopy format (SNIRF) file and fNIRS-BIDS folders to be used in the cloud-based framework. A mock-up is developed with Figma to illustrate the functionalities and the accessibility of the user interface. The mock-up and the package is passed to BU Software & Application Innovation Lab for prototyping. The Python packages were thoroughly reviewed and currently maintained by the software engineers in the BU Neurophotonics Center. This development process provides grounds for implementing the standardized folder structure and processing pipelines that direct users in organizing their fNIRS datasets. Furthermore, this provides the foundation for implementation such as incorporating data quality metrics for immediate data feedback for the users. The long-term goal is to establish a standard platform that facilitates data sharing and quality assurance for fNIRS users.



Investigating the Bioenergetic and Biophysical Effect of Ultrasound on Neural Mitochondrial Activity

Team 7: **John Rim, Rockwell Tang**
Technical Advisors: **Xue Han, Emma Bortz, Yangyang Wang**

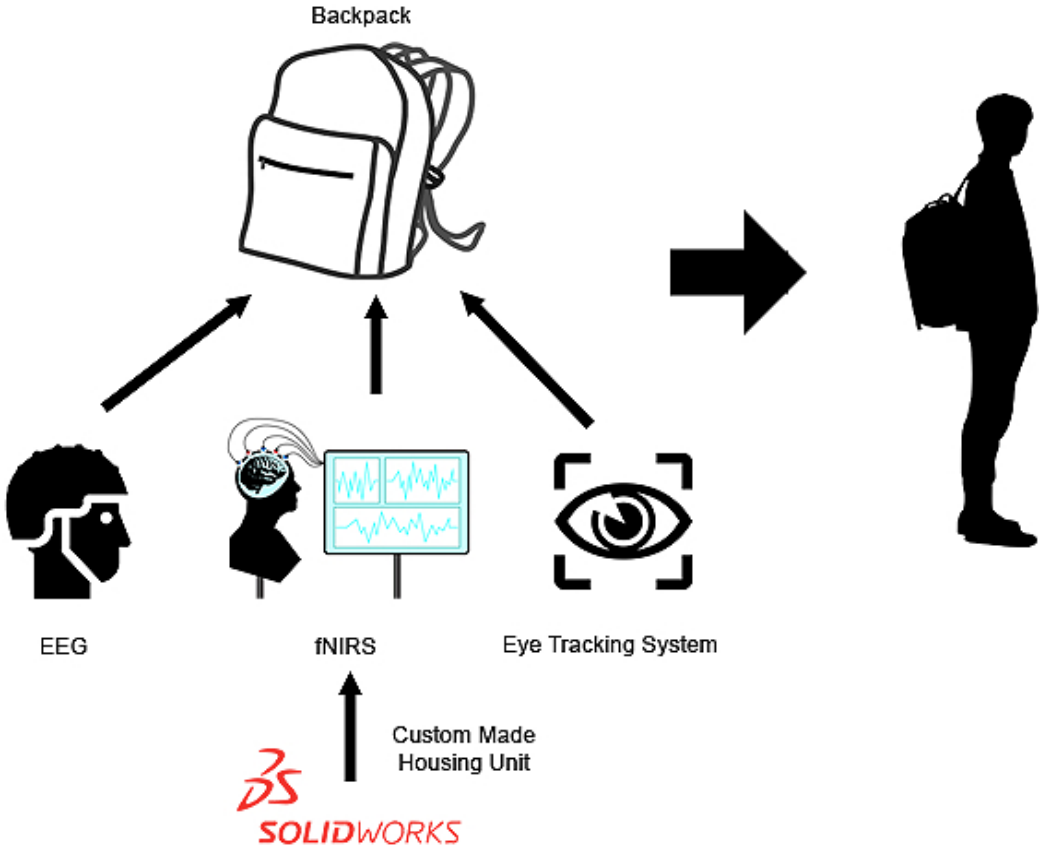
Ultrasound neuromodulation is an emerging technique in the field of neuroengineering which uses acoustic pressure waves to control neural activity. Ultrasound stimulation is unique in its ability to pass through the cranium and deep tissue noninvasively, showing promise in clinical applications as a therapy for neurodegenerative diseases. Despite studies implicating mitochondria in the neural response to ultrasound, the role of mitochondrial activity in ultrasound neuromodulation have not been fully explored. Therefore, there is a critical need to determine the bioenergetic effects and biophysical mechanisms of ultrasound on neuronal mitochondria. The implication of a mitochondrial transduction pathway in ultrasound neuromodulation would broaden understanding of both the neuron's response to mechanical stimulation and neural activity energetics, further enabling its use as an investigative tool and expansion of its clinical potential. First, an in vitro confocal imaging protocol was developed to quantify bioenergetic activity using the mitochondrial inner membrane-targeted voltage dye TMRM. A specimen setup was designed to enable simultaneous imaging and ultrasound stimulation. Then, the dynamics of the voltage gradient driving ATP production under spontaneous and pulsed ultrasound conditions were compared to assess the effects of stimulation. Finally, the biophysical interaction between ultrasound and the mitochondrial membrane was modeled in silico via molecular dynamics simulations, and membrane voltage changes were derived from the simulated deformations to be validated against empirical data. These results evaluate an alternate pathway for ultrasound transduction via the mitochondria and the possibility for bioenergetic uses of ultrasound stimulation.



NinjaNIRS 2022 Backpack System

Team 8: **Robert Bing, Benjamin Lissner, Juan Luis Ugarte Nunez**
Technical Advisors: **David Boas, Walker J. O'Brien, Bernhard Zimmermann**

Brain monitoring devices like fNIRS and EEG offer valid approaches to monitor the cognitive states and activity of the brain. Moreover, it's been found that utilizing fNIRS and EEG in tandem creates a hybrid fiber system that attains greater success than each individually. However, use of this improved method has been limited by its lack of portability and inability of long-term continuous monitoring of brain activity during movement, perception, and social interaction in real time while in the real world. Therefore, we propose a multimodal portable brain monitoring system that incorporates fNIRS, EEG, and an Eye Tracking System into a lightweight backpack that can capture the data in real time. The case to house the fNIRS system was designed using the CAD software, SolidWorks. The purpose-built casing was created to accommodate a greater array of optodes and updates on the custom NinjaNIRS system. The backpack was designed such that it safely houses each system and is ergonomic towards the user. An interior composed such that it will secure systems from damage, while maintaining accessibility to components for easy troubleshooting and data collection. Upon finalization of the realized hybrid backpack system, it's within expectations that we'll have found and designed a prototype that best exemplifies desired traits for long duration real time clinical brain recordings. The device will open up a whole new field of experimentation and testing from which valuable data can be collected and analyzed.



Track 1

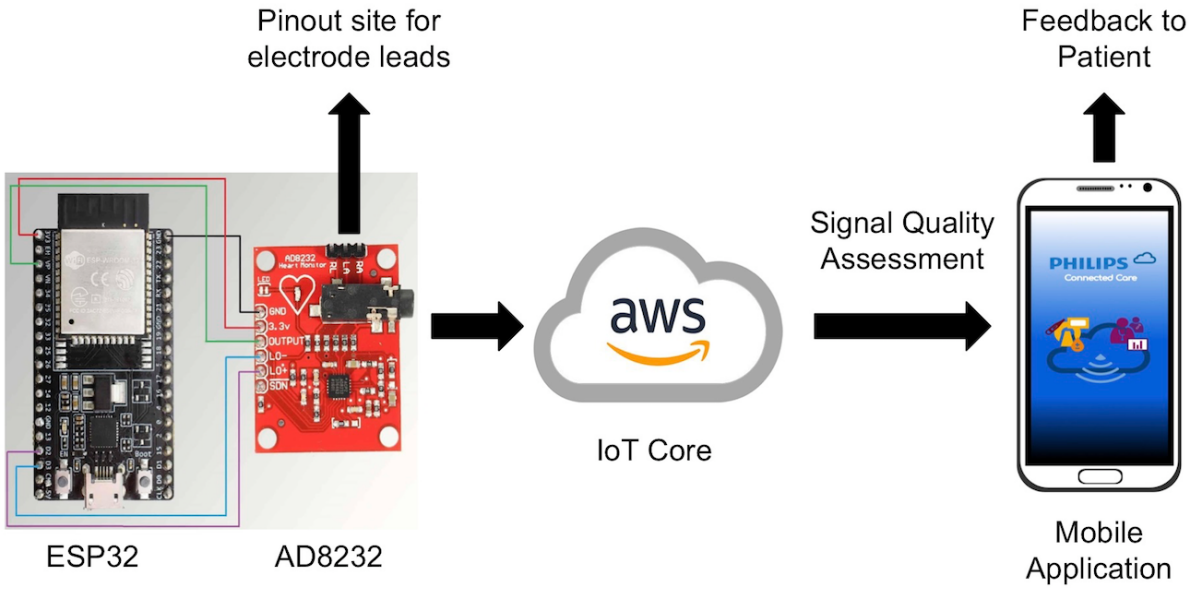
Session C

Devices

Developing an ECG Sensor and Smartphone Application to Monitor the Cardiac Health of Remote Patients

Team 21: **Rachael Chiao, Brian Jung, Jaspreet Momi, Dasha Veraksa**
Technical Advisor: **Edward Medri (Philips)**

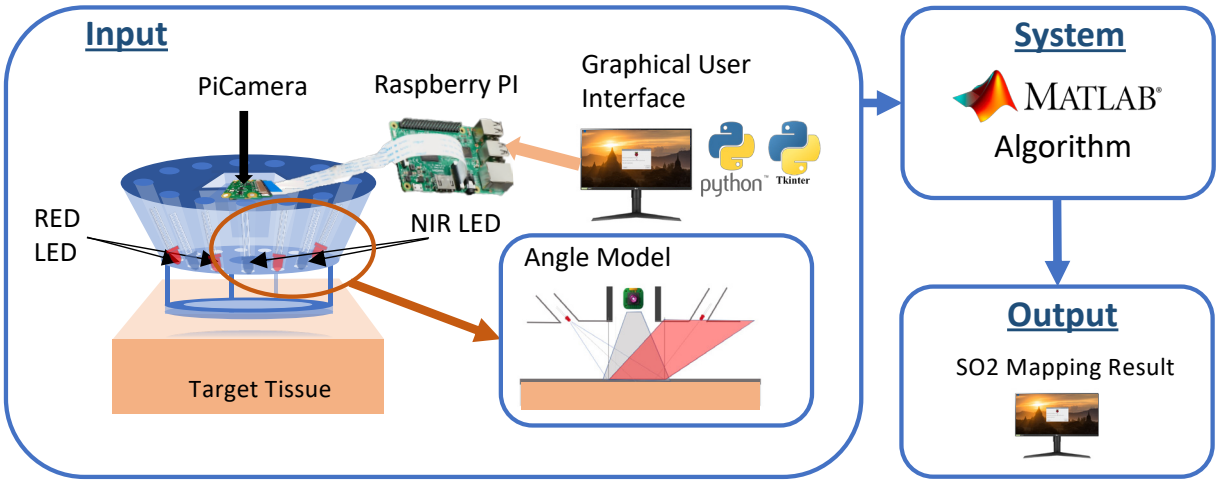
An electrocardiogram (ECG) is a method used to monitor the cardiac health of patients, but ECG is typically collected in the presence of a clinician. The primary goal of this project was to create an electrocardiogram (ECG) measurement device that is connected to a compatible software application, which can output data sufficiently accurate to be used for patient-administered medical monitoring in a remote setting. A 3-Lead ECG device was developed using an ESP32 microcontroller and an AD8232 module, which is an integrated signal conditioning block for ECG. In order to confirm the reliability of the device's collected signal, we compared it to verified ECG signals from the Physionet ECG database. An Arduino program was uploaded to the ESP32 that initializes data transmission. The ECG device communicates with the software application wirelessly by sending data through Amazon Web Services (AWS), a cloud-based computing service that can securely analyze, organize, and direct data to its final destination. In AWS, lambda functions were created based on previously researched Signal Quality Indices (SQIs) to categorize the signal as Excellent, Barely Acceptable, and Unacceptable. Depending on the signal's categorization, the smartphone application relays to the patient whether the ECG device needs to be adjusted and the signal recollected. ReactNative was utilized as the framework for the mobile application. Distinction of our approach and device design from competing devices on the market lie in our novel IoT cloud computing methods, real-time feedback to the patient about signal quality, and patient data encryption methods.



Multispectral 2D Imaging for Oxygen Saturation in Tumor Detection

Team 22: **Chengxi Fan, Yining Guo, Ziwen Xie**
Technical Advisors: **Ousama A'amar, Irving Bigio**

Tumors exhibit greater vascularization and lower blood oxygenation. Suspicious tumors may be detected by measuring the changes in oxygen saturation (SO2), noninvasively. In this project, we explore a method to perform 2D SO2 mapping of superficial human tissue. Oxygenated and deoxygenated hemoglobin exhibit distinctive reflection patterns of light in response to both red and near-infrared (NIR) wavelengths. Using a multispectral imaging technique, SO2 mapping of a region of interest (ROI) can be performed. Light from red and NIR LEDs is sequentially projected on tissue while short videos are automatically recorded. Frames are then isolated and processed at each illumination wavelength. LEDs are placed at a specific angle relative to the surface of the tissue so that the camera only captures reflected light that interacts with the targeted tissue. The frames are then analyzed with an algorithm that was designed to extract and process the light intensities frame by frame. Each frame is split into 10X10 pixels areas. The average intensity of each area is collected over time. Matching pixel coordinates are then used to produce SO2 maps. Both the device and the algorithm are validated by liquid phantoms that mimic the optical properties of oxygenated and deoxygenated tissues. Consequently, our product, utilizing 2D SO2 imaging technology, is capable of producing high-resolution images of SO2 mapping from targeted tissues based on the difference in vascularization.

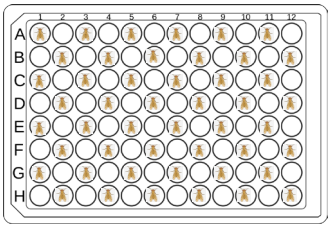


A Non-Invasive and Massively Parallel Imaging Device for Longitudinal Monitoring of Infection Progression in Fruit Flies

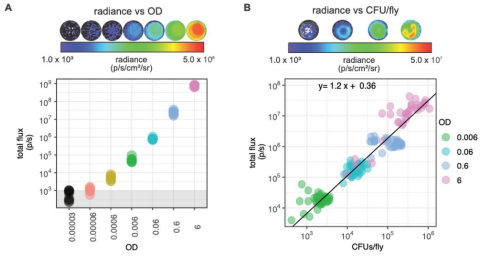
Team 38: **Beminet Desalegn, Joshua Monroy, Pablo Saucedo, Fetsum Tadesse**
Technical Advisor: **Zeba Wunderlich (BU Dept. of Biology)**

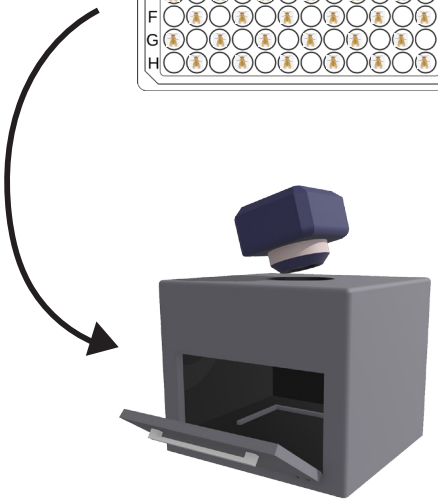
Practices such as in vivo bioluminescent imaging (BLi) are used to track disease progression in live subjects. Currently, most practices of bioluminescence imaging are performed on small mammals such as mice, although recent studies have shown that murine models do not accurately translate into human disease expression genes. Research shows Drosophila Melanogaster, otherwise known as the fruit fly, may be a better model for studying bacterial disease progression due to sharing approximately 75% of the disease expression genes humans have. Until recently, all tools used to characterize the infection in fruit fly models were destructive to either measure the bacterial pathogen load or host response. The Wunderlich Lab at Boston University is conducting research that combines bioluminescence disease tracking and the use of the fruit fly model to mitigate these limitations. A compact, cost effective, and robust bioluminescence imaging device will be prototyped. Through an iterative design process, the device will be capable of capturing raw data from bioluminescent injected fruit flies, process the data to determine pathogenic load in all fruit flies, and output a legible plot for visual aid. To correctly process the data, a team-scripted MATLAB code will be used for image processing to convert the number of photons to pathogenic load. Through longitudinal monitoring of induced diseases, research may uncover important turning points in disease development. Furthermore, this prototype is intended to make this research more feasible and accessible.

96-Well Plate Fruit Fly Configuration



Graphical Output of Logitudinal Pathogen Development





Prototyped Bioluminesense Imaging Device

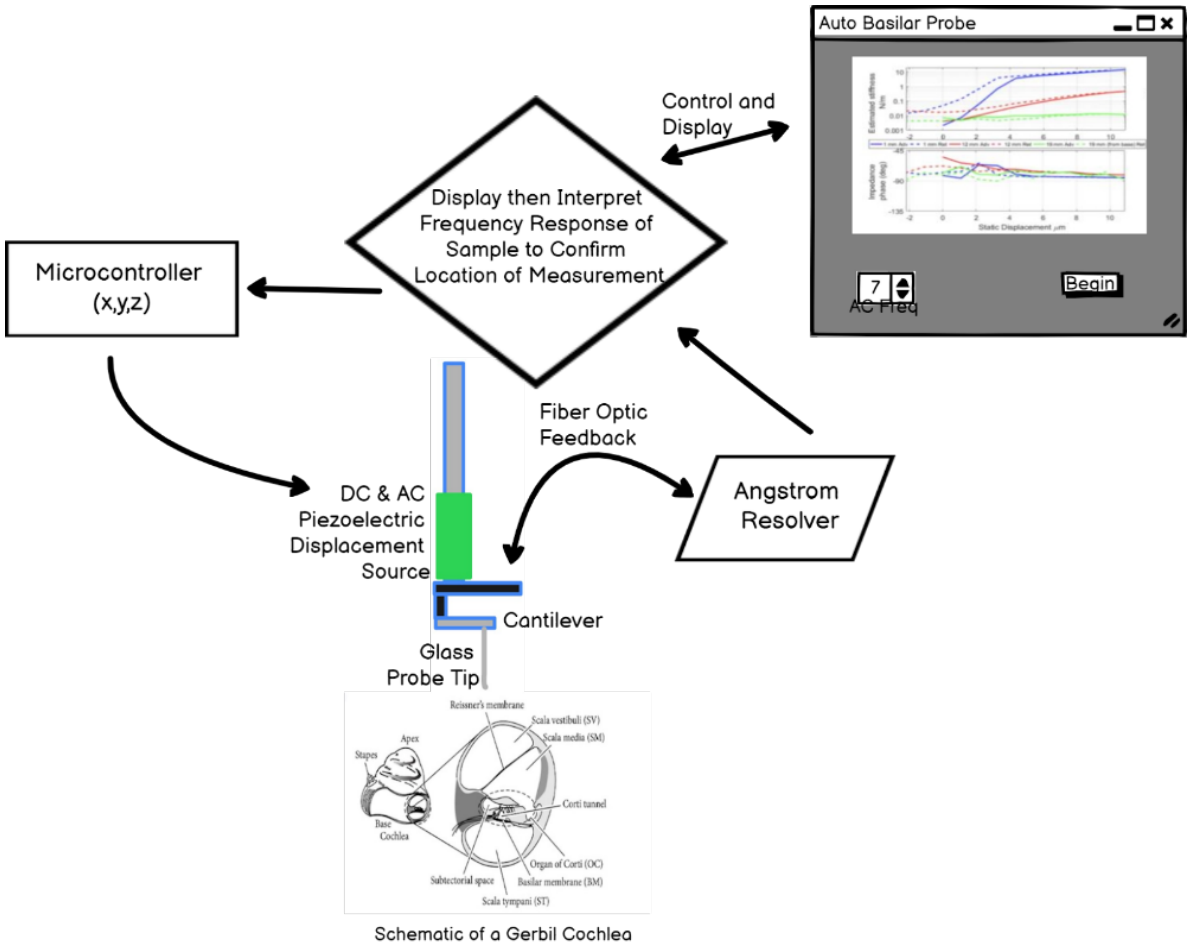
MATLAB®

Image Processing Software

Improving the Sensitivity and Automating the Basilar Membrane Probe

Team 41: **Andrew Gross, Jose Miguel Sevilla, Jasper Zeng**
Technical Advisor: **Aleks Zosuls**

Marine mammals rely on their hearing for spatial awareness, catching prey, and communicating. Interference from naval sonar disrupts their abilities to survive such as causing their eardrums to rupture which can result in them being stranded. The cochlea is a part of the inner ear which aids with hearing. Within it is the basilar membrane, a spiral shaped membrane which contains sensory receptors responsible for hearing. The stiffness of the membrane is what determines what frequencies it is sensitive to. To better understand this we have built a probe to measure the stiffness of the basilar membrane based on the design of a similar probe by Brian S. Miller et al. The main changes we have made to this design is to make the loading mechanism less stiff as well as automate it to increase the sensitivity of the probe and to optimize gathering of measurements. To determine the probe's performance, measurements were taken using the old probe and our improved probe on AFM beams of known stiffness to determine the accuracy of the probe. Measurements were also taken on gerbil membranes with both probes to determine the amount of time to take measurements. We believe a successful automated basilar probe will allow for a better understanding of what frequencies animals are sensitive to.

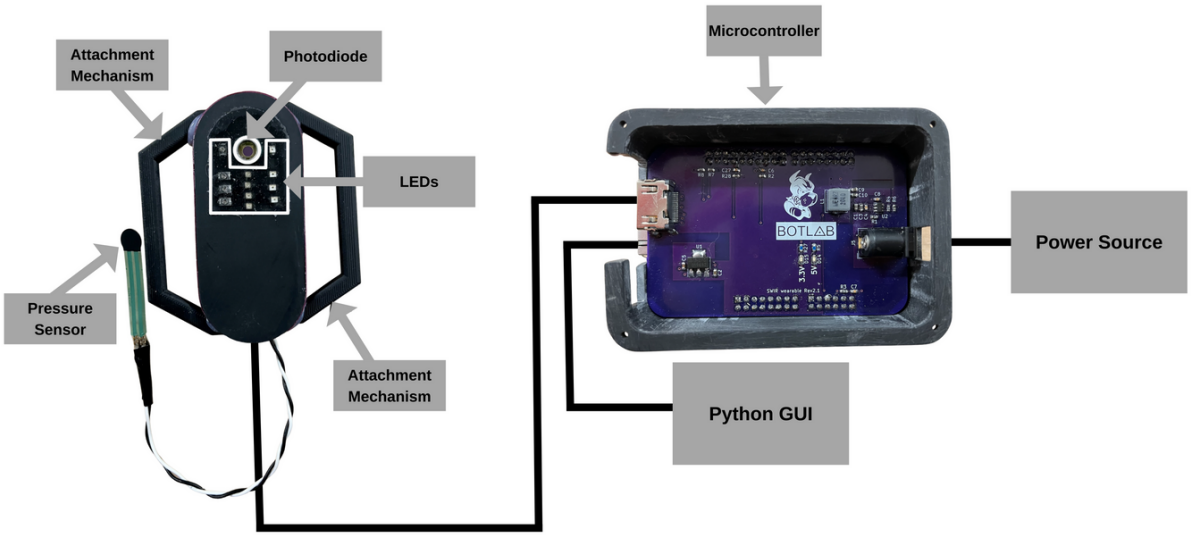


Schematic of a Gerbil Cochlea

NEPHRO: Novel Evaluative Probe for Hydration Real-Time Observation

Team 2: **Kylee Anders, Sabrina Franco, Jodee Frias, Olivia Claire Rose**
Technical Advisors: **Darren Roblyer, Samuel Spink, Anahita Pilvar, Lina Lin Wei**

Chronic kidney disease (CKD) affects more than 20 million Americans and is commonly treated with hemodialysis (HD), a treatment that replaces kidney function by removing excess fluid from the body. There is a need for a method to assess fluid volume in HD patients to ensure that fluid overload or depletion does not occur. Our goal is to demonstrate the feasibility of NEPHRO, a novel wearable short-wave infrared (SWIR) probe with an integrated pressure sensor, to quantify water and lipid composition in tissue in a non-invasive, direct, and computable way. Developments in SWIR technology enable a quantitative and non-intrusive way to image tissue with higher transparency and resolution than near-infrared spectroscopy (NIRs) imaging. The probe has LEDs of 980, 1200, and 1300 nm and source-detector separations (SDSs) of 7, 10, 13, and 16 mm. Light from the LEDs penetrate tissue and the photodiode measures the absorbance of the reflected light, which is then converted to an electrical current with a measurable voltage. The microcontroller connected to the photodiode stores the voltage measurements taken. We are investigating the relationship between the voltage signal and the concentration of water and lipid in a sample using tissue-mimicking phantoms and in vitro trials to determine the amount of excess fluid carried by a patient. Our integrated pressure sensor has allowed us to ensure that NEPHRO is making sufficient contact with the tissue. We hope that our device will be able to provide a personalized and precise measurement to improve patient care for HD patients.



Track 1

Session D

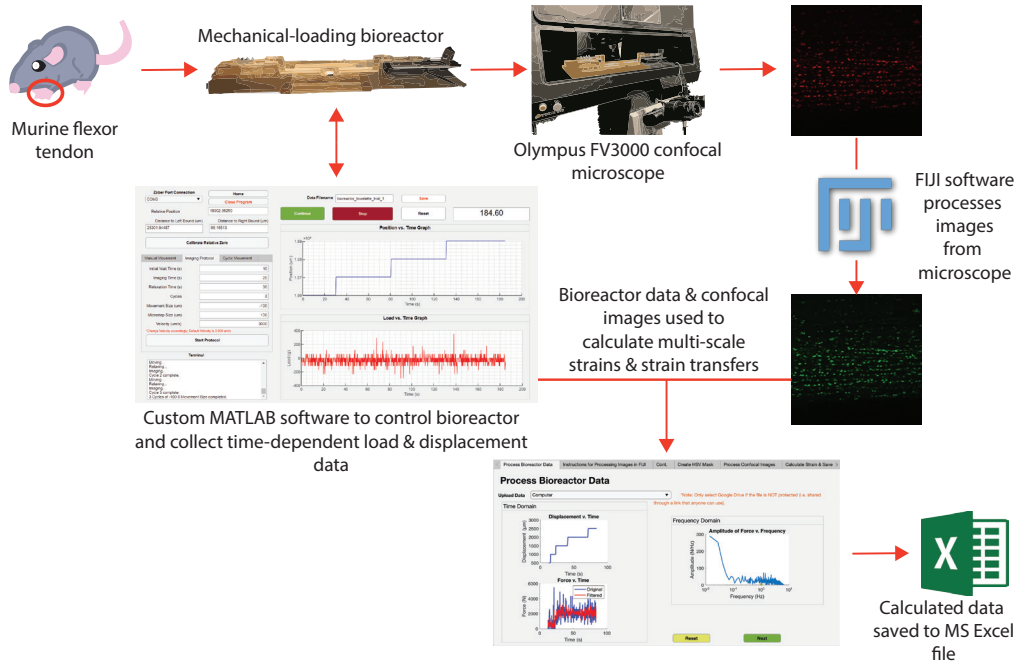
Biomechanics

Novel Method for Strain Transfer Research on Murine Flexor Tendons at Cellular Level

Team 26: **Gabriela Alba, Anushka Murti, Chi Chiu Victor Wong**
Technical Advisor: **Brianne Connizzo**

Tendinopathy is a highly prevalent clinical condition mainly caused by overuse or age-related degeneration of tissues. The transfer of strain from the ECM to the cell triggers extracellular matrix (ECM) remodeling. Therefore, a reduction in strain transfer could lead to a reduction in ECM remodeling and ultimately, tissue degeneration. A bioreactor with the capabilities of applying controlled loads and imaging loaded tissues would enable the study of strain transfer at the cellular level. The team inherited previously established hardware for a customized mechanical loading bioreactor, which has the potential to be used in conjunction with the Olympus FV3000 confocal microscope. The team developed two custom programs using MATLAB App Designer to control the bioreactor and analyze data. The control software performs customized experiments (Manual Movement, Imaging Protocol, and Cyclic Movement), provides real-time data of relative position of the slider and applied load on the sample, and saves data to an Excel file for further analysis. The data analysis software uses image processing and tissue-level displacement data to calculate multi-scale strains and strain transfers. Depending on the structure(s) stained in the confocal images, the software has the ability to calculate ECM-, cell-, and nucleus-level strains as well as strain transfers from tissue to ECM, ECM to cell, and cell to nucleus. Additionally, the team developed a research protocol for a future age-related experiment, which would allow Dr. Connizzo to observe strain transfer via simultaneous mechanical loading and fluorescence imaging on aged live murine flexor tendons.

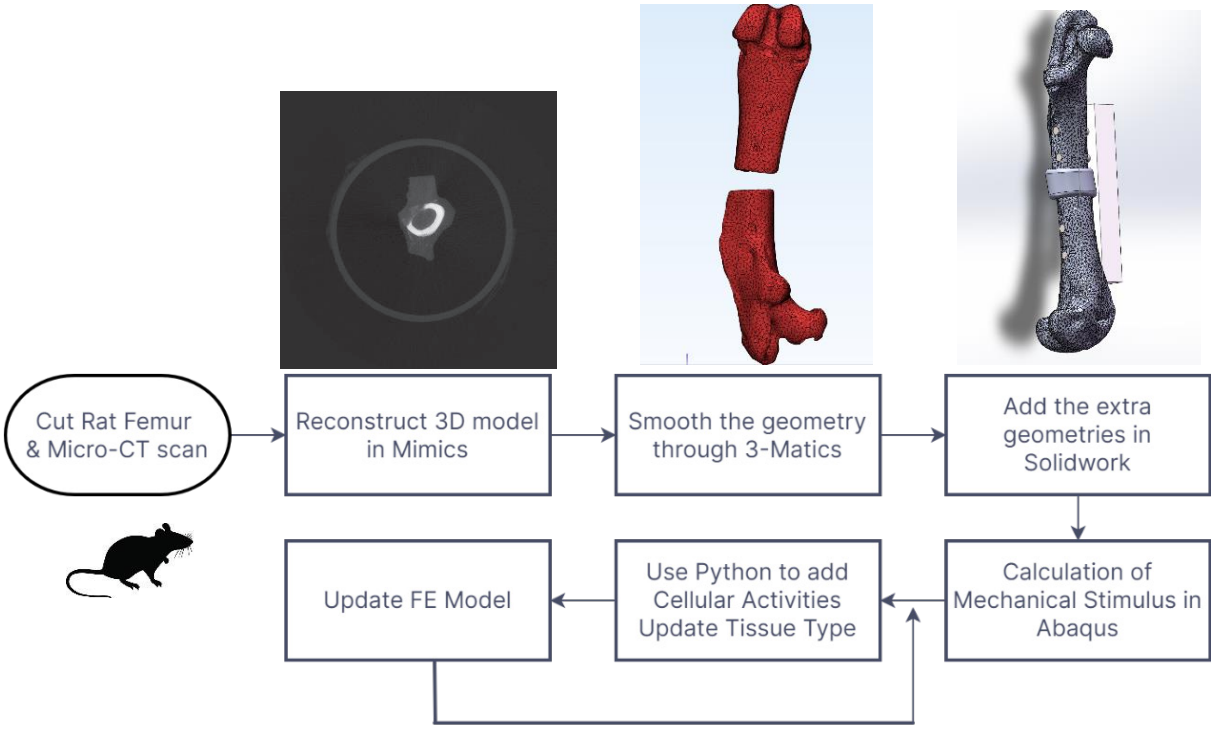
Research reported in this publication was supported by the Boston University Micro and Nano Imaging Facility and the Office of the Director, National Institutes of Health of the National Institutes of Health under award Number S10OD024993. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Health.



The Effect of Inflammatory Phase in Mechanobiological Modeling on Bone Fracture Healing

Team 30: **Zhuojian (Jamie) Jiang, Zakarey Sharif, Hanyu (Wendy) Wang**
Technical Advisor: **Ara Nazarian (BIDMC & Harvard Medical School))**

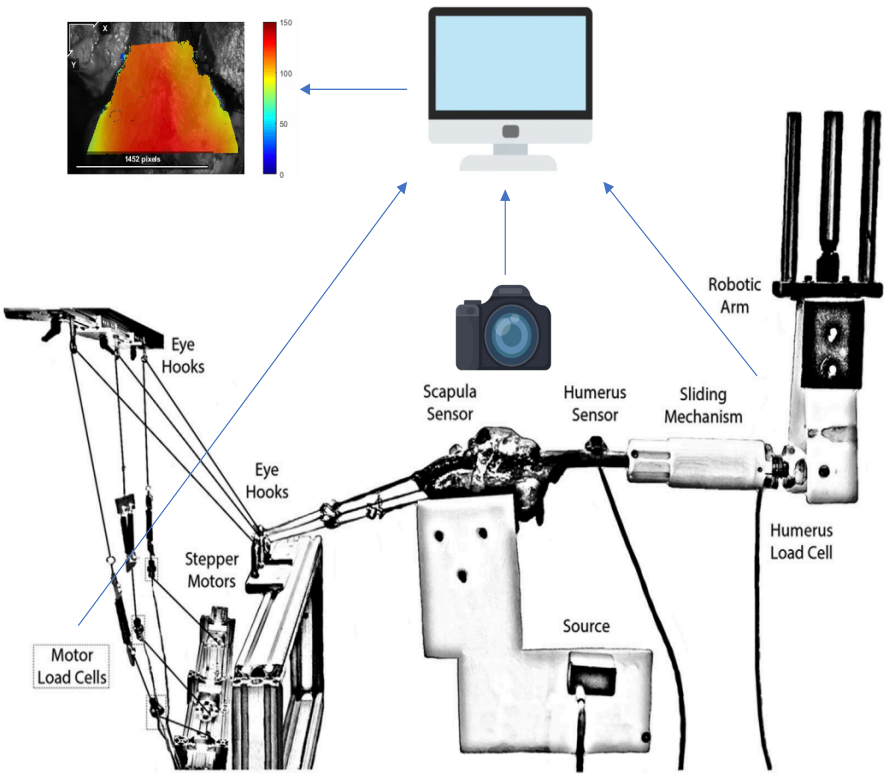
Bone fractures are commonplace in our fast-paced society. Medicine has advanced so much that people take for granted how intricate recovery is. The healing process at the cellular level is complex and involves a cascade of reactions that occur over the course of recovery. This complexity makes it difficult to simulate the bone fracture's progression as it heals. A successful simulation model would allow care providers to accurately track healing outcomes for their patients and catch any deviations in a timely manner. The issue is that the current framework for bone healing models is incomplete because these models fail to account for all four stages of healing (inflammatory phase, soft callus formation, hard callus formation and bone remodeling). In particular, the inflammatory stage is the most neglected stage in these models and so our team, using data collected from healthy rats , focused on this issue by constructing a computational model that simulates healing from the earliest stages of healing to bone reformation. The team created a biological expression map incorporating new RNA data to model the different growth factors that are present at the fracture site during recovery. We also updated an existing mechanical model that describes the optimal conditions of a bone fracture during recovery. It is the combination of these two models that are used to construct the new mechanobiological computational model that will simulate bone healing. This model will hopefully set a foundation for bone healing models that can be easily implemented in healthcare in the future.



Rotator Cuff Tendon Surface Strain during Glenohumeral Motion: A Cadaveric Model to Assess the Effects of Mechanical Load and Joint Position

Team 31: **Andrew Miao, Zhongkun Xue**
Technical Advisors: **Ara Nazarian (BIDMC & Harvard Medical School), Patrick Williamson (BIDMC & MechE)**

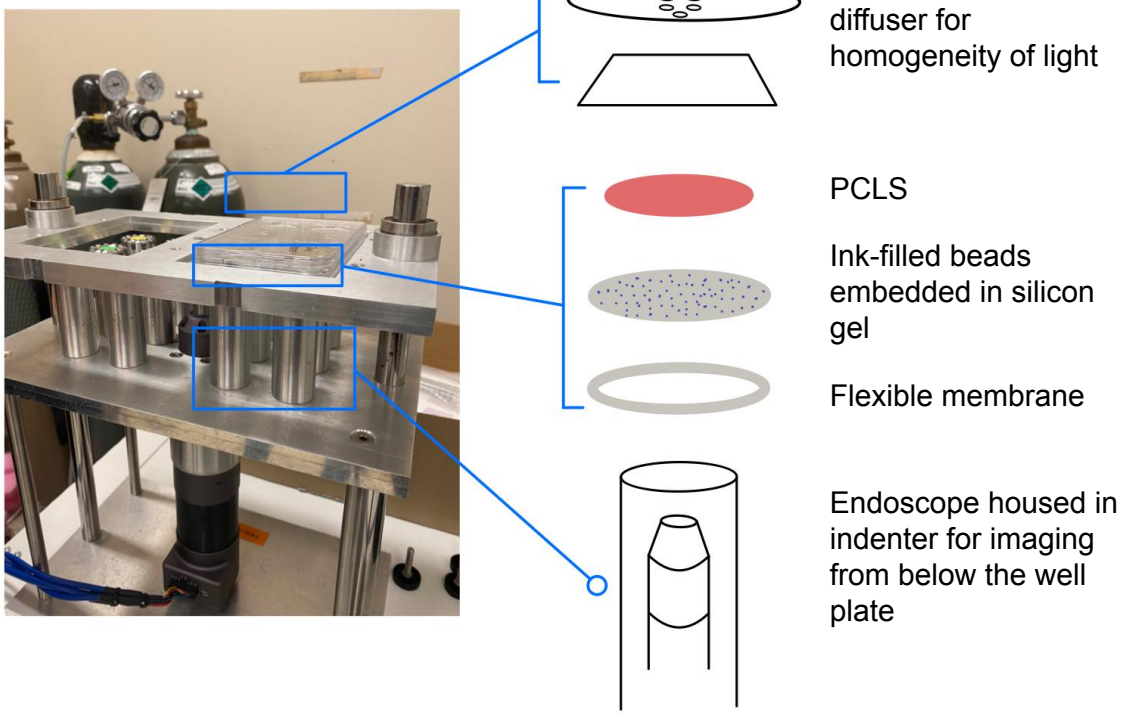
The rotator cuff muscles stabilize the glenohumeral joint which consists of the humeral head and the glenoid. This ball-and-socket joint enables the shoulder to have a wide range of motion. There are four muscles that create the rotator cuff (RC): Subscapularis, Infraspinatus, Supraspinatus, and Teres Minor. Each of these RC muscles serves a unique role in movements such as adduction and rotation. Injuries such as shoulder impact or jerking movements of the shoulder are common incidents that cause a rotator cuff tear (RCT). RCTs can be a partial or full tear and symptomatic or asymptomatic. Patients are more likely to seek treatment if they have a symptomatic tear because of pain or difficulties with typical movements. Nearly two-thirds of all RCTs are asymptomatic and can be left untreated. Given that RCTs are difficult to identify and their tear progression, this creates a critical need to identify the surface strain of RC tendons from mechanical loading and joint position so that RCTs can be treated before muscle and tendon atrophy occurs. Here we propose a cadaveric study to analyze the surface strain of the supraspinatus tendon during passive adduction using an existing glenohumeral testing system and a 2D image correlation. Furthermore, we propose to apply this system to investigate the effect of RC load and joint position on tendon strain. The objective of this project is to better understand how the position of the glenohumeral joint and loading on the RC tendons affect the surface strain of the tendons.



A System for Imaging Precision Cut Lung Slices

Team 33: **Keira Donnelly, Landon Kushimi, Reyn Tyler Saoit**
Technical Advisor: **Béla Suki**

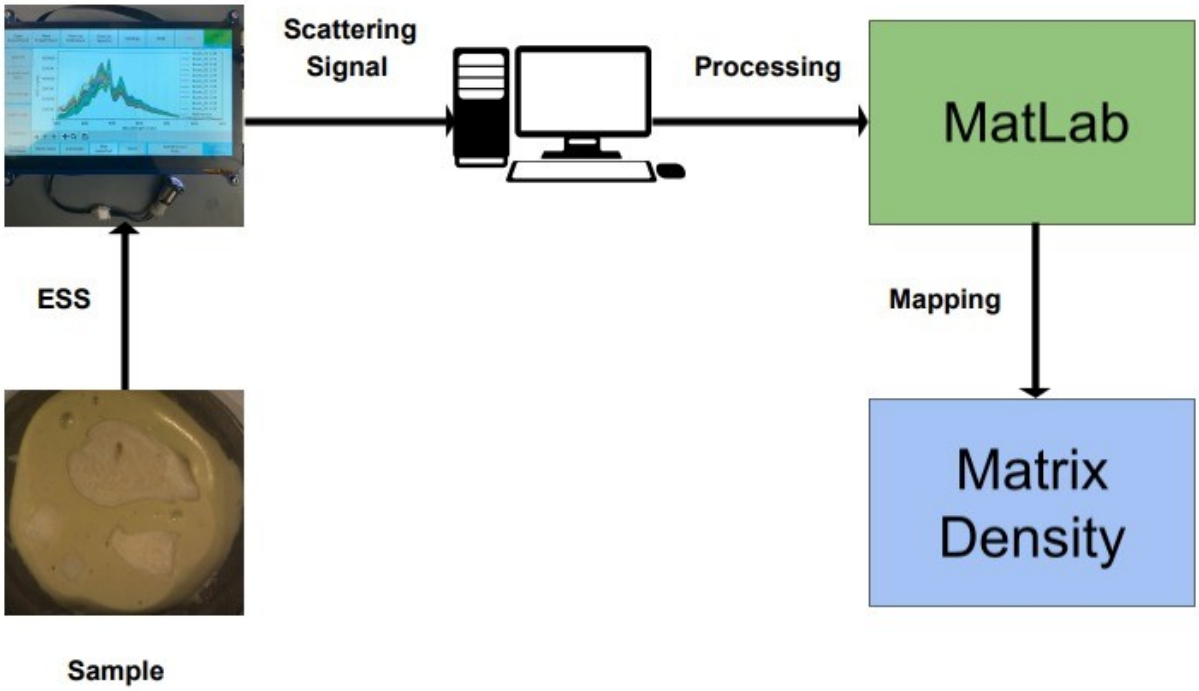
Precision Cut Lung Slices (PCLS) are a reliable tool to model the biomechanical activity of lung tissue. Its numerous advantages include the retaining of nearly all resident cell types in the lung, preserving the native extracellular environment, and suitability for high resolution imaging. Recent developments of novel tissue stretchers which mimic physiological breathing patterns allow researchers to track lung pathology progression via the changing mechanical properties of the lung tissue. Tracking tissue deformation, however, is difficult due to the lack of high contrast areas within the tissue, which image processing software require for their correlation algorithms. Current solutions are constrained by a small field of view, or are limited to the imaging of a single sample. We propose the use of ink-filled beads to provide the contrast necessary for mapping areas of the tissue during stretch, and housing the camera below the sample in the indenter to avoid light scattering caused by imaging through the tissue. This technique is known as Absorption Contrast, enabling tracking of deformations via the movement of beads at resting state and stretching state. Methods used in previous studies have been employed to ensure bead homogeneity and proper binding to the tissue. The beads are illuminated through the tissue using six dimmable, white LEDs and two layers of a light diffuser to ensure even lighting. An endoscope is housed within the indenter in order to image the tissue from below, allowing us to image a large field of view of 12 samples simultaneously.



Investigating the Density of Cetacean Middle Ear Bone

Team 42: **Viet Nguyen, Gautham Salgam, Danial Shafi**
Technical Advisors: **Aleks Zosuls, Ousama A'amar**

Whales are thought of as big mammals of the ocean that are few and live for long periods of time. Amongst the middle ear bones of aquatic cetaceans there is an anatomical anomaly where different regions of the bone vary in density. Through the use of a precision saw and resin to create effective whale middle ear bone samples and a microscope camera, precise mapping of the density of the samples can begin. Recent studies have shown by using Electric Scattering Spectroscopy (ESS), one can utilize the scattering of photons at different wavelengths for the incus, malleus, and stapes of two different species of whales and relate them to the number density can be used to detail different regions of bones for multiple species. In comparison, the water displacement method could measure the mass density of the material, but not specific areas while the Basilar Membrane Probe could measure the density of the material, but fails at high hearing frequencies. In this experiment, we explore a new way to quantify and understand the density of aquatic cetacean middle ear bones and expand on making it precise by building a fixture to hold the ESS probe. The number density can be achieved through the reduced scattering coefficient found using ESS and then one can find the scattering coefficient and subsequently the number density for regions of the middle ear bone. We demonstrate that using ESS is a much better tool to quantify the density because of its accuracy and precision than other methods.



Track 2

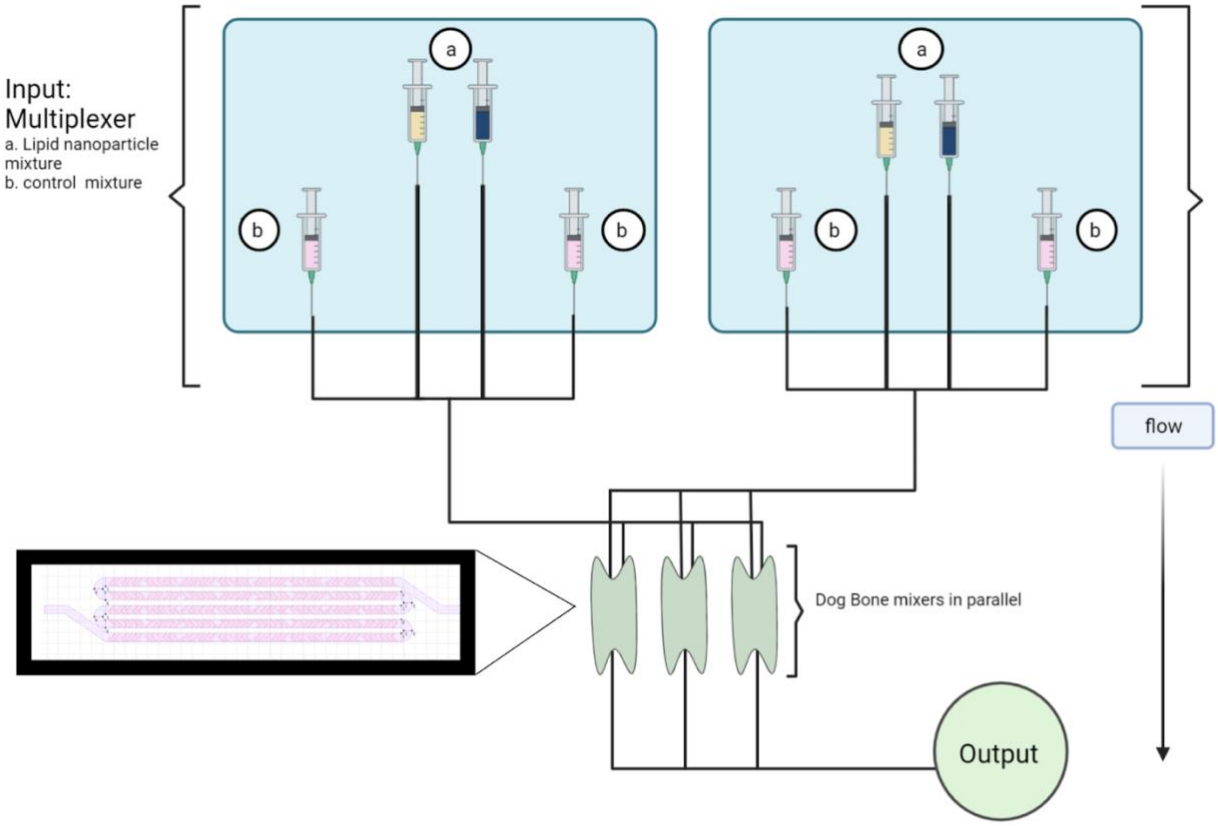
Session A

Nanoscience & Synthetic Biology

Miniaturized Microfluidic Device for High Throughput Production of Lipid Nanoparticles

Team 25: **Shirin Bakre, Genevieve Dowd, Liam Murray, Michael Sisk**
Technical Advisors: **Douglas Densmore (BU ECE), Radhakrishna Sanka (ECE)**

Microfluidic devices are ideal for developing and manufacturing lipid nanoparticles for drug delivery because they allow the production of micro-scale products with limited waste. The primary restriction with these devices, however, is their output potential; microfluidic devices are often limited to production of small volumes of product. In order to counter these constraints, toroidal micromixer (TrM) and staggered herringbone micromixer (SHM) designs are investigated. To resolve which of the mixing methods is most efficient at high flow rates, mixing index (MI) is measured across colored water pushed through the mixers. After determining that the TrM is a suboptimal mixing mechanism in comparison to the traditional SHM, we have developed computational designs for the SHM in order to create this component through soft lithography. Using a chrome mask and custom manifold to produce an insert, this PDMS-based mixer was then inserted into a polycarbonate device containing a multiplexer and parallelization ladder. Multiplexion allows for the selection of inputs internally, enabling expedient switching between various inputs. The use of a parallelization ladder enables greater throughput by dividing the inputs between multiple mixers. As the mixer requires a comparatively low volume to function, mixing serves as a bottleneck. Parallelization via a ladder system allows individual mixers to receive appropriate volumes while a greater volume is processed by the device as a whole.

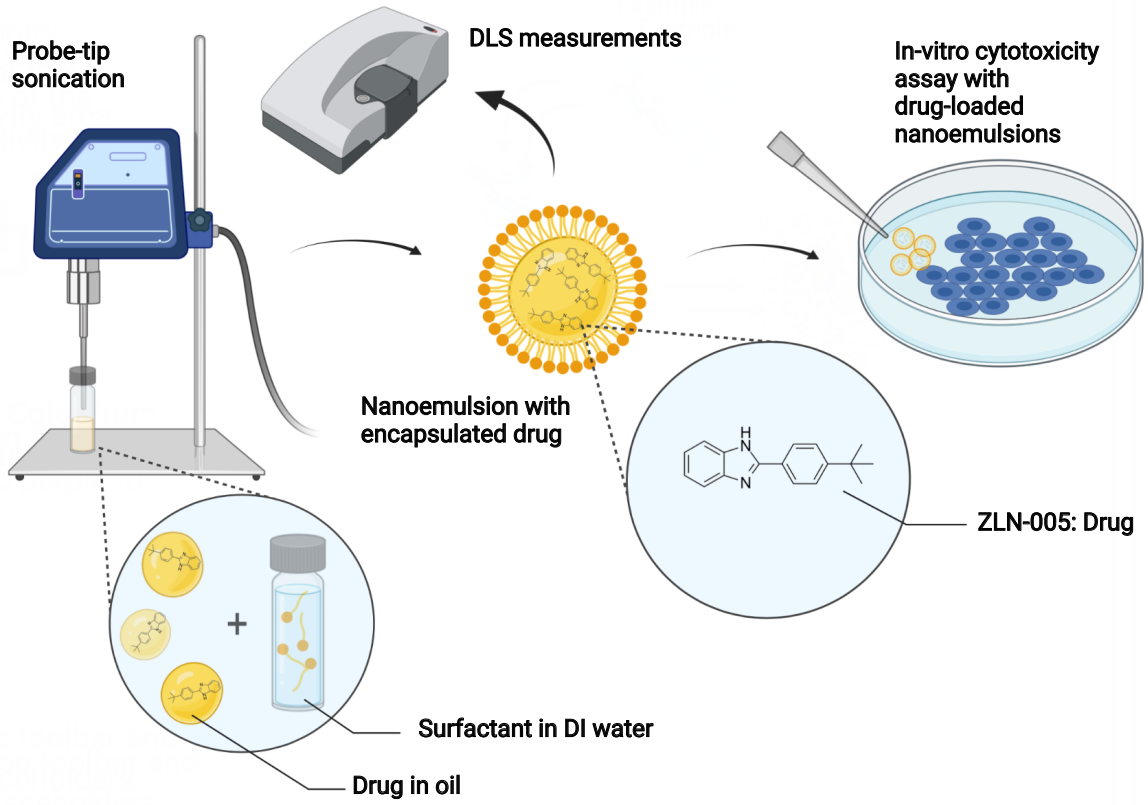


Novel Nanoemulsions for Intra-ocular Delivery of Mitoprotective Drugs

Team 24: **Matthew Reynolds-Tejeda, Cedric Salame**

Technical Advisors: **Leo Kim (Massachusetts Eye and Ear - Harvard Ophthalmology), Magali Saint-Geniez (Novartis Institutes for BioMedical Research)**

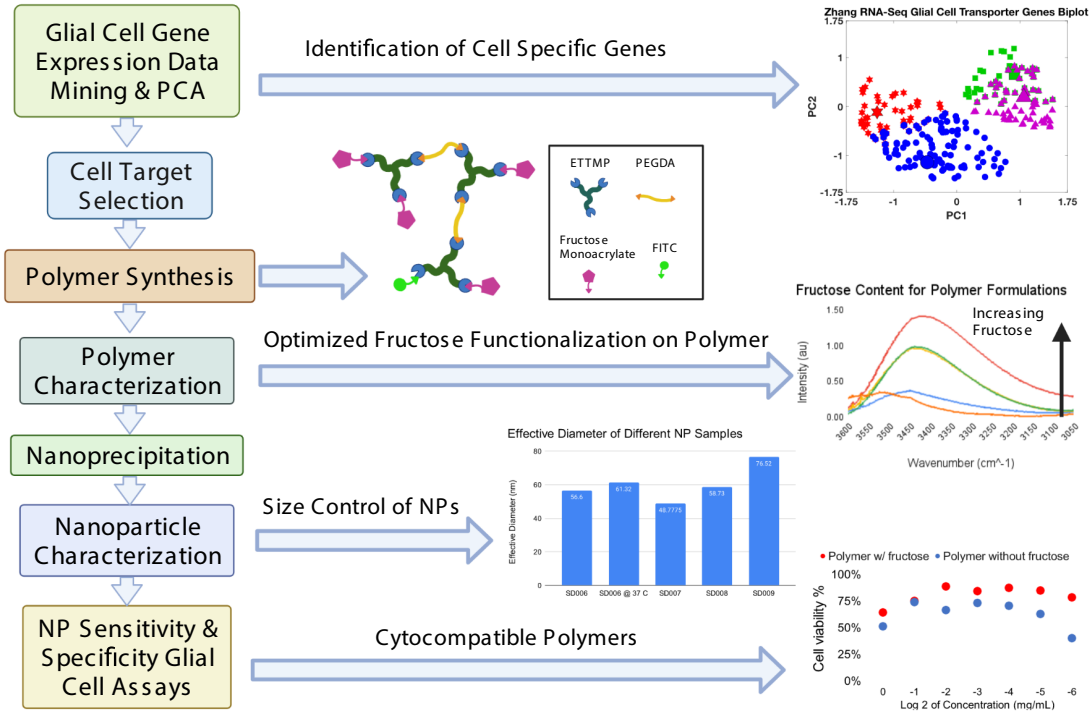
Age-related macular degeneration (AMD) represents the major cause of irreversible vision loss in elderly populations and is characterized by the progressive degeneration of the retinal pigment epithelium, the primary support of the photoreceptors. Currently there is no treatment for the early stage of the pathology, dry AMD, and there is sub-optimal treatment for the advanced stage, wet AMD. Previous work in the lab has identified a compound, ZLN005, as a potent antioxidant able to normalize mitochondrial activity to rescue retinal pigment epithelial degeneration and/or block choroidal neovascularization. However, the application of the compound in-vitro and in-vivo has been hindered by its low solubility in aqueous environments. Nanoemulsions (NEM), which are composed of an oil core and an emulsifier shell, have been shown to improve the biodistribution of such drugs; therefore, we propose the encapsulation of ZLN005 within a NEM. The NEMs are formed using a probe tip sonicator and then characterized by dynamic light scattering, which informs on size, polydispersity index, and zeta potential. We have optimized the composition of the NEMs and encapsulated ZLN005 in our best formulations. We then treated human retinal pigment epithelial cells with drug-loaded NEMs in-vitro to correctly quantify the therapeutic effect of ZLN005 when delivered by the nanocarriers. Furthermore, it becomes possible to treat AMD through a topical application of drug loaded NEMs.



Novel Design of Polymeric Nanoparticles for Targeted Drug Delivery to Glial Cells

Team 11: **Simrita Dhulekar, Elizabeth Hanchar, Alexandra Piñeiro, Rosangel Ramos Espinoza**
Technical Advisor: **Timothy O'Shea**

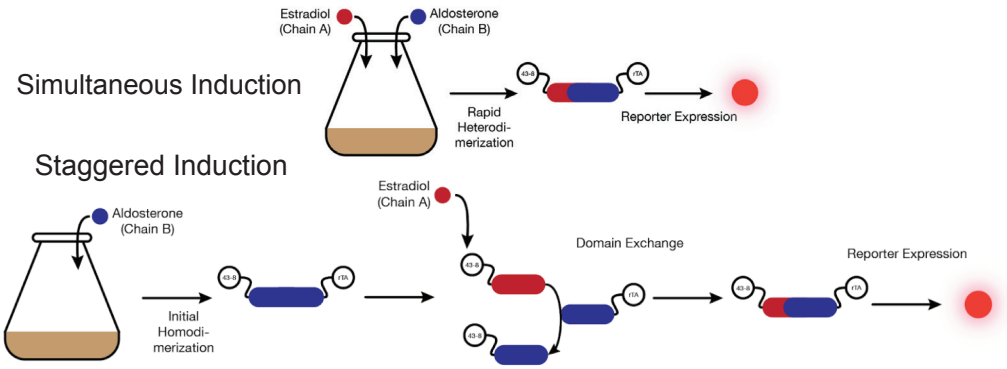
As the population ages, central nervous system (CNS) disorders have become more prevalent, yet the challenges associated with treating them persist. Glial cells, which maintain a healthy CNS, are an important target for drug therapy. To address glial dysfunction, our team designed polymeric nanoparticles to preferentially target microglia and deliver small-molecule drugs. We developed an in silico pipeline to identify uniquely-expressed glial surface transporters. This pipeline mined published datasets with expression reads for glial cell transporter genes and computed z-scores to normalize the expressions across datasets. Using data dimensionality reduction, we identified uniquely and highly expressed genes for glial cell types. From this analysis, we selected a microglial gene, SLC2A5, which is the only fructose transporter in the CNS. We designed a polymer that includes a fructose ligand to permit preferential binding to this transporter. To enable polymer functionalization, we acrylated fructose by an enzymatic reaction, purified it by flash chromatography, and confirmed purity by NMR. Branched polymers were synthesized via Michael Addition polymerization using different multifunctional thiol and acrylate oligomers before end-capping with fructose monoacrylate. Comparisons of polymer composition were evaluated by FTIR. These polymers were nanoprecipitated to generate nanoparticles (NPs). Stability and size of NPs were characterized using DLS. Formulations with optimized fructose percentage, stable ~100 nm size were pursued further. Polymers applied to neural cell cultures were non-toxic. Additional cell uptake assays are scheduled to determine microglial cell selectivity and specificity. Nanoparticles designed to interact with a specific cell transporter show promise to target cells for therapy.

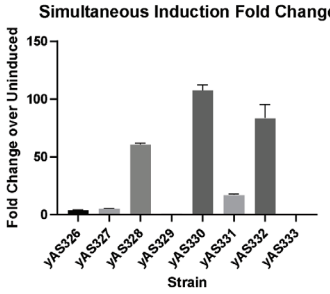


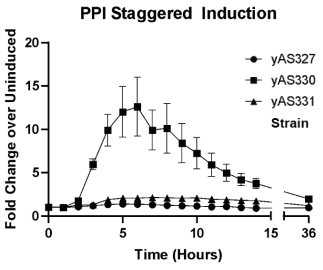
Designing, Modeling, and Constructing Coherence Detection Synthetic Gene Circuits Based on Protein Oligomerization

Team 17: **Hannah Collins, Delaney Dow, Emily Hill, Blaire Smith**
Technical Advisors: **Ahmad (Mo) Khalil, Adam Sanford**

Synthetic biology is an emerging multidisciplinary field that involves not only the modification of existing DNA, but also the synthesis of DNA de novo. We designed a genetic circuit in Saccharomyces cerevisiae that utilizes molecular assembly kinetics to perform “input coherence detection”. These circuits can detect when two distinct input signals are present simultaneously, allowing for greater specificity and fine-tuned output control to make a synthetic circuit more akin to natural biological circuits. Our system leverages oligomerizing protein-protein pairs that can form both homodimers and heterodimers. Each oligomerizing domain is fused to half of a synthetic transcription factor and controlled by a distinct chemical input. In the simultaneous presence of both hormones, co-expression of both protein domains drives formation of heterodimers to activate circuit output. Staggered induction will alternatively drive production of homodimeric complexes that delay circuit activation. Through a series of experiments, we measured fluorescent output in response to varied temporal input sequences via flow cytometry. We then developed a computational model of the circuit based on protein-protein assembly kinetics, from which we derived characteristic circuit parameters, such as induction and decay time constants. Further work includes identifying topological improvements to the circuit architecture to adjust for unwanted couplings that may influence its behavior. By modeling our synthetic circuit under physiologically relevant conditions, we have expanded our toolbox of protein-protein pairs for future applications in vivo. Our work could contribute to downstream therapeutics, such as CAR T-cell therapy or biosensors to recognize pathogens in the body.







$$\frac{d[AA]}{dt} = \frac{k_{act_1}[Est]^{n_1}}{[Est]^{n_1} + (EC_{50_1})^{n_1}} - k_{dil_1}[AA]$$

$$\frac{d[BB]}{dt} = \frac{k_{act_2}[Ald]^{n_2}}{[Ald]^{n_2} + (EC_{50_2})^{n_2}} - k_{dil_2}[BB]$$

$$\frac{d[mKate2]}{dt} = \frac{k_{act_3}[AB]^{n_3}}{[AB]^{n_3} + (EC_{50_3})^{n_3}} - k_{dil}[mKate2]$$

Track 2

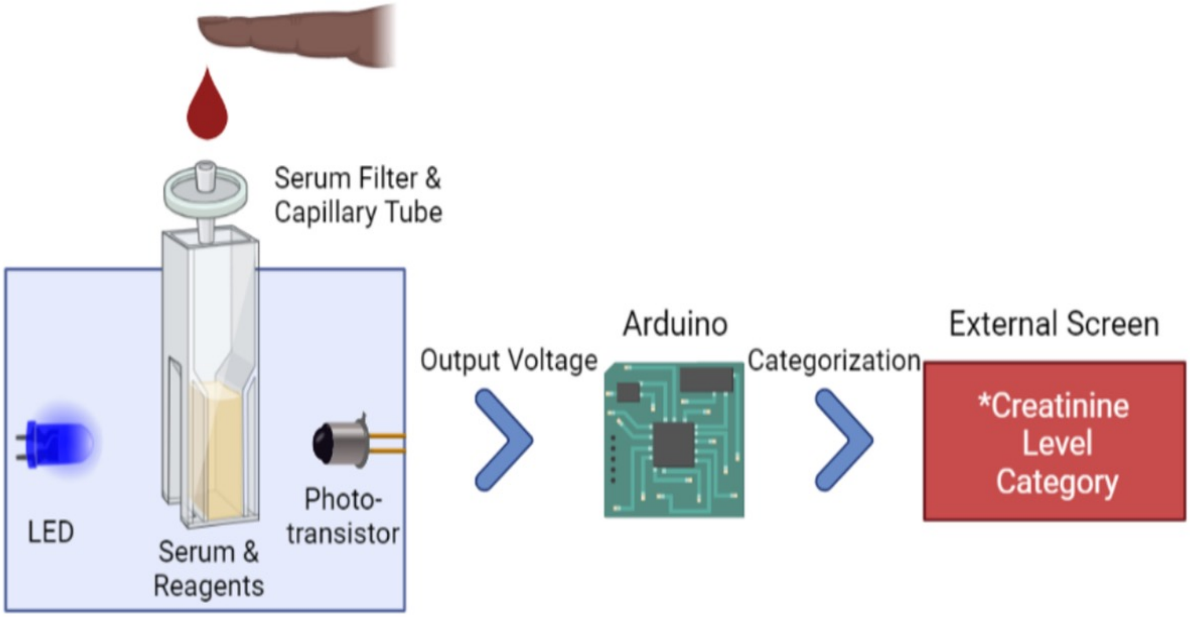
Session B

Apps & Diagnostics

Development of Affordable Kidney Disease Diagnostic Device for Use in Low Resource Areas

Team 4: **Lujain Khusheim, Ashley McFarlane, Ethan Strauther, Zakiah Tcheifa**
Technical Advisors: **Catherine Klapperich, Sushrut Waikar (BU School of Medicine)**

There is a huge need for more accessible options for the diagnosis of kidney disease in low-income areas. The device will be used to perform mass screening of individuals and provide a metric for additional testing and diagnosis from a licensed medical professional. It will return a semi-quantitative value based on low, slightly elevated, or high creatinine values using the results from a Jaffe reaction - a more affordable alternative to enzymatic reactions. The main component of our device is a small light proof cuvette holder and a cuvette with a lid to contain the blood sample (obtained from a finger-prick). The lid will hold a plasma separation membrane and a capillary tube to drain the serum. The blood will then mix with the reagent found in the cuvette and the reaction will occur. The reaction will run for five minutes and then the voltage drop will be recorded across the phototransistor at an absorption value of 500 nm. The patient will be categorized into a risk group based on the corresponding voltage reading, where higher readings indicate higher creatinine levels. The device will display this reading on a built-in LED screen. To achieve this functionality, 3-D printed components, simple spectrophotometer-like measurements, and a microprocessor (such as an Arduino) will be used to create the POC diagnostic device at an affordable price range.

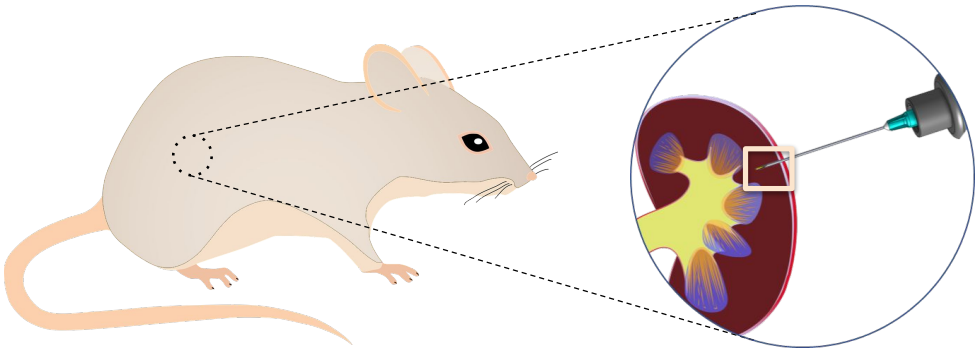


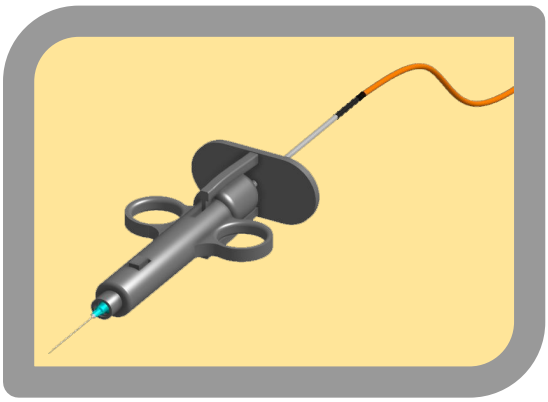
*Categories are: normal, elevated, and very elevated

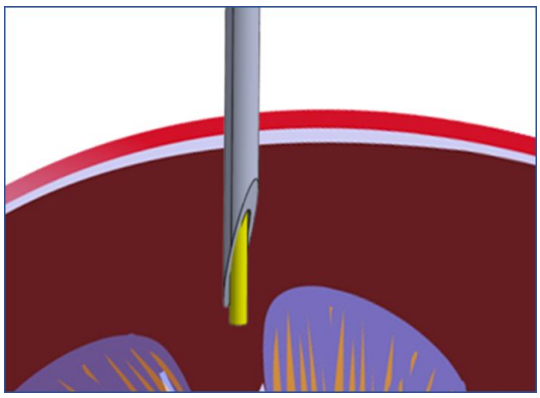
Assessing Interstitial Fibrosis and Tubular Atrophy (IFTA) Using Minimally-Invasive Elastic Scattering Spectroscopy as an Indicator of Kidney Health

Team 6: **Giulia Boccardo, Ji Young Chung, Meghan Howard. Emily Oros**
Technical Advisors: **Ousama A'amar, Irving Bigio**

Chronic Kidney Disease (CKD) is a serious illness characterized by diminished kidney function that affects about 1 in 7 US adults. It consistently results in required dialysis and eventually kidney transplant(s). Currently, assessing the health of kidneys for transplant involves reviewing the deceased's medical record history and physically examining the organ ex vivo. The current gold standard of CKD diagnosis involves measuring the extent of IFTA through a kidney biopsy, a risky procedure involving a large needle with many drawbacks. Therefore, there is a pressing clinical need for a method to rapidly measure and assess IFTA for both the allocation of transplant kidneys and treatment of CKD without the guesswork or tissue damage. Our team has designed, built, and tested a minimally invasive fiber optic probe to measure the viability of kidney function. Our probe incorporates elastic-scattering spectroscopy (ESS) which measures backscattered light over the 300-900 nm range. We have tested our device on unlabeled tissue of an adenine rat model of CKD and were able to find correlation between disease progression and changes in the measured ESS spectra. The results were observed spectral trends of decreased slope of scattering intensity in the near-UV to short-visible region (300–500 nm), relative to longer wavelengths, for fibrotic kidneys compared to normal kidneys. The results of this study will demonstrate the potential of ESS technology as a more accurate, rapid, and non-invasive assessment of IFTA for potential donor kidneys and its application for in vivo procedures.



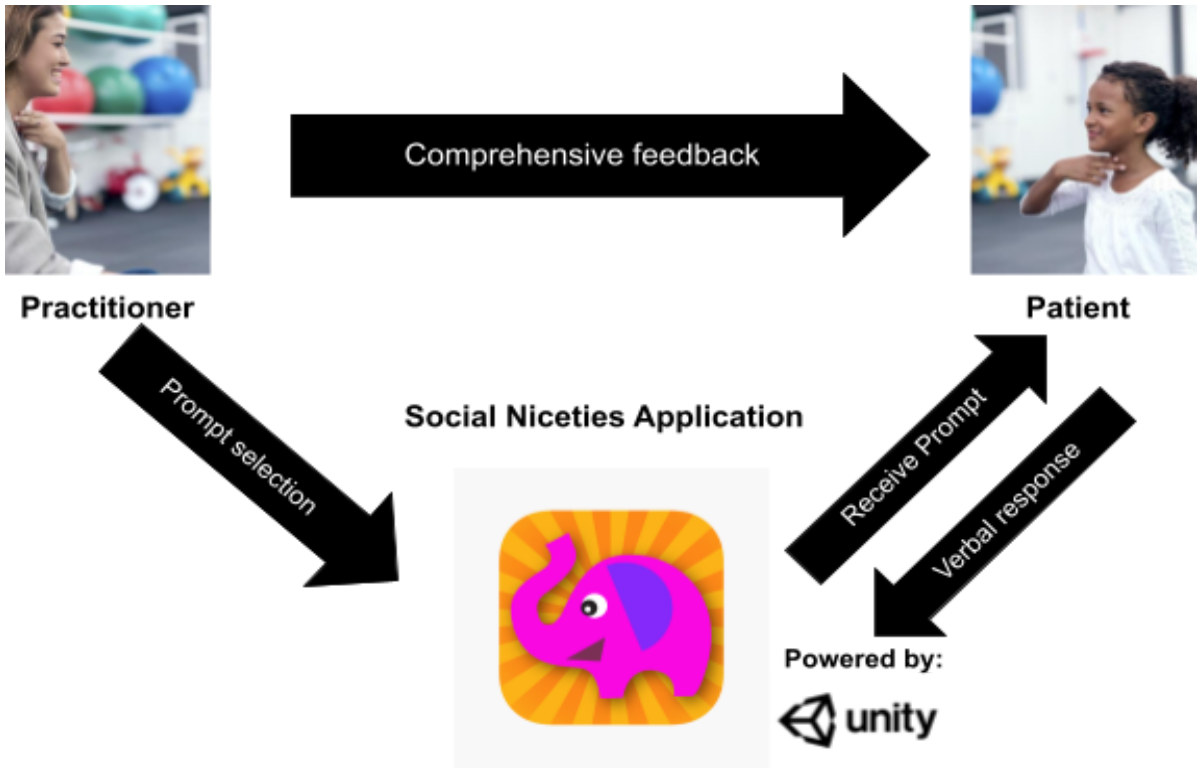




Effect of Digital Intervention on Social and Verbal Skills in Individuals with Autism Spectrum Disorder

Team 9: **Matthew Collins, Nathaniel Heitmann-Basoni, James Maher,**
Technical Advisor: **Andrey Vyshedskiy (ImagiRation, LLC; BU MET)**

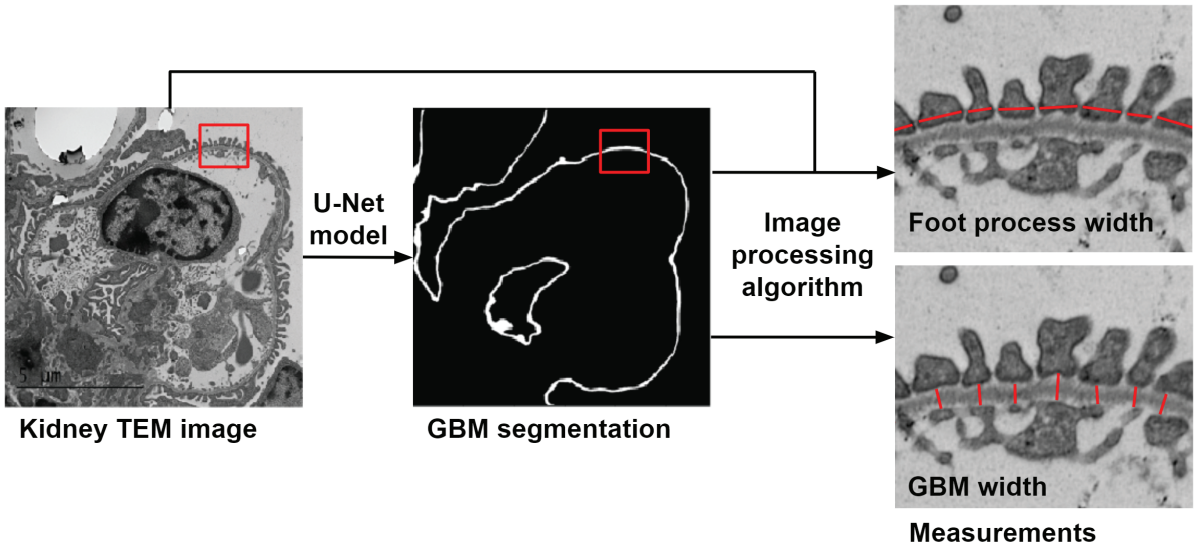
Verbal communication is arguably the most common and effective method of communication between people. Children with cognitive impairments and learning disabilities, however, often face challenges with regards to the expression and understanding of ideas in a verbal form. Difficulty with such communication can have a very harmful effect on a person's ability to be independent and fully integrated into society. As such, studies have been conducted on a variety of methods to help these children develop crucial conversation skills, such as understanding social cues and continuing a conversation. Direct intervention and one-on-one speech therapy have been widely proven to be the most impactful methods. Unfortunately, such methods are costly and potentially difficult to implement at a large scale, and many speech therapists face difficulty when trying to distinguish between providing feedback and participating in conversation, an issue which is exacerbated by echolalia. This project aims to improve upon this method of therapy by developing a smart device-compatible application which will assume the role of conversation partner, leaving the clinician to provide feedback. The application utilizes a cloud storage system to pull videos of actors which correspond to conversation topics or particular questions, and it provides methods by which clinicians may give feedback to the patient. Ultimately, this project aims to understand the effects, if any, of replacing human conversation partners with an application on the effectiveness of one-on-one speech therapy for children with Autism Spectrum Disorder (ASD).



Digital Biopsy for Glomerular Ultrastructural Measurement in TEM Images

Team 37: **Connor Kim, Aksel Laudon, Grace Qian, Zhaoze Wang (ECE), Jackson Ye** **INTERDISCIPLINARY**
Technical Advisors: **Weining Lu (BU School of Medicine), Vijaya Kolachalama (BU School of Medicine), Joel M. Henderson (BU School of Medicine)**

The glomerular filtration barrier is vital to normal kidney function. Transmission electron microscopy (TEM) images visualize its cross-sectional ultrastructure, which consists of the sieve-like glomerular basement membrane (GBM) and podocyte foot processes. Proteinuric kidney diseases (PKD) are associated with filtration barrier morphological changes, which are observed experimentally and clinically in terms of GBM width and foot process width (FPW) measurements. Current TEM image measurement is performed manually as no fully automated solution exists. This limits research into PKD mechanisms and therapeutics with its labor intensiveness and operator bias. We developed an automated tool to measure input TEM images from a dataset of wild type (WT, n=5) and PKD model (ILK cKO, n=5) mice. A U-Net semantic segmentation model was trained on the dataset and corresponding manually annotated GBM masks. First, the segmentation model identifies GBM in input images. Next, these GBM segmentations enter an image processing algorithm that estimates GBM width and FPW. In our validation study on the dataset, resulting segmentation accuracy was strong relative to existing literature. The estimated mean GBM width and FPW measurements closely matched manual measurements for WT but differed significantly for ILK cKO animals. Measured GBM width and FPW were significantly wider for ILK cKO than WT mice, which aligns with known morphology. These results suggest our tool performs comparably to manual measurement on healthy tissue and can distinguish healthy from pathological samples. Our tool provides high-throughput, objective morphological analysis for research, and in the future could potentially facilitate clinical PKD diagnosis.



Track 2

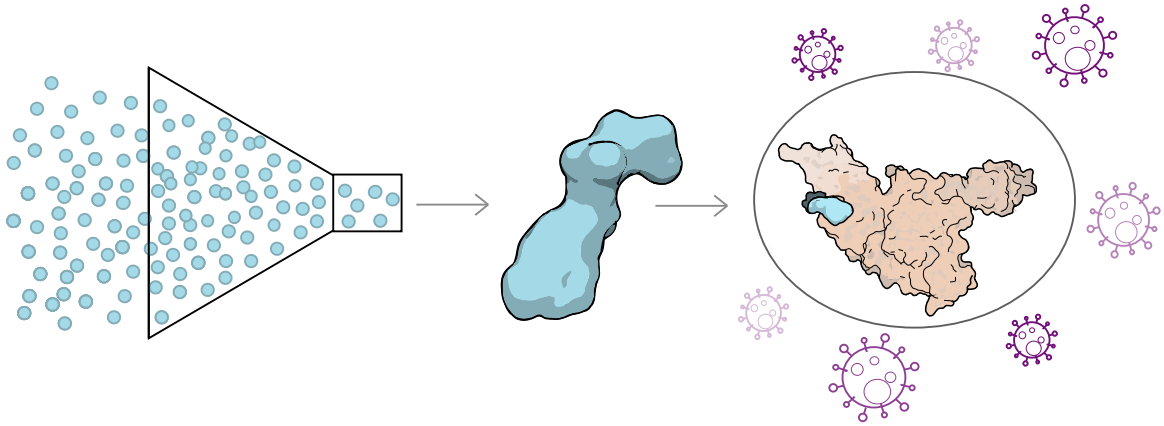
Session C

Digital & Predictive Medicine

Designing Novel Disruptors of SARS-CoV-2 Viral Spike Protein Function by Targeting the Substrate Binding Domain of Chaperone Protein GRP78

Team 16: **Jonathan R. Hutton, Maria Lazou**
Technical Advisors: **Diane Joseph-McCarthy, Arijit Chakravarty (Fractal Tx)**

SARS-CoV-2, the virus that causes COVID-19, had led to an ongoing health emergency across the globe, claiming the lives of millions and impacting billions of others to a profound extent. Despite the increasing availability of vaccines, the virus continues to spread and mutate into new variants. Because most vaccines tend to target the spike protein of the SARS-CoV-2 virus, there exists the threat of viral escape by evolution from vaccine effectiveness. As such, there is an urgent need for antiviral treatments that target a different mechanism of viral entry to increase the evolutionary selection pressure placed on the virus, potentially extending the duration of effectiveness of vaccines across viral variants and directly reducing viral transmission and infection. The protein GRP78 provides one possible novel target for antiviral treatments. GRP78 is known to act as a host auxiliary factor for the binding of [JDM1] the SARS-CoV-2 viral spike protein to the human cellular ACE2, the primary pathway of cell infection. Here, we first modeled the binding of GRP78 to the spike protein ACE2 structure. We then used that model of the GRP78-Spike-ACE2 complex to propose a set of molecules determined through structure-based virtual screening of known drug databases that can be computationally demonstrated to disrupt the SARS-CoV-2 viral spike protein from binding to the GRP78 substrate binding domain (SBD), effectively preventing viral entry to the cell. A subset of the lead compounds has been selected to be suitable for intranasal administration to prevent viral propagation beyond the nasal mucosa, offering the potential for an early exposure intranasal treatment for COVID-19 following further clinical development.

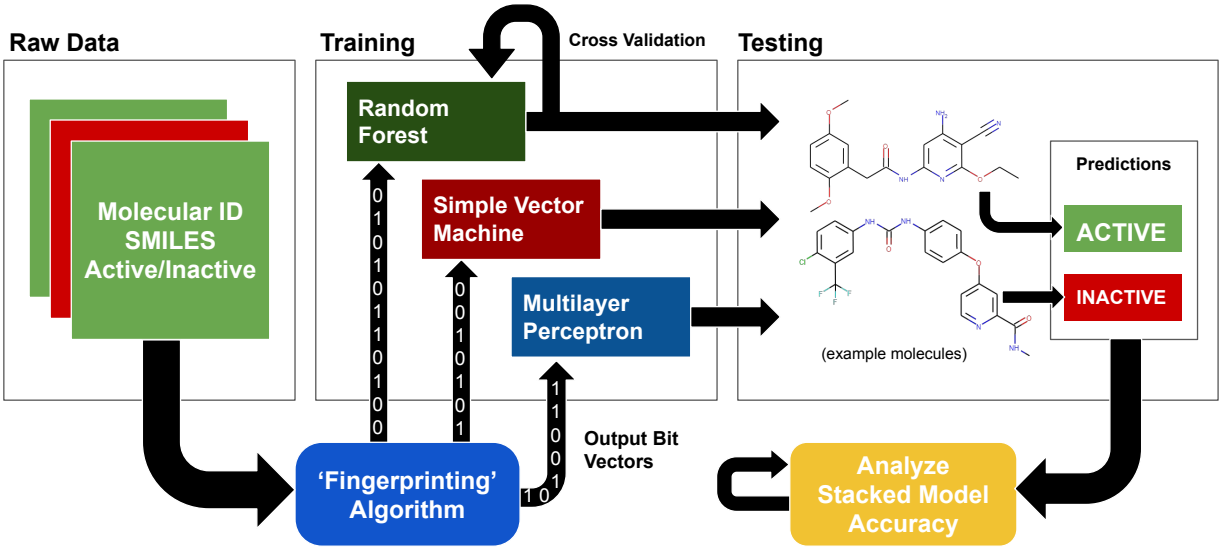


Classifying and Modeling of Selective and Common Actives and Inactives Against GSK3α and GSK3β

Team 36: **Joe Bosco, Julia Roy**

Technical Advisors: **Arthur J. Campbell (Broad Institute), Sumaiya Iqbal (Broad Institute)**

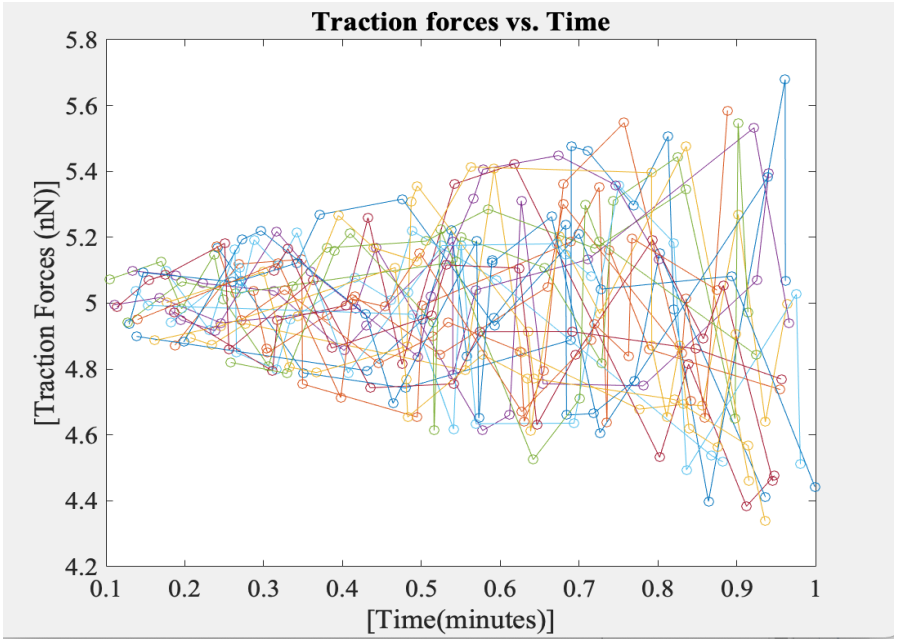
Inhibitors of glycogen synthase kinase-3 are implicated in the treatment of Alzheimer's Disease, Fragile X syndrome, and bipolar disorder symptoms. However, most known GSK3 inhibitors are non-specific, affect both paralogs, and as a result, incur undesirable side effects. Hence, machine learning classification of GSK3 inhibitors into alpha-specific and beta-specific binding categories is fundamental in narrowing down compounds for more precise drug development, which in turn can guide the way towards improved patient outcomes. As in any machine learning problem, the first step of this project was to gather a large dataset (labeled, in this case, for supervised training) and to filter out duplicate and unlabeled data points. Additional preprocessing included feature selection and generation of Morgan fingerprints from SMILES keys. Our machine learning model consisted of multiple different classifiers. Integration of multiple algorithms to increase predictive power is common practice for many applications in the machine learning world, such as natural language processing and image analysis. Studies have shown that multi-layered models can decrease variance, avoid overfitting, and improve classification accuracy of ligands as drug-like and non-drug like. In this project, we integrate random forest, SVM, and MLP algorithms to predict the ligand activity of chemical inputs to GSK3α and GSK3β separately.



Computational Model of Tensional Homeostasis of Focal Adhesions at Subcellular Level

Team 40: **Selina Qin, Jiaming Zhang**
Technical Advisors: **Dimitrije Stamenovic, Michael L. Smith**

Homeostasis is a core concept in understanding body behaviour in biology and physiology; it refers to the self-regulating process by which an organism can maintain internal stability while adjusting to changing external conditions. Though, there is a lack of research on homeostasis on a smaller scale, where this project will explore tensional homeostasis at the focal adhesion (FA) points of the cell on the subcellular level. When a cell reaches a homeostatic state, the morphology of the cell will fluctuate to external stimulus. Specifically, this research will analyze how the displacement and fluctuation at the FA level will affect tensional homeostasis when the mechanical force is applied to the cell. FA are dense molecular assemblies and actin stress fibres connect together. This computation modelling is proposed to simulate cellular fluctuations that mimic in vivo laboratory cell fluctuations when the cell is responding to a stimulus such as traction force. This study introduces the Monte Carlo algorithm into the simulation process, so as to maximize the use of mathematical models to analyze the relationship between various transformations in the tensional homeostasis process to reduce physical laboratory experiments. As shown in Graph 1, the horizontal axis represents the full duration of an in vivo experiment and the vertical axis represents random traction forces generated by the Monte-Carlo function. The different coloured lines represent one simulation of cellular fluctuation. These data can be used to predict the threshold when the cell reaches the homeostatic balance. Our long term goal is for these data to be used in further research to perform analysis on cellular behaviours relating to reaching the success of homeostasis and hence be a critical need in preventing diseases caused by the disruption of homeostasis such as cancer and artherocolosis.

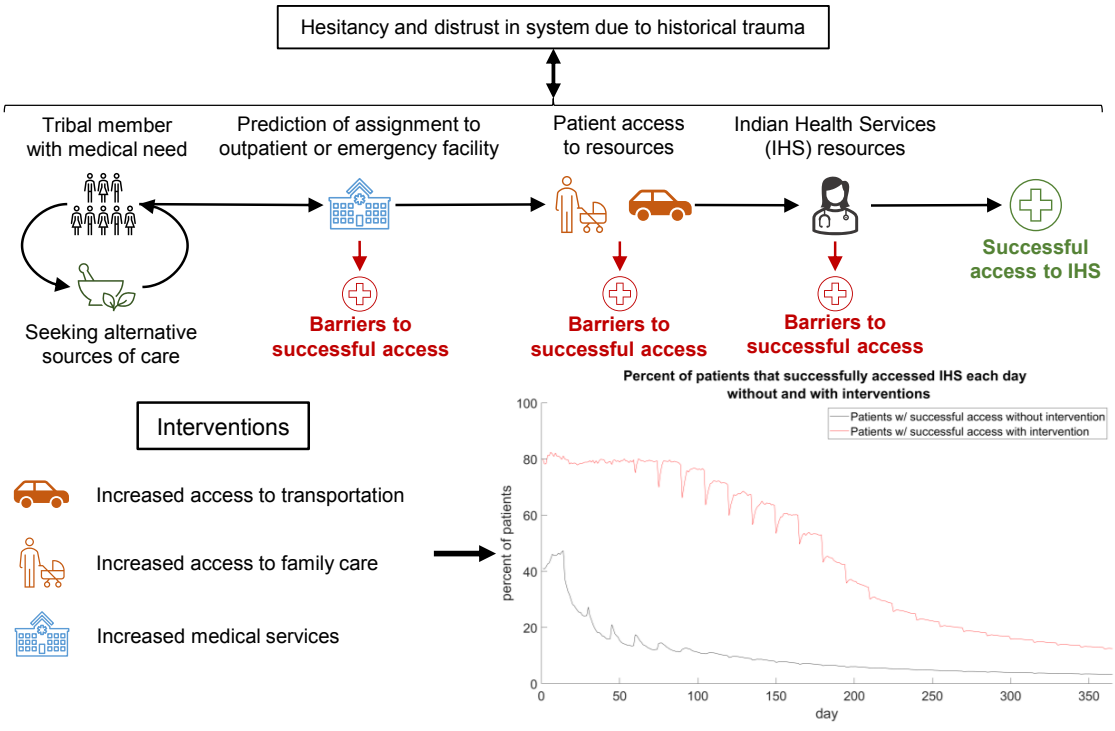


Graph 1: Traction forces for FA points within experiment time simulated in Matlab

Quantitative, Data-Driven Systems Analysis and Modeling to Improve Access to Healthcare Among Native American Communities in Rosebud, SD

Team 5: **Cecile Meier-Scherling, Taylor Schissel**
Technical Advisor: **Muhammad Zaman**

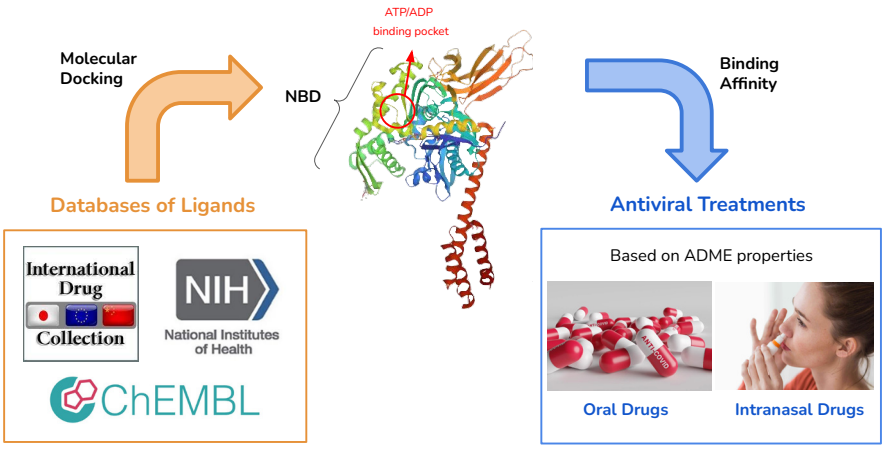
The Sicangu Lakota Oyate (Rosebud Sioux) tribe has a life expectancy that is ten years shorter than the national average and five years shorter than other indigenous communities. The Rosebud healthcare system faces limited resources, 20% hospital understaffing, and long-standing historical trauma. Furthermore, their Indian Health Services (IHS) hospital was shut down in 2015 for failure to meet the Center of Medicare and Medicaid Services' criteria for standards of care, and the surgery and obstetric units have remained closed. There is currently no systematic method to evaluate successful interventions for funding and training to mediate these issues and initiate actionable change within the Rosebud healthcare system. We propose a novel data-driven and community-based computational model analyzing resource-dependent outcomes in the Rosebud IHS. The purpose of this model is to simulate the average patient population during one year to test different potential interventions to systematically analyze how patient trust and access to care may be improved through targeted interventions. Application of the model to specific patient and staffing barriers indicates, through quantitative results, that the number of appointments available at the outpatient ward, access to family-care, transportation, and historical trauma are key areas that impact patient access. These quantitative predictions are consistent with the recommendations presented in the Community Health Profiles, such as the increased support for transportation and expanded medical services. This model will lay the groundwork for the utilization of similar computational models in other marginalized communities seeking to analyze and improve patient access and trust.



Designing Novel Disruptors of SARS-CoV-2 Viral Spike Protein Function by Targeting the Nucleotide Binding Site of Chaperone Protein GRP78

Team 43: **Ximeng Fu, Huiyi Xiong**
Technical Advisors: **Diane Joseph-McCarthy, Arijit Chakravarty (Fractal Tx)**

GRP78, a host auxiliary factor for many viruses, is a promising target for antiviral treatment of SARS-CoV-2 because of its role in forming a complex with ACE2 and the viral spike protein. Further studies have also shown that disrupting GRP78 function in vitro down-regulate ACE2 expression, leading to reduced viral cell entry. It is believed that binding to nucleotide binding domain (NBD) is responsible for disrupting GRP78 function, and compounds that capable of disrupting GRP78 function will serve as promising leads for the discovery of potential early-treatment options for SARS-CoV-2. After literature review completion and confirmation of GRP78 binding sites, we were able to choose appropriate databases in preparation to compute our own virtual screens. By comparing the nucleotide binding domain (NBD) residues used in different academic articles and available drugs repurposed to target the NBD of GRP78, we have determined the binding sites and residues. After a careful review of ZINC15 database, we decided to use the NIH, International Drug Collection, and ChEMBL as the final databases for docking to avoid those databases that have already been screened by other research groups. We first docked ATP to the NBD of 5E84 (ATP-bound state of GRP78) Chain A after we removed its original ligand ATP, as a control to make sure the docking site is specified correctly. Then, we have performed our own virtual screens by utilizing the software Glide to calculate docking-scoring grids for binding sites and conduct ligand docking. After docking, the most promising ligands were selected based on the information gathered from both previous literature and our own virtual screens. The top molecules have been determined based on their binding affinity compared to the control ligand ATP, as well as other ADME properties that are available for any in vivo or in vitro studies about their toxicity to human body. By using QikProp Software, we have determined the most promising ligands that have the highest binding affinity to GRP78 and the best ADME properties for orally and potentially intranasally delivered drugs. By discovering ligands that can successfully reduce the rate of SARS-CoV-2 spike protein binding to the human ACE2 receptor, this project will vastly advance the development of antiviral treatments and slow the escape evolution of the SARS-CoV-2 viral spike protein.



Track 2

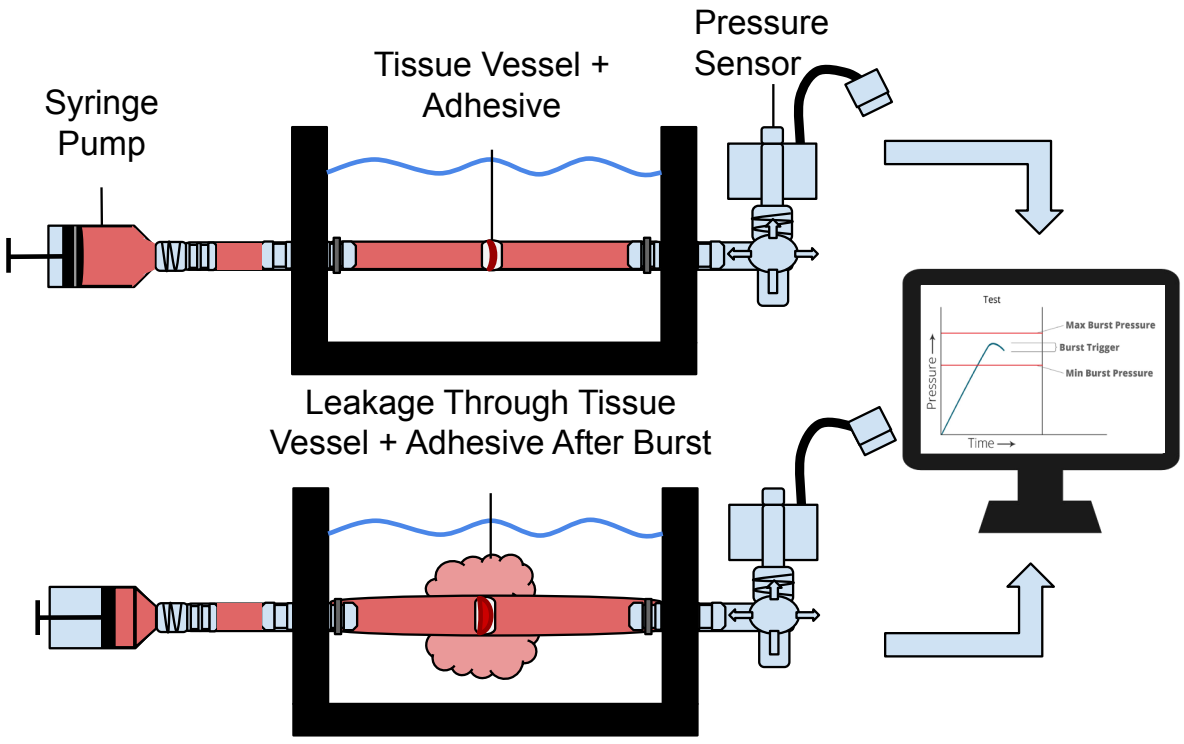
Session D

Cell & Tissue Engineering

Development of a Burst Pressure/Leak Testing System for Surgical Adhesives

Team 14: **Tyler Alstede, Connor Burke, Zachary Silfen, Kevin Wu**
Technical Advisors: **Daniel King (Draper), Corin Williams (Draper)**

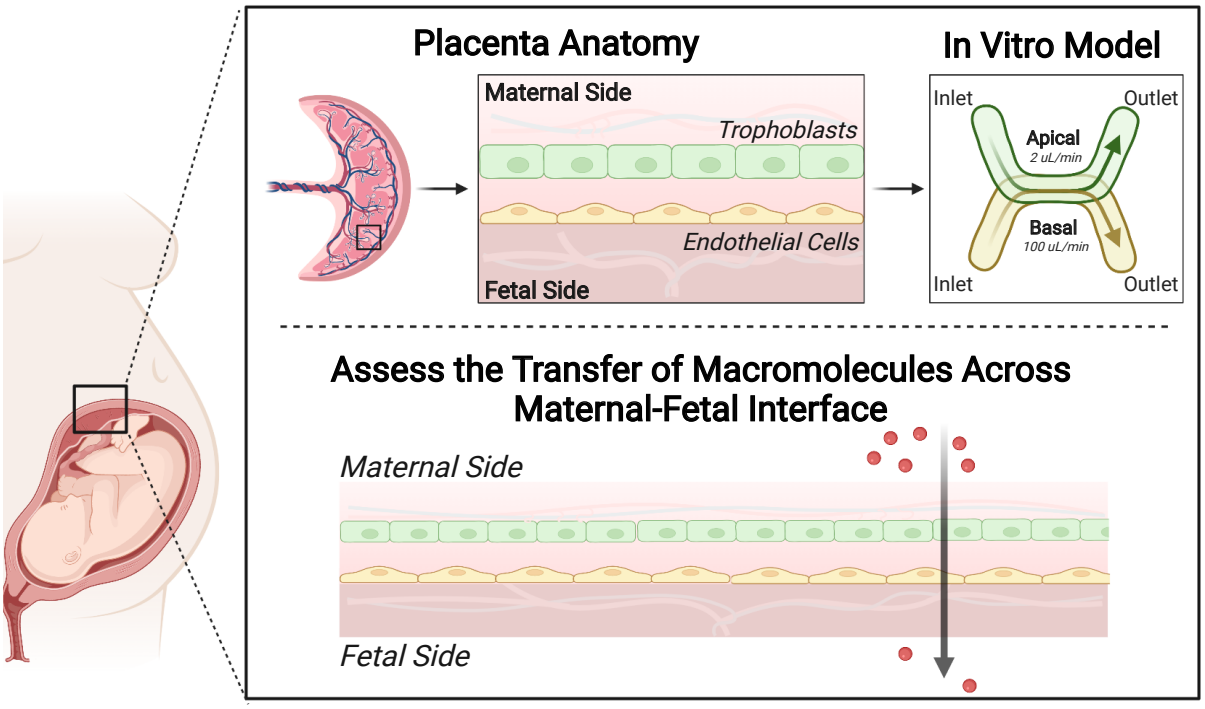
Surgical adhesives provide excellent tools for wound closure. However, prior to their use in clinical applications, extensive testing is required to evaluate their material properties and the forces that they can sustain. An important adhesive characteristic to consider is its burst pressure, defined as the pressure at which an adhesive applied over a hole or laceration fails. Burst pressure testing is a standard method used to evaluate the mechanical stresses that adhesives can withstand, and various laboratory bench tests have been individually developed across research and industry for evaluating this parameter in vitro. The aim of our project was to utilize aspects of prior burst pressure bench tests to design a custom testing apparatus optimized to both measure burst pressure and visualize leakage for the purpose of supporting Draper R&D efforts. To construct this system, a review of other burst testing systems was conducted to reveal necessary system components. Conceptual design iterations were then created, incorporating the components of prior designs that best fit the aims of our system. These conceptual designs were reviewed until one was selected to be physically prototyped and tested to validate the capabilities of the system. By allowing for both measurement and visualization of surgical adhesives, our design enables rapid and accurate testing of surgical adhesives to aid in the continuing development of novel surgical adhesives. Moreover, it can provide further precedent for the development of future burst pressure tests that can better yield insight into the qualities of surgical adhesives.



Developing Placenta-on-a-Chip Model to Test Drug Transfer at the Maternal-Fetal Interface

Team 15: **Mackenzie Obenreder, Christianna Roggeveen**
Technical Advisors: **Robert Gaibler (Draper), Corin Williams (Draper)**

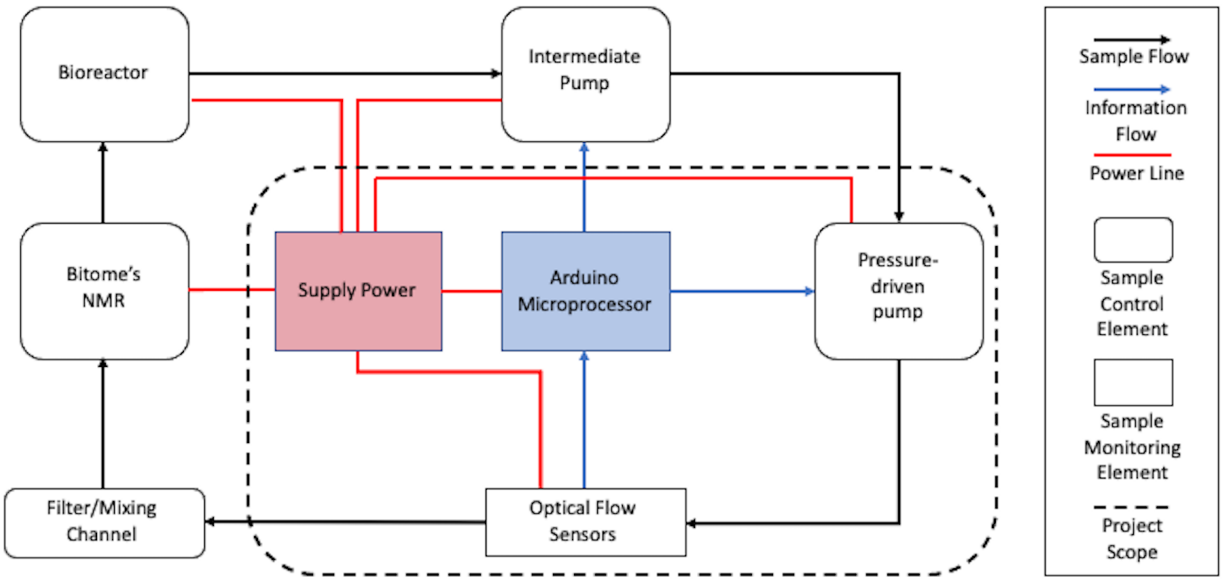
Despite the large number of women who report taking drugs throughout the course of pregnancy, the transfer of drugs from mother to fetus is largely understudied. Due to the limitations and ethical concerns of testing drugs in pregnant women as well as the structural and functional constraints of existing in vitro and animal models, it is hard to gain an understanding of placental transfer. To this end, a physiologically relevant in vitro model of the human placenta is required. In this project, an organ-on-a-chip model of the placental barrier was engineered using Draper's PREDICT96 platform. By capitalizing on this high throughput microfluidic system, the conditions to establish the placental barrier were optimized. To improve upon the model, the flow rates on either side of the barrier were controlled independently with the maternal trophoblast cells receiving low flow while the fetal endothelial cells had a higher flow rate. The BeWo trophoblasts became more confluent when treated with forskolin which improved barrier function. We are currently testing glucose transfer across the barrier for comparison to in vivo measurements. From there, the transfer of Tylenol from maternal to fetal side can be assessed using liquid chromatography - mass spectrometry. Our studies point to the feasibility of using the PREDICT96 platform to optimize the in vitro organ-on-a-chip model of the placenta barrier and conduct high throughput drug testing.



Microfluidic Pump Optimizes Sample Transport In Integrated Bioreactor

Team 28: **Cassidy Balboa, Austin Cozzone, Kian Patton**
Technical Advisors: **Nate Fullam (Bitome), Herb Ryan (Bitome)**

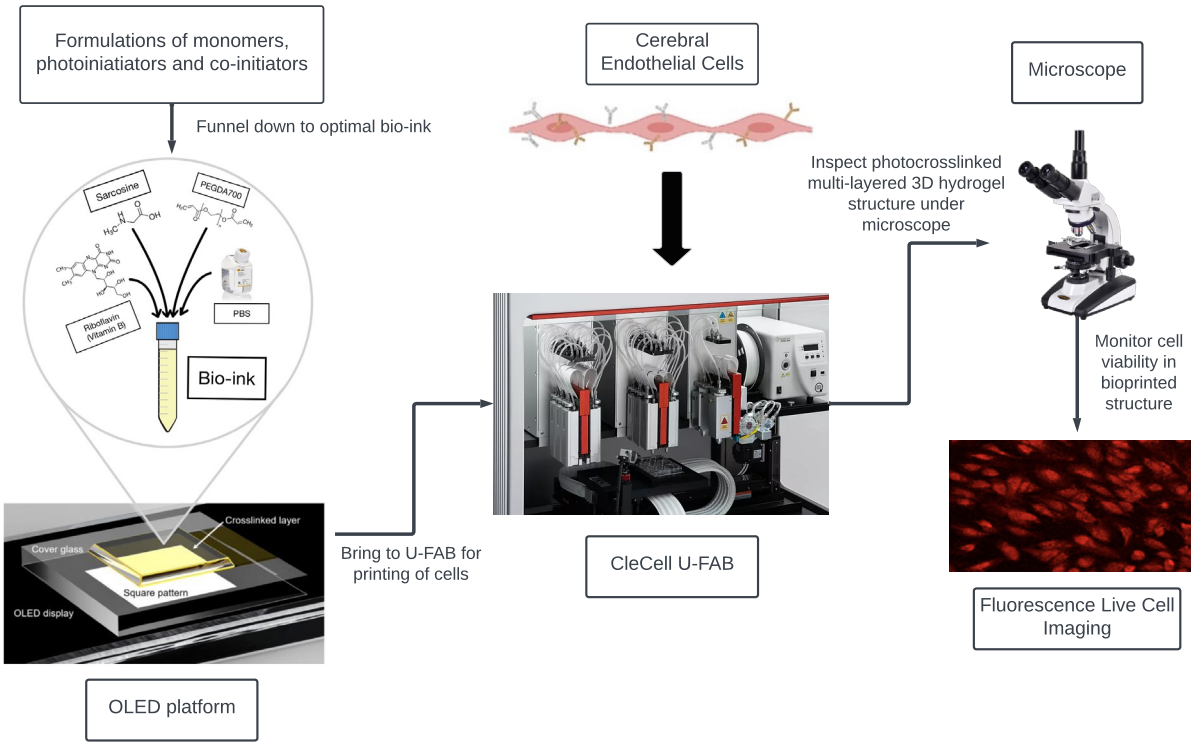
Bitome uses their benchtop nuclear magnetic resonance (NMR) spectrometer to provide automated analysis of liquid cell media from any bioreactor. As bioprocess research and manufacturing grows, there is a growing need for metabolomic analysis that is quick, low-cost and minimizes loss of product. The company's miniaturized NMR spectrometer currently requires manual sample delivery and further streamlined integration between bioreactors and their product is desired. Automation of sample delivery, integration bioreactor and NMR components would allow for higher data throughput. Our group produced an automated, in-line, pressure-driven sample transport system enabling control and monitoring of bioprocessing parameters. Our novel application of a pressure-driven pump to integrate Bitome's bench-top NMR with a bioreactor allows for consistent microfluidic sample mixing and filtering prior to NMR analysis leading to higher fidelity metabolite analysis. For large-scale data analysis of this kind to be successful, it is essential to optimize the components of sample handling and processing as best as possible. Our team employed in-line pressure sensors with our pump to monitor sample transport flow rate. The use of these sensors, along with optical flow rate monitoring fed to an Arduino microprocessor providing proportional-integral-derivative (PID) control, ensures consistent flow of cell broth through the pump, filters, and mixers. Closed-loop transport ultimately returns the sample back to the bioreactor for continued culture growth, minimizing product loss.



Breaking Barriers in Bioprinting

Team 10: **Thang Le, Tiffany Lukmantara**
Technical Advisors: **Seung-Schik Yoo (BWH & Harvard Medical School), Kavin Kowsari (BWH & Harvard Medical School)**

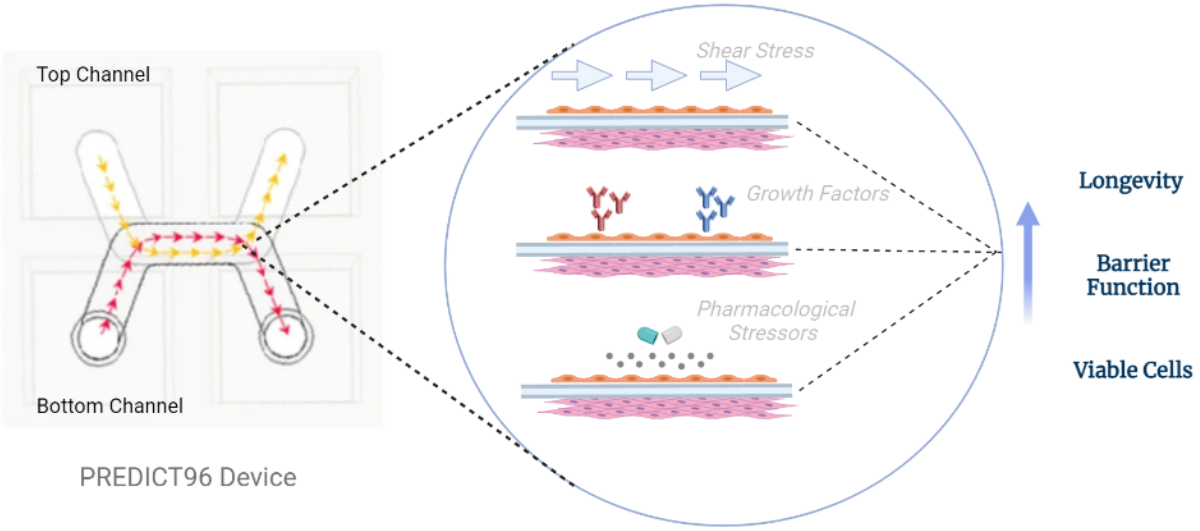
Given the significance of unprecedented biomimicry for artificial organs and tissues, there is an unmet need for a 3D bioprinting technique that can facilitate rapid printing while supporting high cell viability. Conventional extrusion or droplet dispensing printing is too time-consuming due to the constraint of layer-specific molds and exposes cells to high shear stresses at the nozzle. The photo-crosslinking technique addresses these limitations by crosslinking two-dimensional (2D) layers in a single exposure through modulation of the light source. However, existing photocrosslinking-based methods rely on cytotoxic ultraviolet-sensitive photoinitiators. The goal of this study is to develop a novel 3D bioprinting technique that eliminates the use of toxic components and cell-damaging UV irradiation. We propose to funnel through different compositions of biocompatible monomers, photoinitiators, and co-initiators to formulate an optimal bio-ink and utilize an organic light-emitting diode (OLED) microdisplay as a visible light modulator to photocrosslink 2D layers. Human cells will then be embedded into these hydrogel layers using the CleCell U-FAB machine. In this study, we discovered an optimal bio-ink with a rapid photocrosslinking time of 1 minute and demonstrated successful attachment of cerebral endothelial cells on multi-layered three-dimensional (3D) hydro-gel structures fabricated using the OLED platform and CleCell U-FAB machine. This integration of an innovative biocompatible ink with a high-throughput OLED printing platform carries great potential in the wide range of tissue engineering applications and is a step closer to mimicking the complex biological shapes and structures of the human body.



A Long-lived Organ-on-chip Model of the Human Vasculature

Team 18: **Tyler Crawford, Krishna Kotak, Vien Tran**
Technical Advisors: **Robert Gaibler (Draper), Corin Williams (Draper)**

Organ on a chip (OOC) technology offers an accurate and responsive model of natural human physiology. This technology has gained interest recently for its ability to enhance drug discovery at preclinical stages for the testing of new drugs. Draper has developed PREDICT96, a unique high-throughput OOC platform that is capable of supporting vascular models under physiologically relevant fluid shear stress. Although the PREDICT96 has a longer viability and function compared to the static culture system, the lifespan has not been tested for longer than two weeks. The goal of this project is to test the current lifetime limits and then improve the model with enhanced longevity to 2-3 months. To extend the model's lifetime, we will target its barrier function by co-culturing primary human coronary endothelial and smooth muscle cells, exposing the endothelial layer to high fluid shear stress, and adding various factors. To test if the model is able to respond and recover from drug perturbations, an anti-inflammatory drug is added and the response is physically and chemically characterized. Early results from trans-epithelial electrical resistance measurements and LIVE/DEAD staining have elucidated that co-cultured high shear stress devices contained more viable cells with a stronger barrier. Other factors, such as forskolin, were also shown to improve barrier function.



PREDICT96 Device

Projects Previously Presented

Improving Management, Detection, and Treatment of Iron-Deficiency Anemia With Rapid, Portable, and Affordable Next-Generation Point-of-Care Diagnostic Technology

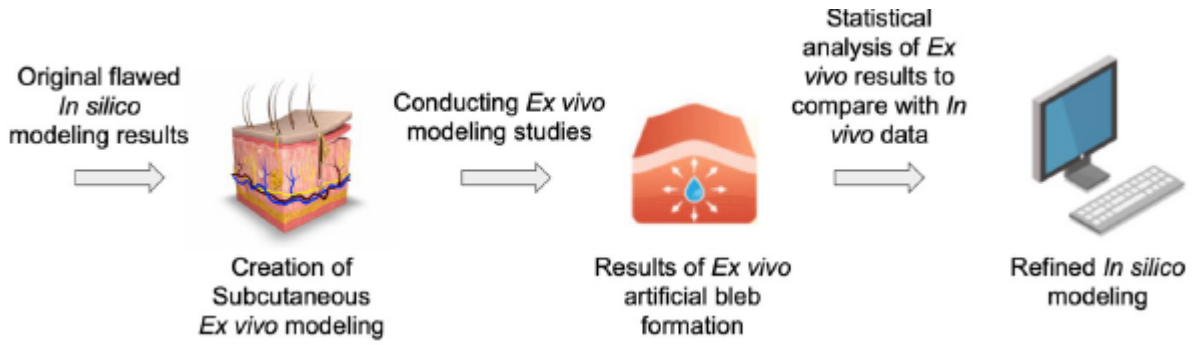
Team 27: **Andrew Chan, Parth Jalihal, Sahil Mohanty, Rohun Yarala**
Technical Advisors: **Heather Fraser (Synthera Health), Javier Fernandez-Juarez (Synthera Health), Preeti Putcha (Synthera Health)**

Around five million people in the US currently suffer from iron deficiency anemia (IDA), but expensive and inconvenient standard blood testing options tend to lead to significantly late detection of this condition, thereby reducing the effectiveness of treatment options. The cost of repeating standard blood tests, which often process in several hours to days, can quickly become a great burden for patients in areas with relatively low health care resources who wish to test frequently. Potential lack of affordable transportation to well-equipped medical facilities also proposes an obstacle to consistent testing. Furthermore, even patients in developed, high cost-of-living areas with adequate medical resources are typically not tested enough to properly track and evaluate iron levels. Most standard blood tests also rely solely on hemoglobin sample detection to interrogate iron health status, ignoring other important markers which may also provide indicative medical information. To address these shortcomings, an affordable, novel, paper-based point of care (POC) diagnostic test for iron deficiency anemia will allow for rapid at-home testing for IDA. Utilization of multiple detection analytes and chemical paper mediums, which have colorimetric properties, will allow for more comprehensive analysis and can be operated with minimal sample preparation and knowledge by the user. Testing of iron biomarkers to evaluate iron health through this device will be repeatable at any desired frequency with little to no additional cost and provide results within mere minutes, offering a convenient and efficient solution to the existing IDA diagnostic barriers.

Characterization of A Subcutaneous Bleb Model

Team 29: **Jordan Barker, Thomas Settelmayer**
Technical Advisor: **Edward Tang (Takeda Pharmaceuticals)**

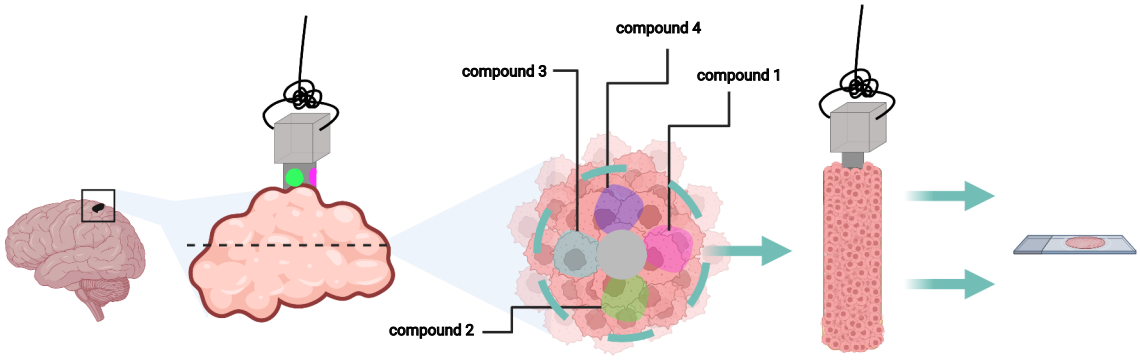
Subcutaneous large volume infusions play a critical role in drug therapies that require continuous delivery at low dosages. Delivered into adipose tissue underneath the epidermis and dermis, subcutaneous injections provide many advantages over intravenous administration, including offering the possibility of at-home treatment, reducing user error and reducing overall care costs. Despite these advantages, subcutaneous administration of large volume infusions can lead to the formation of blebs that produce concentrated pressure, further leading to complications for patients receiving treatment. When utilizing subcutaneous injection volumes greater than 1 mL, these complications from bleb formation can include injection pain, high subcutaneous back pressure, leakage and reactions at the injection site. Current research on the formation of subcutaneous blebs is primarily performed through costly and laborious animal studies. Furthermore, these animal studies generally lack in providing sufficient quantitative data for analysis. To solve the issues associated with conventional animal studies, a three-part in-silico computer model was developed by Takeda Pharmaceuticals with the goal of assessing the contributing factors in predicting patient complications from bleb formations. The current computer modeling relies on the assumption that human subcutaneous tissue is a uniform space, which is not representative of real-world data and was unable to reproduce in vivo testing results. By conducting ex vivo studies utilizing proprietary subcutaneous modeling, we propose research guided solutions to flaws associated with Takeda's current computer model. Results of the conducted ex vivo studies are ultimately leading to more robust in silico modeling, capable of providing a novel and efficient alternative to in vivo testing of large volume infusion therapies.



Implantable Microdevice for Drug Efficacy Testing in Tumors

Team 35: Samantha Downing, Rebecca Janes, Maria Merhej
Technical Advisors: **Oliver Jonas (BWH & Harvard Medical School), Kyle Deans (BWH), Sebastian Ahn (BWH), Sharath Bhagavtula (BWH)**

Implantable microdevices (IMDs) have emerged as a useful method to improve the processes of cancer treatment. Existing tumor imaging, tumor marking analysis, and other current alternative cancer drug assessment and treatment methods expose patients to drug toxicities, require months to years for results, and may not accurately model in vivo tumor sensitivities. Utilizing IMDs for assessment of brain and deep-tissue tumors requires modifications to the size and shape of existing IMD designs. Using clinician input, the brain IMD was redesigned for placement under the meninges and is removed with surrounding tissue through a biopsy procedure. Additional adjustments were made for removal by pulling on a nylon suture in the case of an aborted procedure. Force testing was performed to determine if the suture interface would be able to withstand estimated removal forces. The brain IMD was able to withstand a force over 120% greater than the force required as estimated by the clinician. The brain IMD was also able to withstand a force over 1200% greater than the force as estimated by phantom model testing. The deep-tissue IMD shaft design was significantly modified in order to facilitate minimally invasive retrieval through a 16-gauge needle. In order to evaluate drug effectiveness, a 400 μm radius of tissue is needed. The deep-tissue IMD design was tested in phantom gels and tissue samples in order to determine the amount of tissue collected during the biopsy. We plan to further investigate the efficacy of the brain and deep-tissue IMDs by conducting animal trials to evaluate their drug eluting properties.



Delivery
Device is inserted into the brain lesion site

Dosing
Device releases drug microdoses into tumor

Retrieval
Frozen tumor sections are prepared for histology

Histological Analysis
Determines drug effectiveness for comparisson

Senior Design Projects Conference

2022

Student Resumes

BU Department of Biomedical Engineering

Noah Abrha

33 Harry Agganis way, Boston MA · 860-618-8845 · abrhano@bu.edu

EDUCATION

Boston University, Boston, MA *May 2022*

Bachelor of Science: Major in Biomedical Engineering

Relevant Coursework: MATLAB, Probability Statistics and Data Science, Electrical Circuits, Differential Equations, Biomedical Engineering Design, Signals and Controls, Molecular Cell Biology and Biotechnology, Computational Linear Algebra

EXPERIENCE

Boston University, Boston *September 2020 - Present*

Research Associate

- Working in university's undergraduate research facility to test effects of emotionally stimulating photographs on an individual's blood pressure and pulse pressure levels
- Monitored and recorded systolic and diastolic blood pressures of 25 subjects using stethoscope, sphygmo-manometer, and BP cuffs before and after exposure to visual stimuli
- Calculated 25 subjects pulse pressure and mean arterial pressure in response to stimuli to determine if significant change occurred
- Presented findings to lab PIs and working on internally published paper to university's journal

Engineering Product Innovation Center, Boston *January 2020 - May 2020*

Integrated Engineering Design Team Member

- Developed functional vaccine storage prototype for refugee camps in Kenya
- Calculated and analyzed end-to-end KPI metrics such as power consumption, input energy and input power to optimize performance
- Researched and evaluated multiple viable solutions and concluded project with actionable insights and prioritized objectives

Boston University, Boston *January 2020 - May 2020*

Research Associate

- Worked in university's undergraduate research facility utilizing GFP expression in order to tag and identify presence of particular proteins in an organic structure
- Used data analysis to examine how bacteria turns genes on and off in response to environmental conditions to sustain cell growth
- Computed a time-series analysis over change in optical density and change in relative fluorescence unit of four different culturing conditions for GFP expressions to analyze cell growth, phase growth and relationship between inducer presence and GFP expression

LEADERSHIP & PROFESSIONAL DEVELOPMENT EXPERIENCE

National Society of Black Engineers, Boston *February 2018 - Present*

Chapter Member

- Participate in a four year comprehensive Career Development Program including professional career coaching, case studies and projects to hone analytical, quantitative, and communication skills
- Involved in a global network of Black Engineers, scientists and technologists practicing leadership development, mentoring and community service

SKILLS & CERTIFICATIONS

Computer: MATLAB, Signal generators, Oscilloscope, Microsoft Word, Microsoft Excel, Microsoft Powerpoint, C, C++, Microcontroller programming, Adobe products, Quantitative PCR, Spectrophotometer, Electrophoresis, Fluorescence Microscopy

Languages: Native in English and Amharic

Vian Ambar Agustono

vianambar@gmail.com | 914-656-9640 | www.linkedin.com/in/vian-ambar-agustono

EDUCATION

Boston University **Expected May 2022**
B.S in Biomedical Engineering, Minor in Computer Engineering
Boston, MA
GPA: 3.69 [Dean's List 2018-2021]
Tau Beta Pi Honor Society **Inducted Fall 2021**
Alpha Eta Mu Beta Honor Society **Inducted Fall 2020**

SKILLS

Programming: Python, C++, MATLAB, Java, SQL, HTML/CSS, Keras, TensorFlow, Scikit-learn, Verilog, FPGA, Arduino, Shell Scripting, Unix/Linux, Git, FreeSurfer
Technical: Data Structures, Machine Learning, Signal Processing, Operating Systems, Computational Biology
Communication: English, Malay, French, Spanish

EXPERIENCE

Boston University School of Medicine **Sep 2021 – Present**
Undergraduate Researcher
- Building a pipeline to investigate the effect of different preprocessing methods on characterizing cortical features.
- Created BASH, ZSH shell scripts and python scripts to automate the processing of raw brain MRI data.

Pfizer, Digital Medicine and Translational Imaging **May 2021 – Sep 2021**
Imaging Biomarker Researcher
- Performed pre-clinical research on Non-Alcoholic Steatohepatitis by performing data analysis, image processing, and machine learning.
- Utilized a multitude of non-invasive imaging biomarkers to stratify subjects and monitor treatment efficacy.

Pfizer, Digital Medicine and Translational Imaging **Jun 2020 – Aug 2020**
Imaging Intern
- Researched the use of medical imaging technologies through exploring machine learning algorithms and performing literature analysis for monitoring Covid-19 disease progression.

Podinno **May 2019 – Aug 2019**
Summer Intern
- Podinno is an award-winning healthcare startup, conceived in the Stanford Biodesign program, that uses data analytics to prevent life-threatening injury for diabetic neuropathy patients.
- Assisted Dr. Scott Wong, the Founder/CEO in app wire-framing and the development of the Podinno app.
- Conducted market research with medical insurance companies in Singapore.

ENGINEERING PROJECTS

Classifier for Prediction of State of Anesthesia
- Studying anesthesia effects on neuronal activity in the Boston University Neuronal Dynamics Laboratory.
- Currently developing a computational model to predict the level of anesthesia in mice by utilizing multimodal neural signal recordings from the cortex.

Genetic Circuit Design Program
- Developed a Python software tool which reads a library of genetic logic gates in JSON format and allows the user to select and organize genetic gates into full genetic circuits in accordance with library-defined design constraints.
- Optimized genetic circuit response performance by computationally modifying the DNA structure of input signals.

Platformer Video Game Application
- Led a team of 4 students. Created "Jump Quest": a C++ SFML-based platforming video game which allows the player to control a sprite and navigate it through an infinite number of platforms and missions.

Gabriela Alba

galba@bu.edu • (949) 228-3094 • www.linkedin.com/in/gabrielaalba Boston, MA, 02215

EDUCATION

Boston University
May 2022
Bachelor of Science in Biomedical Engineering, Pre-Med

- Relevant Coursework: Cell Biology, Systems Physiology, Organic Chemistry, Biochemistry, Fundamentals of Biomaterials, Clinical Applications of Biomedical Design, Applications of Tissue Engineering

RESEARCH EXPERIENCE

Growth Factor Mechanobiology Lab of Boston University *April 2021-Present*
Undergraduate Research Assistant

- Investigating transport-diffusion properties of growth factors as a mediator of cartilage tissue engineering to treat osteoarthritis in the synovial joint
- Extensive training and experience in ELISA, DMMB, and PicoGreen assays
- Skilled in sterile work, tissue harvesting, tissue mechanical testing, and histology techniques

RELEVANT PROJECTS

Loading Bioreactor for Novel Age-Related Tendon Research *September 2021-Present*
Senior Design Project

- Developing MATLAB data analysis program to evaluate strain transfer in mouse tendon explants using data acquired from mechanical loading bioreactor and confocal microscope
- Implementing analysis program to evaluate decline of strain transfer in aged tendon explants

ACTIVITIES

Technology and Innovation Scholars Program *January 2019-May 2021*
Mentor

- Provided mentorship and instruction through TISP outreach program aimed at inspiring elementary through high school students to pursue engineering in college
- Lead motivational panels and hands-on engineering activities for students, highlighting the important role of societal engineers

BU Engineering Student Government *September 2020-May 2021*
VP of Philanthropy

- Primary duties of welfare, philanthropy and professional events for the College of Engineering
- Main organizer and point of contact for such events which occur at least twice a semester
- Responsible for contacting speakers and charities, and recruiting sponsors and event partners

PUBLICATIONS

- Dogru, S., Alba. G. M., Pierce, K. J., Wang, T., Albro, M. B. (2022). Dose-dependent Chemical Reaction Kinetics for Modeling of TGF-β Delivery in Cartilage Tissue Engineering. *SB^{3}C*.
- Dogru, S., Alba. G. M., Pierce, K. J., Wang, T., Albro, M. B. (2022). Reaction-Diffusion Modeling of TGF-β Delivery in Cartilage Tissue Engineering.
- Dogru, S., Alba. G. M., Albro, M. B. (2022). Spatiotemporal Activity of TGF-β in Healthy and Osteoarthritic Synovial Joint.
- Dogru, S., Alba. G. M., Pierce, K. J., Simone, N., Albro, M. B. Dose Dependent Reaction Kinetics of TGF-β in Engineered Musculoskeletal Tissues. *(under review)*

ADDITIONAL INFORMATION

Technical Skills: MATLAB, Excel, Word, PowerPoint
Languages: English, Spanish

Tyler E. Alstede

talstede@bu.edu • (413) 726-4895 • linkedin.com/in/tyler-alstede-972b21206

Education

Boston University, College of Engineering — Boston, MA
Bachelor of Science in Biomedical Engineering — May 2022
GPA: 3.99/4.00

Relevant coursework

- Calculus | Differential Equations | Probability, Statistics, and Data Science | Thermodynamics | Linear Algebra
- Programming (MATLAB) | Signals & Controls | Engineering Design | Electric Circuits | Engineering Mechanics
- Cell Biology | Systems Physiology | Chemistry | Physics | Molecular Bioengineering | Principles of Neuroscience

Honors & Awards

- College of Engineering Dean's List (Fall 2018 –Fall 2021) | Tau Beta Pi Member | National Honor Society

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Projects

Water Filtration System, Introduction to Engineering Design — Spring 2020

- Led interdisciplinary team of four in designing a water filtration system for potential use in refugee settings
- Organized team meetings to keep team on track under stressful circumstances
- Interacted with faculty to better learning experience and improve quality of team's work
- Delivered a final presentation through Zoom

Straw Truss Design Project, Engineering Mechanics — Fall 2019

- Guided team of three as team leader in designing a truss for physical testing
- Completed computational tasks on MATLAB to yield predicted data to be tested
- Developed a final report to summarize results and design process

MATLAB Final Project, First-Year Engineering Programming — Spring 2019

- Published a MATLAB application with a team of three that output car emission data based on user input

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Skills

Software: MATLAB
Scientific: Collecting & analyzing biomedical signals/measurements | Wet lab techniques

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Leadership & Work Experience

Tutor – Boston University Student Athlete Academic Support Services — September 2021 - Present

- Conducted tutoring sessions with student athletes to help with studying strategies, studying for exams, and understanding content provided during class time
- Communicated clearly with students both during and outside of scheduled appointments
- Covered subjects such as calculus, biology, cell biology, chemistry, and engineering mechanics

Outdoor Golf Operations Worker - International Golf Maintenance — May 2019 - August 2020

- Executed tasks assigned by management and co-workers to foster a positive environment for customers

Kylee Anders

kyanders@bu.edu | 302-545-3480 | www.linkedin.com/in/kyleeanders

Education

Boston University | Boston, MA — Expected May 2022
B.S. Biomedical Engineering
- Concentration in Technology Innovation, GPA: 3.61
- Resident Assistantship

University of Delaware | Wilmington, DE — May 2019
Associate of Arts
- Graduated Summa Cum Laude, GPA: 3.97
- Received Outstanding Academic Achievement Award

Skills

Programming: C++, MATLAB
Tools & Training: CITI Training, Microsoft Office, OnShape, SolidWorks

Work Experience

Biomedical Engineering Department | Boston University — Jan – Pres
Teaching Fellow
- Graded assignments and hosted help sessions for *Statistics for Engineers* students
- Promoted to lead teaching fellow; responsible for leading help sessions and assigning grading

Boston University Kidney and Medical Engineering Program | Boston, MA — Jun – Aug 2021
Research Fellow
- Observed renal clinicians at Boston Medical Center to acquire skills for human studies and assess a need for accurate volume evaluation of hemodialysis patients for research in the Biomedical Optical Technologies Lab (BOTLab)
- Adapted a computer model to validate and impact design improvements for a wearable probe for quantifying tissue hydration in hemodialysis patients
- Produced gelatin tissue phantoms to validate the ability of a benchtop system to quantify bound water in the tissue of hemodialysis patients

Academic Projects

Senior Project | Boston University — Aug – Pres
- Continuing in the BOTLab to characterize new wearable probe through *in vitro* and *in vivo* experimentation and data analysis to develop a probe for quantifying tissue hydration *in vivo*

Design-A-Thon | Boston University — July 2021
- Won first place among five teams in the Biomedical Engineering Society Design-A-Thon competition
- Utilized OnShape to produce a computer-aided design of a urea patch for early detection of chronic kidney disease

Hemodialysis Device | Boston University — Jan – May 2021
- Interviewed clinicians and researched existing technologies to determine an unmet need for kidney disease patients: early detection of infections in hemodialysis patients
- Built an inexpensive working prototype with classmates using an Arduino as the base in a control system for a motor, a computer model to detect color change, and visible feedback

Additional Experience

Dairy Queen | Middletown, DE — Jun – Aug 2020
Assistant Manager
- Supervised 30 employees operating a storefront grossing $5000 in sales per day, conducted weekly inventories, and ordered products as necessary to sustain operations

Christian Arthur

chrsthur@bu.edu | 857-318-7914 | linkedin.com/in/christianarthur35 | Boston, MA

EDUCATION

Boston University, Boston, MA — *Expected May 2022*
B.S. in Biomedical Engineering | Minor in Electrical Engineering — GPA: 3.98/4.0 (Dean's List)
Relevant Coursework: Optical Microscopy, Computational Optical Imaging, Digital Image Processing, Digital Signal Processing, Image and Video Computing, Machine Learning

SKILLS

Programming: C++, Python, C, C#, Verilog, Arduino, Docker
Tools/Utilities: MATLAB, ImageJ, Git, Microsoft Office
Laboratory Skills: Confocal Microscopy, Brightfield Microscopy, Direct Cell Staining, FRAP

EXPERIENCE

Undergraduate Student Researcher — Apr 2021 – Present
Emili Lab - Biology and Biochemistry Department at Boston University

- Utilized confocal microscopes and plate readers to obtain VBF (spatial) images and Lambda (spectral) scans of dye samples in solution form and stained cells.
- Assisted the cell expansion microscopy procedure for super-resolution fluorescence imaging.
- Conducted staining experiments on peptide microarrays for high throughput analysis of developed dyes attached to various prepared peptides.

Laboratory Assistant — Sep 2020 – May 2021
Bio Optical and Acoustic Spectroscopy (BOAS) Lab - BME Department at Boston University

- Developed of Homer3 used for analyzing fNIRS data.
- Created a GUI to update Homer3 application settings according to user needs.
- Wrote scripts for probe display manipulation and SNIRF file processing utilities.

Undergraduate Research Assistant — May 2019 – Feb 2021
Bio-imaging and Informatics Lab - Anatomy and Neurobiology Department at Boston University

- Built a NIFTI File and Brain Connectivity Viewer (brain ROI connection map) on MATLAB.
- Prototyped an application for the Gulf War Illness (GWI) Consortium to map patient's Kansas Scores to calculate expected brain imaging scores (neurite density values).
- Presented a summary of the GWI Project for the Undergraduate Research Opportunities Program.

LEADERSHIP & VOLUNTEER EXPERIENCE

Liturgical Committee — Sep 2018 – May 2021
Boston University Catholic Student Association (BUCC)

- Manage a committee of six in organizing weekly Sunday Mass, Holy Week, and Easter on campus (as liturgical chair from August 2020 – May 2021).

Student Mentor — Oct 2020 – Apr 2021
Biomedical Engineering Society (BMES) at Boston University

- Mentored a student by giving guidance and advice on dealing with classes and approaching non-academic activities (research, clubs, and internships).

PROJECTS

Gulf War Illness Brain Imaging Application (Prototype) (MATLAB)

Description: A MATLAB GUI to creates a 3D brain model based on predicted imaging score based on a user's input Kansas Score. The application uses a framework built based on the Bayesian Network concept and inferencing data from available datasets.

Smart Rodent Trap (Arduino)

Description: A rodent trap designed to trap a rodent without killing it, notify users, and allow a remote release by users. Contributed by programming scripts on the Arduino to notify users via email and enables users to remotely release the trapped rodent via a button on an Arduino cloud-based dashboard.

Shirin Bakre

Email: sbakre@bu.edu
Phone: 781-281-0909

EDUCATION

Boston University, Boston - Bachelor of Science: Biomedical Engineering

Expected May 2022

EXPERIENCE

Fount Bio, Cambridge —*Research Consultant*

October 2020 - May 2022

- Assisted Project lead in experimentations
- Managed technical equipment such as evaporator and high-pressure liquid chromatographer
- Researched large scale ex vivo study to determine efficiency of skin treatment drug conjugates/polymers

Student Government, Boston - *Senator*

January 2020 - May 2022

- Operated as executive Chair of FEAST, a student government endorsed club that promotes sustainability of food on campus
- Trained carious staffers on writing intricate bills to promote a better college life on campus
- Volunteered at local events such as blood drives, food drives, etc

Chen Laboratories, Boston — *Undergraduate Researcher*

June 2021 - December 2021

- Engaged in study to determine the efficiency of WNT2 protein on Hepatocyte cell proliferation
- Manufactured genetically engineered WNT2 protein in efforts to quantify Hepatocyte proliferation
- Conducted various experiments through bacterial culture and gene expression manipulation via genetic engineering
- Presented findings as a capstone presentation at the UROP Symposium

Mitragotri Laboratory for Drug Delivery, Cambridge — *Research Assistant*

January 2019 - October 2019

- Performed skin penetration studies for non-invasive drug therapy via varied ratios of doxorubicin
- Conducted chemical synthesis and characterization of polymer-drug conjugates and their specified ratios
- Analyzed incoming data for accuracy and integrity to identify and fine-tune experimental protocol
- Cultivated various cancerous cells: Lymphoma, Leukemia, Melanoma
- Completed and assisted in the writing of extensive literature review

PROJECTS

- Senior Capstone project: Improving the efficiency of generating lipid nanoparticles via microfluidic device

SKILLS

- Quantitative and qualitative analysis of data
- Proficient Matlab and coding skills
- Documentation, literature review, and writing

HONORS & AWARDS

- Undergraduate Research Opportunity Program 2021
- Technology and Innovations Scholarship 2020
- Krishnan, V: Dharamadasani, V.; Bakre, S.; Dhole, V; Wy, D; Bogdan; Mitragotri, S. “Hyaluronic acid nanoparticles for immunogenic chemotherapy of AML and T-cell Lymphoma”
- Krishnan, V: Peng, K.; Sarode, A; Zhao, Z; Filippov, S.K.; Todorova, K.; Sell B.R.; Lujano, O.; Bakre, S.; Mitragotri, S. “Hyaluronic acid conjugates for topical treatment of skin cancer and precancerous lesions”

LEADERSHIP

- Spearheaded various movements within the student body including mental health advocacy and diversity and inclusion

Cassidy Balboa

cbalboa@bu.edu • 443-966-2043 • linkedin.com/in/cassidybalboa • Boston, MA

Education

Boston University College of Engineering | Boston, MA — Expected May 2022

Bachelor of Science in Biomedical Engineering

Relevant Coursework:

- Programming for Engineers
- Statistics and Data Science
- Calculus 124/125/225
- Intro to Engineering Design
- Physics 211/212
- Device Diagnostics
- Molecular Cell Biology
- Systems Physiology
- Chemistry 101/102

C. Milton Wright High School | Bel Air, MD

- Class Rank: 20
- Weight GPA: 4.65
- Member of National Honors Society, Math Honors Society, Science Honors Society, French Honors Society, Section Leader in Marching Band

Skills

- Proficient in programming languages MATLAB, Arduino, and C+
- Experienced in Microsoft Word, Excel
- Lab experience with 2 semesters of chemistry lab, 1 semester of microfluidics lab, 1 semester of cell biology lab, 2 semesters of physics lab, 2 semesters of biomedical measurements lab
- Strong analytical and mathematical skills along with strong leadership qualities
- Fluent in Spanish

Relevant Experiences

Design Internship | Worchester Polytechnic Institute — May 2021 – Aug 2021

- Prototyped an infrared orthopedic wearable device alongside teammates based on design created in SolidWorks, along with a rudimentary device with working infrared lights

Engineering Brigades | Boston University — Sep 2018 – May 2022

- Analyzed problem solving scenarios relevant to world problems such as resolution of economic disparities and lack of resources in other countries
- Worked with members of brigade and local community to assess problems and solutions to water access within Honduras to design sustainable water system pump and infrastructure
- Helped chapter fundraise over $400 to alleviate cost of travel to Honduras

Student Government Senator | Boston University — Sep 2020 – May 2022

- Served as a representative of the College of Engineering in the Student Government Senate and brought forward advocacy topics and proposed initiatives to address concerns of constituents
- Participated in weekly Senate debates and managed Election Oversight Committee to oversee student government candidates in election of slate representing 16,000 students

Tri Delta Sorority | Boston University — Feb 2019 – Dec 2020

Sponsorship Chair

- Facilitated relationships between members through creation of pairings as head of Sponsor Committee by creating mentor/mentee pairs throughout chapter
- Planned logistics and budgeting of membership events, managing a budget of $700
- Worked as part of membership team that focused on relationships in chapter and recruitment of 30 new members

Jordan Barker

jabarker@bu.edu • (631) 578-0629 • www.linkedin.com/in/jordan-barker- Boston, MA

EDUCATION

Boston University College of Engineering — Boston, MA
Bachelor of Science in Biomedical Engineering — Expected May 2022

RELEVANT COURSEWORK

Optical Microscopy of Biological Materials	Device Diagnostics and Design	Biomedical Optics
Thermodynamics & Statistical Mechanics	Systems Physiology	Nanotechnology

SKILLS

Languages: C, MATLAB
Applications: Microsoft Excel, PowerPoint, Word, Arduino

PROJECTS

Takeda Pharmaceuticals: Characterization of a Subcutaneous Model — Sep 2021 – Apr 2022

- Researching human tissue through literature reviews and subject matter expert consultations to optimize an in silico model for subcutaneous bleb formations caused by large volume infusions
- Generating and testing the principles surrounding a physical subcutaneous tissue model at Boston University's Interfacial Fluid Lab to acquire data for in silico model development

Research of Sleep and Caffeine on the Acuity of Cognitive Function — Sep – Dec 2020

- Conducted an experiment that tested sleep duration and caffeine metabolism as separate variables
- Identified correlations between tested variables, separately and in conjunction, and reaction time

Temperature Control Unit for Tissue Engineering — Sep – Dec 2019

- Designed and programmed a temperature regulating unit with sensors to measure and adjust the system's heat to maintain cellular sample integrity
- Conceived design from client's specifications, which included being compatible with a 96-well plate and a specified microscope from a BSL-2 laboratory
- Collaborated in a team of 5 to program unit using an Arduino
- Presented final product to a class of 30 students and professor

Additional Projects: Truss Analysis Project, Gold Nanoparticles to Improve Transfection Efficiency Proposal, Quantum Dot Therapy Research Project Proposal, Device and Diagnostics Design Project

PROFESSIONAL EXPERIENCE

Boston University Healthway — Boston, MA
Testing Site Personnel — Sep 2020 – Apr 2022

- Instructed and oversaw staff, faculty, and students as they collected nasal samples for the RT-PCR testing of COVID-19
- Aided patrons when questioned about university policy and directions
- Coordinated with the laboratory in the Rajen Kilachand Center for Integrated Life Sciences & Engineering to safely organize and send samples for testing

Pettegrew Homestead Farm Research Inc. — North Babylon, NY
Research Intern — May – Sep 2021

- Researched traditional medical treatments and diagnoses tests for autism spectrum disorder and Alzheimer's disease in collaboration with two other interns
- Consulted experts in augmented reality technology and general psychiatry in applying diagnostic and therapeutic examinations for neurodegenerative disorders to a device

Robert William Bing

rbing@bu.edu • 516-592-1192 • Boston, MA 02215

EDUCATION

Boston University College of Engineering, Boston, MA — Expected May 2022
Bachelor of Science in Biomedical Engineering with a Concentration in Nanotechnology

EXPERIENCE

BOAS Labs, Boston, MA — May 2019 – Present
Research Assistant

- Co-authored research abstract, *NinjaNIRS 2021: Continued progress towards whole head, high density fNIRS*, for Society of Photo-optical Instrumentation for Engineers (SPIE) conference
- 3D print parts using SolidWorks and design skills for experiments with LulzBot and Formlabs printers
- Apply Arduino, circuitry, and soldering skills to aid in experiments
- Design and manufacture casings for NinjaNIRS source optodes, detector optodes and accelerometers
- Conduct 3D printer routine maintenance and calibration on the lab's Lulzbot printers and train new users

EK481 Introduction to Nanotechnology, Boston, MA — January 2022 – Present
Teaching Fellow

- Taught and set-up three lab sections that demonstrated the fundamentals of nanotechnology
- Responsible for grading lab reports of undergraduate engineering students

ICC Consulting LLC, Marlborough, MA — October 2019 – April 2020
Optical Technician Consultant

- Constructed silicon and germanium photodiodes to distribute for use to photonics companies
- Calibrated photodiodes using NIST traceable UV-NIR calibration

PROJECTS

Ergonomic Backpack Design for Combined Three-System Brain Analyzation — September 2021 – Present

- Designing a comfortable backpack that can hold EEG, fNIRS, and eye-tracking glasses systems
- Modeling case designs in SolidWorks to hold open-source fNIRS system and battery
- Writing comprehensive surveys to assess comfort and issues with previous single-system fNIRS backpack design
- 3D printing models using both stereolithography (SLA) and selective laser sintering (SLS) techniques
- Training teammates how to use SolidWorks to better team performance and quicken prototyping process

Serial Sequencer — May 2021 – August 2021

- Solved issue of sequencing brain tissue slices as to not disrupt PS-OCT microscopy for up to 24 hours
- Designed automatic plate loading system to drop aluminum plates in brain bath water to serial section plates

LEADERSHIP

Boston University College of Engineering EK200 Program Boston, MA — September 2020 – Present
EK200 Mentor

- Acting as a source of guidance to help sophomores adjust to a harder curriculum
- Organizing online events for sophomores to network and hosting time-management/teamwork workshops

Residence Life at Boston University Boston, MA — September 2018 – May 2019
Floor Representative

- Arranged floor events with my RA to help approximately 40 freshman students engage and make new friends
- Increased floor morale and quality of life on the floor by making myself available to discuss floor issues

SKILLS

Computer: SolidWorks, Arduino, MATLAB, Sketch-up, LabScribe, MetaMorph, Fiji, AutoCAD, Microsoft Word
Laboratory/Technical: Soldering, Micropipetting, Photodiode Calibration, 3D Printer Maintenance and Calibration, Basic Circuitry, Gel Electrophoresis, Cell Culturing, PCR, EEG, ECG, Fluorescence Microscopy, fNIRS

Joseph Bosco

joebosco@bu.edu
(413) 923-8237

EDUCATION

Boston University Boston, MA
Bachelor of Science in Biomedical Engineering Expected May 2022
Cumulative GPA: 3.40/4.00

RELEVANT COURSEWORK

Fundamentals of Biomaterials	Device and Diagnostics Design	Electromagnetic Systems
Organic Chemistry I & II	Biomedical Signals and Controls	Systems Physiology
Principles of Biochemistry	Modern Control Systems in BME	Cell Biology and Biotechnology

SELECTED PROJECTS

Mechanical Properties of Potential ACL Prostheses, *Biomedical Measurements Class*
- Led a group of five students in an investigation of three materials (poly-L-lactic acid, polycaprolactone, and polyglycolic acid) in braid-twist configurations useful for replacing a torn ACL.
- Designed cyclic fatigue-testing protocol for target materials.
- Analyzed data from past studies to determine the relationship between ACL replacement modulus of elasticity and *in vivo* performance.

Laser Fluorescence Dental Caries Detector, *Device and Diagnostics Design Class*
- Designed an inexpensive handheld camera device for detecting stage 1 dental caries using principles of laser fluorescence and computer vision.
- Built a statistical model using tensorflow and python capable of making predictions about caries present in pictures taken by the camera device.
- Coordinated a group of four engineering students in building a functioning prototype using a 405nm laser, a Raspberry Pi with a camera, and 3D-printed parts.

Electricity-Free Vaccine Cooler, *Personal Project*
- Built and iteratively tested a cooler designed to provide a 40^{o}F environment to store inactive vaccines temporarily in areas without reliable electricity.
- Utilized principles of evaporative cooling and thermodynamics to model and execute electricity-free solutions.

WORK EXPERIENCE

Small Radio Telescope Computer Technician September 2021 - Present
Boston University Department of Astronomy Boston, MA
- Wrote and modified programs in C to troubleshoot communication issues between telescope and motor controller.
- Managed a small team in troubleshooting and rebuilding damaged radio telescope parts, including patching reflector dish and rewiring tracking motors.
- Designed and implemented an effective workflow for fixing technical problems as they arise.

Medical Scribe June 2019 - August 2021 (Summers)
Northampton Area Pediatrics Northampton, MA
- Documented detailed patient histories, updated electronic medical records, and sent orders for diagnoses/prescriptions on behalf of physicians.
- Reduced clerical load on physicians and nurses by 10-20%.

SKILLS

Laboratory: IR Spectroscopy, NMR Spectroscopy, Gel Electrophoresis, PCR, Oscilloscope
Computer: C, C#, Python, MATLAB, JavaScript, Unix/Linux, SolidWorks, Fusion 360, Arduino
Manufacturing: CNC Mill, 3D Printing, Fatigue Testing, Drill Press, Lathe

LEADERSHIP

Volunteer, Kidney Disease Screening and Awareness Program (KDSAP) October 2018 - March 2020
Skilled persuasive speaker and writer, adept at video and audio production.
12 years of experience as a Karate-do practitioner and instructor.

Connor P. Burke

(773) 870-2111 • cpburke@bu.edu • www.linkedin.com/in/connor-p-burke

EDUCATION

Boston University College of Engineering **Boston, MA**
B.S. in Biomedical Engineering, Concentration in Technology Innovation **May 2022**
GPA 3.90/4.00 (Dean's List)

Universidad Pontificia Comillas - ICAI **Madrid, Spain**
Bachelor of Science, Biomedical Engineering **January 2020 – May 2020**

- Studied abroad as part of Boston University's study abroad program

EXPERIENCE

Management Consultant Intern, F-Prime Capital **May 2021 – August 2021**

- Assisted with due diligence on potential investments in several medical technology companies
- Conducted market research and competitive landscaping; met with key opinion leaders to verify findings from research and conduct commercial, clinical, and technical diligence
- Researched prospective technology partnerships and acquisitions for existing portfolio companies

Research Assistant, Boston University – Economo Lab **July 2019 – December 2019**

- Assembled and 3D printed lab equipment
- Performed minor surgical procedures involving head-fixation of mice
- Designed MATLAB code for testing apparatus

ACADEMIC PROJECTS

Technology Innovation Company Proposal **January 2021 – May 2021**

- Collaborated in a team of 5 to develop a company proposal consisting of conceptual design, market and competitor analysis, and financial projections including key assumptions and financial statements
- Device concept was a scanner which could measure a patient's vitals using non-contact infrared sensors and image processing techniques; the purpose of the device was to mitigate disease propagation in healthcare environments

Petri Dish Incubator **January 2019 – May 2019**

- Designed and constructed a functioning prototype for a petri dish incubator which could maintain a constant temperature of 37°C while being observed under a microscope
- Collaborated in a team of 4 to program a screen interface using Arduino, design circuitry connected to heating components, and 3D model external components of the prototype in SolidWorks

LEADERSHIP & ACTIVITIES

Member, Tau Beta Pi Engineering Honor Society **December 2020 – Present**

- Association which recognizes academic achievement and personal and professional integrity
- Must be within the top 12.5% of the Junior class or the top 20% of the Senior class to receive admission

Member, Club Baseball **October 2018 – Present**

- Played in fall and spring baseball seasons as a pitcher

SKILLS

General: Problem Solving, Teambuilding, Data Analysis, Data Presentation, Public Speaking, Spanish
Computer: Microsoft Office, MATLAB, C, Arduino, SolidWorks

Andrew Chan

88 Summer Street, Apt. 18, Arlington, MA 02474
aschan@bu.edu | 617-997-5381

Education

Bachelor of Science - Biomedical Engineering Candidate **Expected May 2022**
Boston University, Boston, MA

Arlington Catholic High School, Arlington, MA **September 2014 – May 2018**

Work Experience

Massachusetts Eye and Ear, Boston, MA **November 2019 – March 2020**

- Replenished and organized medical supplies in the Emergency Department
- Delivered used surgical instruments to the Central Sterile Department for disinfection
- Escorted patients to other departments in the building
- Transported specimens to the lab for testing
- Triaged incoming telephone calls for the Emergency Department

Edith Nourse Rogers Memorial Veterans Hospital, Bedford, MA **June 2015 – July 2017**

- Organized, labeled, and maintained the pharmacy cache with the Associate Chief of Pharmacy
- Prepared medications for outpatient veterans and medication carts for delivery to inpatient veterans alongside pharmacists and pharmacy technicians
- Removed expired medications from the pharmacy inventory and prepared the inventory with the pharmacy staff

Projects

Synthera Health, Lexington, MA – Diagnostics for Iron Anemia **September 2021 – Present**

- Developing a paper-based diagnostic test for iron deficiency anemia
- Performing chemical assays with reagents to determine iron concentration within a sample
- Replicating chemical assay readouts within a paper-based medium
- Developing a prototype smartphone app that quantifies the results of the chemical reaction

Boston University, Boston, MA - Water Filter Project **January 2020 – May 2020**

- Developed the design of the UV water filter system
- Lead the development of the UV compartment of the water filter system and calculated the exposure time needed within the compartment based on research data

Boston University, Boston, MA - Truss Project **September 2019 – December 2019**

- Analyzed the optimal truss member length through experimentation
- Collected the data for the maximum potential force on each truss member length
- Created an algorithm within MATLAB to predict the forces on a hypothetical truss structure
- Constructed a truss composed of straws and foam gusset plates

Boston University, Boston, MA - MATLAB Project **November 2018 – December 2018**

- Organized and sorted a large dataset of average hospital treatment costs for select hospitals within the United States
- Lead the development of an algorithm to sort hospitals based on one's location and cost within MATLAB
- Lead the design of a user interface in MATLAB for this algorithm

Honors & Awards

Boston University College of Engineering Dean's List: Fall 2018-Spring 2021

Boston University Honor Society Member: Alpha Eta Mu Beta, Tau Beta Pi

Rachael Chiao

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EDUCATION

Boston University, **College of Engineering |** Boston, MA **Expected May 2022**
Bachelor of Science in Biomedical Engineering, Pre-medical track
GPA – 3.75/4.00 (Dean's List)
Honors and Awards:
BU Presidential Scholar, BU Yawkey Scholar, Tau Beta Pi Engineering Honor Society

RESEARCH EXPERIENCE

Harvard Orthopedic Trauma Service | Massachusetts General Hospital **June 2021 – present**
Student Research Intern

- Assumed primary responsibility for building and updating the Amputation Repository associated with the Interdisciplinary Care for Amputees Network clinic, expanding it from 70 patients to over 900
- Recruited both inpatients and outpatients for multiple orthopedic trauma studies
- Collected longitudinal data through patient phone calls and reviewing patient charts in EPIC
- Conducted a literature review of hundreds of research articles regarding racial bias in orthopedic medicine

Faja Laboratory | Boston Children's Hospital **Sep 2020 – present**
Student Research Intern

- Processed NetStation EEG and BioPac physiological data (ECG, GCR) by adjusting event tags, eliminating artifacts, and performing EPA and HRV/RSA statistical analyses
- Conducted analyses on a study comparing pragmatic skill and perceived knowledge in the context of dating and sexual health
- Assisted in clinical data collection through EEG, behavioral observation, and clinical measures

Sports Medicine Department | Boston Children's Hospital **Sep 2019 – Dec 2019**
Student Research Intern

- Recruited patients for a study regarding Relative Energy Deficiency in male athletes and collecting vitals after obtaining consent

PROJECTS & PUBLICATIONS

Philips **Sep 2021 – present**
Senior Design Project

- Developed a wireless ECG sensor and smartphone application that provides user feedback and displays a real-time graph of the signal, intended to monitor the cardiac health of remote patients (team project)

Faja Laboratory, Boston Children's Hospital **Jan 2022**

- Kohn, B. H., Vidal, P., Chiao, R., Pantalone, D. Faja, S. (Under Review). Pragmatic language ability, but not recognition knowledge, predicts the ability of autistic adults to explain sexual health terms

SKILLS

MATLAB, NetStation, BioPac, EPIC Navigation, REDCap Management, Biosafety Level 1 & 2 Training

Jeonghoon Choi

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EDUCATION

Boston University College of Engineering Expected May 2022
B.S. in Biomedical Engineering
- GPA: 3.80/4.00
- Dean's List
- Richard D. Cohen Scholarship

Relevant Coursework:
Organic Chemistry Biomolecular Architecture Biochemistry Nanotechnology

RESEARCH EXPERIENCE

AltrixBio Oct 2019 – Sep 2021
Research Intern; Head of R&D: Shardool Jain
- Performed experiments for finalizing polymer properties purposed for diabetes and obesity treatment
- Developed enzymatic, mechanical models for effectiveness assessments in peristaltic settings.

BU Bio Optical & Acoustic Spectroscopy Lab Jun 2020 – Sep 2020
Undergraduate Software Engineering Intern; PI: David Boas
- Completed a Python script for validation of Shared Near Infrared Spectroscopy File.
- Listed as official contributor for HOMER3: https://openfnirs.org/software/homer/developers-citations/.

Brigham and Women's Hospital Karp Lab Jun 2019 – Sep 2019
Research Trainee; PI: Yuhan Lee
- Enhanced laboratory skills through optimization of polymer purposed for diabetes and obesity treatm
- Performed chemical analysis of polymer to obtain and organize details for large scale production.

PROJECTS

Luminal Coating of the Intestine Jun 2019 –Sep 2021
- Researched an orally administered gastrointestinal coating drug for controlled GI targeting.
- Optimized drug synthesis protocol for formulation yield, product purity, and batch consistency.
- Optimized pill and tablet content for drug release based on pH and environment exposure time.
- Developed in vitro models of peristaltic movement to test adhesive properties and glucose absorption.

CO-CURRICULARS

BU Biomedical Engineering Society Sep 2018 – May 2022
- Performed as Secretary for 2021-2022 academic year, handling communication and event organization.

BU Technology Innovation Scholars Program Sep 2020 – May 2022
- Collaborated graduate students to develop engineering analysis activities for outreach programs.

Sophomore Mentor Program Sep 2020 – May 2022
- Mentored Sophomores on transitioning from freshman year regarding study abroad, coursework, etc.

SKILLS

Software: MATLAB, Python, Java, Pymol, GitHub, Figma, Arduino
Laboratory: Rheology, Aluminum Content Testing, Strain/Stress Analysis
Other skills: Fluent in Korean, Proficient in Spanish

Hannah Collins

collinsh@bu.edu • (914) 705-3215 • www.linkedin.com/in/hannahrosecollins • Boston, MA

EDUCATION

Boston University College of Engineering — Boston, MA
B.S. in Biomedical Engineering, Kilachand Honors College — Expected May 2022
Semester Abroad, **Université Grenoble Alpes,** Grenoble, France — Spring 2020
GPA 3.71/4.0 (Dean's List)

Relevant Coursework:

Computational Synthetic Biology	Clinical Biomedical Design	Molecular & Cell Biology
Engineered Drug Delivery	Systems Physiology	Device Diagnostics Design
Probability, Statistics, & Data Science	Electric Circuits	Signals & Control Systems

EXPERIENCE

Quality Systems Intern — Boston, MA
Elucid Bioimaging Inc. — Oct 2021 - present

- Create and revise quality/regulatory documentation to facilitate release of software technology that noninvasively informs risk of heart attack and stroke through 510(k) and De Novo submission
- Review & execute testing analysis, assist with quality system training, and support quality/regulatory team
- Develop and improve quality procedures to streamline documentation practices, enhance user experience, and provide corrective/preventive action
- Research, analyze competing technologies to guide design/marketing strategies & inform investors

SELECT PROJECTS

Design/Modeling of Synthetic Gene Circuits Based on Protein Oligomerization — Sep 2021 - present

- Design and construct synthetic gene circuits performing signal processing function of input coherence detection through a collaboration with the BU Khalil Lab and UW Baker Lab
- Translate novel proteins into an *in vivo* yeast system and perform iterative induction experiments
- Develop a mathematical model based on ordinary differential equations to derive circuit parameters such as maximum induction, induction time constant, and decay time constant with greater than 85% accuracy

Pulse Oximeter Design — Sep - Dec 2020

- Designed and constructed a working prototype of fingertip pulse oximeter intended for at-home use
- Programmed device with an Arduino Uno to recognize user input and initiate measurement, capture blood oxygenation information, relay the information to a remote sensor, process and filter signal, display final output

Study of Spectral Differences of Myoglobin Derivatives — Feb - May 2019

- Prepared myoglobin species (Mb(II) & Mb(III)) from lyophilized horse heart myoglobin through reduction and purification techniques, including size exclusion chromatography
- Distinguished between two Mb species and analyzed properties with UV/Vis spectroscopy
- Mathematically determined binding strength between myoglobin and various anionic ligands

SKILLS

Laboratory
HPLC, TLC, size exclusion, quantitative solution preparation, titration, molecular and atomic spectroscopy, cell culture preparation, micropipetting, flow cytometry, data analysis, experimental design, signal processing, technical writing, presentation, qPCR

Computer
Matlab, C, Microsoft Excel, PowerPoint, Word, Jira, Arduino, Stella Architect, CAD, Jira

LEADERSHIP & ACTIVITIES

Member, Tau Beta Pi (engineering honor society)
Secretary, Step About Boston (BU Irish culture group)
Tutor, Chemia (BU chemistry org)
Volunteer, Appalachia Service Project

Elisa Cordeiro Lopes

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EDUCATION

Boston University College of Engineering May 2022
Bachelor of Science in Biomedical Engineering, GPA: 3.70 (Dean's List)
Minor in Computer Science, Concentration in Machine Learning

SELECTED PROJECTS

Classifier of the Depth of Anesthesia January 2021 - Present
Neuronal Dynamics Laboratory

- Code moving average algorithm to automate feature labeling of electrical data using Scipy
- Find meaningful features from data using Scipy Signal Processing library, such as spectrograms, coherence, flatness and burst suppression
- Test multiple parameters using sklearn RandomizedSearchCV function of Random Forest and Support Vector Machine to classify data

Diagnosis of the Chest X-Ray May - June 2020

- Tested Alexnet, Resnet, and VGG using keras in chest x-ray images classifying 13 diseases
- Performed image slicing using PIL and specific created filter function

BostonHacks, SmartShop November 2020

- Used Neural Networks to predict user's next grocery shopping list using PyTorch
- Developed backend of website using Firebase and pyrebase

Movie Ratings Predictor March 2021

- Performed feature extraction and organized data with Pandas
- Tested classification models using sklearn such as K-Nearest Neighbors and Support Vector Machine
- Wrote detailed and informative report of thought process, experimentation, and results

EXPERIENCE

Boston University Mechanical Engineering Department September 2019 - Present
Teaching Assistant, Programming for Engineers

- Lectured about MATLAB and C programming languages
- Managed office hours to answer student questions and debug their code

Boston University Nazer Laboratory June 2020 - August 2020
Research Assistant

- Created code in Python for structure learning using Scikit, Scipy, and Numpy
- Debugged and applied algorithms to calculate quadratic approximation of sparse inverse

SKILLS

Computer Programming: Python, MATLAB, C/C++, SQL, Java
Machine Learning Libraries: Scikit-Learn, SciPy, PyTorch, TensorFlow, Pandas, Numpy, Matplotlib
Languages: Portuguese, English (native/full professional proficiency), Spanish (basic)

AFFILIATIONS & LEADERSHIP

Student Government - Senator Since 2022
Biomedical Engineering Society (BMES) - Project Lead, Mentor Since 2018
Boston University Brazilian Association (BUBA) - PR Chair, Secretary Since 2018

Austin J. Cozzone

acozzone@bu.edu • (610) 888-3416 • www.linkedin.com/in/acozzone • Springfield, PA 19064

EDUCATION

Boston University, College of Engineering — Expected May 2022
Bachelor of Science in Biomedical Engineering

Relevant Coursework:

Biomaterials Science	Neuroscience	Thermodynamics	Molecular Bioengineering
Nucleic Acid Engineering	Systems Physiology	Genetics	Human Brain Mapping

SKILLS

Data Analysis & Research	Confocal Laser Microscopy	PCR & Gel Electrophoresis
Lab Animal Maintenance	Restriction Enzyme Digest	MATLAB Programming
Whole-Mount Skeletal Stain	Microdissection	English (Native Language)

RELEVANT EXPERIENCE

Undergraduate Researcher — May 2021 – Present
Boston University Medical Campus, Department of Pharmacology & Experimental Therapeutics

- Sorting & extracting DNA of zebrafish, with focus in craniofacial development and identification of mutant genes conserved in human models to identify treatment for osteogenic disease
- Handling and treating lab animals, conducting polymerase chain reaction and imaging for further analysis of skeletal deformations in embryonic development
- Presenting peer-reviewed, relevant literature to lab staff and elaborating on data pertaining to craniosynostosis while adjusting current research practices in accordance with new information
- Maintaining zebrafish in aquatics facility with regular feeding of rotifers, screening of transgenic lines, and mating to keep records of breeding lines for future identification of potential mutants

Publications:

Miao, K., **Cozzone, A.**, Fisher, S. (2022). "Osteoclast activity sculpts nerve foramens in the zebrafish skull." *Frontiers in Endocrinology*, Fish as a Model Organism for Skeletal Diseases.

Policy Research Intern — Aug 2020 – May 2021
STEM-ME, Inc., Engineering Enrichment Education

- Developed curricula & company policies for STEM non-profit for children aged 6-18
- Met regularly with board of trustees and executive officers, in conjunction with governance internship team to further develop company policies in accordance with state laws & regulations

Student Intern — Jan 2017 – May 2017
Fox Chase Cancer Center, Teen Research Internship Program (TRIP) Initiative

- Designed an experiment using fruit flies and a novel multidimensional locomotive assay to evaluate effects of drugs on injury recovery and translational research into sports medicine
- Presented final research projects at Fox Chase Cancer Center symposium among peers, lab mentors & instructors, and cancer researchers, emphasizing novelty and efficacy of experiment

EXTRACURRICULARS

Judicial Staffer — Nov 2021 – Present
Judicial Advisory Commission of Student Government

- Reviewing, sorting, and archiving of judicial and senatorial documents for accurate bookkeeping and establishing a framework for future representatives to work from
- Assisting with data collection and publication of semester report including university-wide studies of current events and potential future directions

Senior Class Chairperson — Sep 2021 – Present
College of Engineering Student Government

- Organizing career-development and social events for College of Engineering's the Class of 2022, including networking opportunities with local companies and laboratories
- Providing students the opportunity to network with industry professionals during career search

Tyler Crawford

tjcraw@bu.edu • (443) 835-9757 • linkedin.com/in/tylercraw • Boston, MA

Education

Boston University | College of Engineering
Expected May 2022 ***Bachelor of Science in Biomedical Engineering***

Related Coursework: Biomedical Measurements, Biomaterials, MATLAB & C Programing, Material Science, Molecular Bioengineering, Probability Statistics and Data Science, Tissue Engineering, Thermodynamics and Statistical Mechanics, Transport Phenomenon of Living Systems

Experience

Research Assistant | BU Genomic Anthropology Laboratory **July 2020 - Jan 2022**

- Determined variance in gene TMPRSS2 was not affecting Covid-19 susceptibility
- Created R pipeline to compute statistical analyses and graphical interpretations such as Hardy-Weinberg and linkage disequilibrium heat map
- Quantified neutrality statistics and extended haplotype homozygosity of loci to understand howdiffering allele frequencies occurred

Biomedical Engineering Intern | Worcester Polytechnic Institute **June 2021 - Aug 2021**

- Designed low-cost solar powered autoclave alternative for middle to low income countries within a multidisciplinary team of three engineers
- Researched and implemented solar technology with an energy storage to meet constraints
- Investigated sterilization standards to ensure device met all legal criteria

Clinical Engineering Intern | UMD St. Joe's Hospital **May 2018 - Aug 2018**

- Repaired fifteen medical devices such as IV pumps and EKG daily
- Verified functionality or malfunction by performing diagnostics
- Collaborated with eight team members in installation and diagnostic testing of an MRI

Projects

Organ-On-Chip | Draper Laboratories **Sep 2021 - Present**

- Co-culturing human coronary endothelial and smooth muscle cells in an organ-on-chip device to investigate longevity of the model within a team of three engineers
- Planning and executing experiments to improve barrier function and phenotypic response
- Evaluating results of end point and real time conditions using viability and immunostaining assays, TEER measurements, and ELISA
- Incorporating recent findings from literature review into experimental design

Skills

Laboratory: Bacterial Transformation, Cell Culture, Chromatography, Chromosome Extraction, Confocal Microscopy, Immunohistochemistry, Gel Electrophoresis, Molecular Cloning, PCR, Pipetting
Computer: C, CAD, Lab View, MATLAB, Microsoft Office, Python, R

Leadership & Activities

College Democrats of Massachusetts Black Caucus Chair **July 2020 - Present**
Boston University Consulting Group **June 2021 - Present**
National Society of Black Engineers **Sep 2018 - Present**

Simrita Dhulekar

simritad@bu.edu • 864-373-1085 • https://www.linkedin.com/in/simritadhulekar

EDUCATION

Boston University College of Engineering Boston, MA
B.S. in Biomedical Engineering, Cum Laude Expected May 2022
Cumulative GPA: 3.65/4.00, Dean's List: Spring 2020, Fall 2020, Fall 2021
Relevant Coursework: Tissue Engineering, Biomaterials, Fluid Mechanics, Modern Control in BME

EXPERIENCE

Undergraduate Research Assistant: Kotton Lab, PI: Dr. Darrell Kotton Sep 2021 – Dec 2021
Center for Regenerative Medicine (CReM), Boston University School of Medicine, Boston, MA

- Performed PCR genotyping & agarose gel electrophoresis to detect presence of SPC-Cre & AGER genes in mice required for *in vivo* studies on engineered stem cells and examined alveolar epithelial type 1 cells using fluorescence microscopy in collaboration with PhD student.

Undergraduate Researcher: Cell & Tissue Mechanics Lab, PI: Dr. Béla Suki May 2021 – Sep 2021
Boston University College of Engineering, Boston, MA

- Investigated impact of aging on biomechanical and tissue self-healing properties of Lung Parenchyma & Chest Wall by performing computational modeling using MATLAB and Hexagonal Spring Network Program.

Sustainability Innovation Biomedical Engineering Intern Jun 2020 – Aug 2020
Born Global, Portland, ME

- Spearheaded team research & devised Biomimetic strategies to transform unsustainable biomass energy plants into circular, zero-waste Bio-Hub systems.

Cancer Research Intern Jun 2019 – Jul 2019
Prashanti Cancer Care Mission (PCCM), Pune, Maharashtra, India

- Studied triple-negative breast cancer (TNBC) radiology, pathology & surgical oncology.
- Analyzed TNBC patient medical reports to build comprehensive database & create case study presentations for Cancer Genome Atlas International Workshop for Breast Oncoplastic Surgery.

PROFICIENCIES & SKILLS

Technology: MATLAB, Arduino Nano Sense, Principal Component Analysis, Microsoft Office Suite
Laboratory: PCR Genotyping, Agarose Gel Electrophoresis, Fluorescence Microscopy, Polymerization Reactions, Nanoprecipitation, Dialysis, Flash Chromatography, Rotary Evaporation, TLC, NMR, FTIR, DLS, Lyophilization, Ellman's Assay, Cell Viability Assay with Calcein, Visible Spectroscopy, Titrations

ENGINEERING TEAM PROJECTS

Polymeric Nanoparticles for Targeted Drug Delivery to Glial Cells Sep 2021 – Present
Senior Design | PI: Dr. Timothy O'Shea, Glia Engineering Lab, Boston University

- Developed *in silico* methodology using principal component analysis (PCA) & RNA-Sequence data sets to identify specific & uniquely expressed cell surface transporters in glial cell types.
- Designed, characterized, & synthesized polymeric nanoparticles to preferentially target microglia and deliver small-molecule drugs for treating glial dysfunction in CNS disorders.

Baby Incubator Design Feb 2020 – May 2020

- Designed portable, low-cost baby incubator that evenly regulates temperature & treats jaundice.
- Conducted detailed analysis via circuit schematics, Arduino coding, technical drawings, and mathematical models for heating, battery life, & blue light irradiance.

Software Design – "The Threat of Rising Sea Levels in Boston" Sep 2018 – Dec 2018

- Constructed interactive program in MATLAB App Designer to show progression of rising sea levels from 1988-2017. Users select possible solutions and visualize effects over next 60 years.

LEADERSHIP & ACTIVITIES

Vice President: Biomedical Engineering Society (BMES), Boston University Chapter
Project Lead: BU BMES Engineering Design-A-Thon Event
Engineering Inspiration Ambassador: BU Technology Innovation Scholars Program (TISP)
Project Lead: BU BMES Regenerative Medicine & Tissue Engineering Panel Event

Keira A. Donnelly

keiraadonnelly@gmail.com, 914-329-2982 | 9 Gardner Terrace #2, Allston, MA 02134

EDUCATION

B.S. Biomedical Engineering, Boston University; GPA: 3.53/4.00 — Expected May 2022

RELEVANT COURSEWORK

BE505 - Molecular Bioengineering
BE209 - Principles of Molecular Cell Biology and Biotechnology
EC327 - Introduction to Software Engineering
EK125 - Introduction to Programming for Engineers
BE403 - Biomedical Signals and Controls
EK424 - Thermodynamics and Statistical Mechanics

ACADEMIC PROJECTS

A System for Imaging Precision Cut Lung Slices — September 2021 - May 2022
Suki Lab - Boston University — Boston, MA

- Engineered an optical system employing an LED, a camera, and beads to live image lung tissue under equiaxial stretch
- Generated software to measure the biomechanical properties of lung slices during stretching

Plant Care Application — November 2020 - December 2020
EC327 Final Project

- Developed an android application that offers guidance to users regarding the ideal growing conditions for common household plants, including sunlight, temperature, and watering frequency
- Implemented a diagnostic quiz that provides the optimal plant care based on user input

SKILLS SUMMARY

Biology: Cell Type: E. Coli, lung tissue; Techniques: Electrophoresis, OD measurements, suspension cell culture, PCR, pour agar plates, plate E. Coli using both streak and spread methods, prepare media, limited experience with ChIP-sequencing, RNA-sequencing, DNA and RNA extraction; Assays: Growth curves

Computer: Experienced with MATLAB, C, and C++, experienced with Microsoft Word, Powerpoint, Excel, limited experience with Android Studio (JavaScript)

Technical: Digital and Light Microscopy, electronics repair of EKGs, record keeping and updating safety protocols

EXPERIENCE

E. Coli Regulatory Network Mapping Research Fellow, Galagan Lab — February 2021 - May 2022

- Ran and studied growth curves depicting varying E. Coli strains under different biological conditions
- Assisted in ChIP-Sequencing and RNA-Sequencing processes
- Completed tasks such as pouring petri dishes, autoclaving glassware, etc.

Dean of Students Operations Assistant, BU Dean of Students Office — September 2019 - May 2022

- Served as a liaison between Boston University departments and the Dean of Students Office
- Completed daily tasks, including answering phones and emails, issuing conference room and locker keys to student groups, and directing students to various locations on campus
- Aided Boston University students in troubleshooting issues concerning campus move-in, housing arrangements, and coronavirus related protocols

Biopolymers and Human Joints Lab Intern, University of Sydney — February 2020 - May 2020

- Investigated the biomechanical properties and behavior of biopolymers in human joints
- Measured contact angles between substances and surfaces; findings applied artificial joint creation
- Observed the interaction between various substances and surfaces using the software TecPlot

Biomedical Engineering Departmental Intern, White Plains Hospital — April 2018 - June 2018

- Performed electrical safety inspections on clinical instruments to ensure compliance with established standards
- Responded to clinical departments regarding equipment figures and concerns
- Maintained files on procedures regarding inspection certifications of newly acquired instruments

Genevieve Elise Dowd

genelisedowd@gmail.com • (912) 656-9337 • linkedin.com/in/genevieve-dowd/ South Bend, IN, 46601

Education

Boston University College of Engineering — May 2022
Bachelor of Science in Biomedical Engineering

Relevant Coursework

General Chemistry	Organic Chemistry	Molecular and Cellular Biology	Calculus
Multivariate Calculus	Statistics	Engineering Mechanics	Senior Design
Biomedical Measurements	Differential Equations	Electric Circuits	
Fluid Mechanics	Introduction to Programming		
Engineering Design	Probability, Data Science, and Statistics		
Number Theory	Systems Physiology	Signals and Controls	
Nonlinear Systems	Clinical Applications of Biomedical Design		
Fundamentals of Biomaterials		Device Diagnostics and Design	

Experience

Intern, See Yourself Health — January 2021 - Present
- Completed NIH-funded SBIR grant research regarding a new virtual health platform
- Administrated focus groups, qualitative coding, usability and feasibility testing, and data analysis

Qualitative Researcher, Re-Engineered Discharge for Diabetes: Computer Adaptive Testing (REDD-CAT) — October 2021 - May 2022
- Perform qualitative coding of key informant interview transcripts that inform the utility of REDD-CAT

Research Assistant, BU Brain and Vision Research Laboratory — September 2019 - September 2020
- Consolidated tests in MATLAB in preparation for clinical research using point light data

Patient Representative, SouthCoast Health — May 2019 - August 2019
- Conducted daily accounting tasks with a team of three other individuals
- Communicated with clinical staff regarding patient requests, inquiries, and appointments
- Accomplished daily tasks to maintain a sterile medical environment throughout facility

Projects

Miniaturized microfluidic device for high throughput formulation of Lipid Nanoparticles — September 2021 - May 2022
- Researched microfluidic devices to prototype micromixer designs in 3DuF and Fusion360
- Generate micromixer devices and associated components through CNC milling
- Designed and executed experiments for testing micromixers to determine optimal design

Tissue Control for Tissue Engineering — September 2019 - December 2019
- Created a device to heat a 96-well plate within a degree of specificity of 0.2 degrees Celsius
- Coordinated ideas and implemented designs by laying wiring, soldering in place, and testing
- Prototype controlled tissue within wells and maintained a constant temperature for up to an hour

Skills

Laboratory: Experimental Design, Microscopes, Syringe Pumps, CNC Milling
Computer: MATLAB, Psychtoolbox, BioMotionToolbox, Python, Java, C, Arduino, 3DuF, Fusion360

Leadership

Boston University Queer Activist Collective — September 2018 - May 2022

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Samantha Downing

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EDUCATION

Boston University (BU) May 2022

Degree: B.S. in Biomedical Engineering, Minor in Mathematical Statistics

Highlighted courses: Applied Statistics, Biochemistry, Organic Chemistry, Probability, Statistics, and Data Science for Engineers, Signals and Controls, Software Engineering, Protein Engineering and Drug Design

SKILLS

Laboratory Gel electrophoresis, NMR, IR, & mass spectroscopy, animal habituation, pipet column preparation, sterilization, PCR, chemical handling, CNC milling

Computer Python, C++, SolidWorks, MATLAB, Linux, Onshape, Connectome Workbench Viewer

Communication Scientific writing (research proposals, experimental papers), public speaking

EXPERIENCE

Research Trainee **Boston, MA**

Brigham and Women's Hospital Laboratory for Bio Microdevices Oct 2021 – Present

- Presented to classmates and professors about microdevice technology for cancer drug efficacy evaluation.
- Implemented SolidWorks CAD software and MotusCNC™ CNC control software to mill microdevices.

Wolozin Lab Research Assistant **Boston, MA**

Boston University School of Medicine Laboratory of Neurodegeneration Mar 2021 – Aug 2021

- Coded in Linux to determine associations between circRNA and addiction in an experimental mice colony.
- Presented pipeline research project with fellow undergraduate researchers to a principal investigator.

Center for Biomedical Imaging and Neuromodulation Intern **Rockland County, NY**

The Nathan S. Kline Institute for Psychiatric Research Sep 2020 – Dec 2020

- Approved brain imaging x-ray samples on an online simulation.
- Analyzed neurological data with MATLAB and Connectome Workbench and presented findings.

Virtual Student Federal Service Intern **St. Louis, MO**

U.S. Army Corps of Engineers Sep 2020 – May 2021

- Created graphic designs for the Hunting and Fire Safety Social Media campaign and a virtual lesson program.
- Interviewed a USACE anthropologist and NAGPRA coordinator about the Veterans' Curation Program.

Undergraduate Research Assistant **Boston, MA**

Rajen Kilachand Center for Integrated Life Sciences Neuronal Dynamics Laboratory Feb 2020 – Dec 2020

- Completed habituation procedures with post-surgical mice and rodent treadmills.
- Coded in Python with Jupyter Notebook to generate box plots.

Laboratory Assistant **Boston, MA**

Boston University College of Arts and Sciences Organic Chemistry Labs Sep 2019 – Present

- Calibrated computer-interfaced NMR and IR equipment and prepared pipet columns.
- Troubleshooted with lab teaching fellows, students, and facilities during chemical spills.

PROJECTS

Introduction to Software Engineering SFML App Design Project Mar 2021 – Apr 2021

- Created a timed memory tester app in C++ using a Virtual Machine prompting users to recall specific sequences.

Introduction to Engineering Design "Save an iPhone" Project Oct 2019 – Dec 2019

- Designed an Arduino iPhone protector on a PCB board to electromechanically deploy in real time after a fall.

LEADERSHIP AND EXTRA-CURRICULAR ACTIVITIES

President of the Boston University Society of Women Engineers Sep 2021 – Apr 2022

Flutist in Boston University Concert Band Sep 2018 – Present

HOPE Foundation Student Presenter for Bengaluru, India Jun 2015 – Present

Rosangel Ramos Espinoza

rosangel@bu.edu • (650) 878-7171 • www.linkedin.com/in/rosangelramos Boston, MA

Education

Boston University (Boston, MA) **Expected May 2022**
Biomedical Engineering, B.S. GPA: 3.87 – Dean's List (all semesters), Tau Beta Pi Honor Society

Experience

O'Shea Glia Engineering Lab (Boston, MA) **February - May 2022**
Research Fellow

- Arranged a data set of 5000 genes into clusters using the Louvain algorithm and analyzed the clusters with Scanpy to examine the relation between astrocyte, oligo, and NPC genes with each cluster.
- Published findings in *CNS injury lesion environments direct transplanted neural progenitors into protective border-forming astroglia.*
- Built an *in silico* pipeline to identify a transporter gene that only targets a particular cell type.
- Synthesized fructose acrylate using TLC, rotavapor, and flash chromatography, and created polymeric nanoparticles through nanoprecipitation, dialysis and lyophilization, characterized by DLS and FTIR.

Boston Scientific (Marlborough, MA) **May - August 2021**
Endoscopy R&D Intern

- Developed communication skills by writing 4 technical reports: competitor device characterization, potential misuse of the device study, component characterization, and pre-design verification tech report.
- Debugged an Instron test method (for injection of hydrogel) to acquire appropriate data values, such as Young's modulus and compression force. This test method will speed up the hydrogel characterization.
- Reverse-engineered and 3D modeled in Solidworks the air tube connector of a medical endoscopic tube set to improve the engineers' efficiency for a new product design.
- Collaborated with machinists to design a test fixture for better manufacturability (DFM).
- Conducted performance testing for an infection prevention device that was in the final product development phase to support design freeze, and design verification.

Clinica Internacional (Lima, Peru) **May - August 2019**
Clinical Engineering Intern

- Carried out preventive maintenance on over 100 medical devices such as anesthesia machines, multi-parameter monitors, defibrillators, colposcopes, and secretion vacuums, completing 40 procedures per month.
- Repaired surgical devices during intensive surgery and procedures; on-call for over 30 hours a week as an essential hospital worker.
- Trained 20 nurses on how to use the automatic defibrillators in case of an emergency.

Leadership

Society of Professional Hispanic Engineers (Boston, MA) **September 2018 - Present**

- Managed actively $30k budget to plan events, provide leadership development opportunities for students, and ensure a continuous funding cycle for future years.
- Led fundraising initiative of over $10k for members to attend the National Convention for professional development workshops, career fairs and on-site interviews.
- Managed over 20 employer relationships that led to 20+ workshops, 50+ interviews and 20+ job offers per year.
- Met regularly with the Engineering Dean and heads of department to raise club awareness, provide resources, and speak on equity issues and representation for over 150 Hispanic engineers at BU.

Chengxi Fan

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EDUCATION

Boston University Expected 05/22
Bachelor of Science in Biomedical Engineering & Bachelor of Arts in Mathematics
Premed Track
GPA 3.46/4.00

SKILLS

Computer MATLAB, Arduino, SAS, JMP, Microsoft suite, Google suite

Laboratory 2 years in Chemistry, 1 year in Physics, Biology, and Physiology

Math Skills Advanced Calculus, Linear Algebra, Statistics

Language Mandarin, English

PROJECTS

Multispectral 2D Mapping for Oxygen Saturation in Tumor Detection 09/21 - 04/22
- Coordinate with 2 other students to design a device for mapping oxygen saturation of a tissue
- Design an algorithm on MATLAB to analyze collected data
- Create liquid phantoms to validate the designed algorithm

Rodent Trap Project 02/20 - 04/20
- Cooperated with 3 teammates to design a rodent trap for refugee camps to catch rodents humanely
- Proposed design ideas and mechanisms to make the product well function
- Wrote an executive summary for the product report

Truss Design Project 11/19 - 12/19
- Collaborated with 2 group members to design a truss; served as group's programmer
- Wrote a MATLAB code to analyze internal forces and load of truss for truss testing
- Tested truss to check accuracy of prediction from MATLAB code

MATLAB Project 04/19
- Coordinated with two other students to design an application
- Built a MATLAB code to assess one's weight situation and deliver health suggestions

EXPERIENCE

NUTRIORIA Inc. 02/21 - 04/22
- Research on AI and biomedical technology and their application in nutrition as a biomedical intern
- Contribute information about starting a nutrition consultation company

Fuzhou Children's Welfare Institution, Fuzhou, Fujian, China 01/14 - 04/22
- Volunteer to help orphans and children with disabilities in their daily lives
- Donate clothing and money from allowance for improvement of quality of life

UNICEF 01/11 - 04/22
- Contribute monthly financial help and material needs for children in difficult situations around the globe

humanID 02/21 - 10/21
- Searched for publications regarding cybersecurity and disinformation as an intern
- Created and looked for memes related to privacy and disinformation

Sabrina Franco

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EDUCATION

Boston University College of Engineering May 2022
Bachelor of Science, Biomedical Engineering GPA: 3.51

Coursework: Device Diagnostics & Design, Transport Phenomena of Living Systems Thermodynamics, Signals & Controls, Cell Biology, Clinical Applications of Biomedical Design
Skills: Matlab, C++, Autocad: Autodesk Inventor, ImageJ, Microsoft Excel, Microsoft Powerpoint

WORK EXPERIENCE

Boston Scientific, *Quality Intern* **June 2021-Sept 2021, Marlborough, MA**

- Created Finished Good Documents for medical devices including The Rhythmia HDx Mapping System and The Conducted Telemetry Cable to support CAPAs 5456 and 5965
- Retrieved product information from Phillips Medisize, Amphenol and Molex LLC to route Change Notices and produce redlines
- Created DE&I weekly employee spotlights on Adobe Illustrator to boost employee engagement on Yammer

Office of Dr. MM Franco, *Assistant* **June 2020 – Jan 2021, Cape Town, South Africa**

- Administered Covid-19 antibody tests to patients and analyzed data for review

University of Cape Town, *Tutor* **March 2020 – Jan 2021, Cape Town, South Africa**

- Taught first year engineering students calculus, physics and chemistry

Aura Cosmetics, *Marketing Assistant* **June 2019 – Aug 2019, Cape Town, South Africa**

- Developed and delivered social media content using Adobe Photoshop

PROJECTS

Novel Evaluative Probe for Hydration Real-time Observation, *Senior Design Project*

- Demonstrated the feasibility of a wearable probe to monitor hydration in human tissue
- Determined the effect of motion artifacts and pressure by integrating a pressure sensor and accelerometer into the probe
- Characterized successful performance of the electronics of the probe by conducting experiments to calculate signal to noise ratios, drift, precision, and accuracy

Bacterial Detector, *Device Diagnostics & Design*

- Designed and built a bacterial monitor that detects bacteria in patients' blood during dialysis
- Utilized a pH color change reaction coupled with an arduino to mimic Surface Plasmon Resonance imaging (SPRi) allowing detection of bacteria
- 3D printed gears with the use of the Engineering Product and Innovation Center (EPIC) and CAD software
- Integrated the Bacterial Detector with the hemodialysis machinery by collaborating with stakeholders including Dr. Waikar, dialysis patients and technicians at Boston University Medical

Smart Mask, *New York Academy of Sciences*

- Engineered a smart mask surveillance network to monitor and combat Covid-19 outbreaks
- Tracked Covid-19 symptoms by incorporating a temperature sensor, pressure sensor for cough detection and a pulse oximeter for blood oxygen levels and heart rate.

Smart Rat Trap, *Design Engineering*

- Constructed and programmed a Smart Rat Trap to send a text message to the users phone once caught
- Manufactured the device in EPIC with the use of a laser cutter, welder

LEADERSHIP, VOLUNTEERING AND ACTIVITIES

uWISE, *Women in STEM Club*
Biomedical Engineering Society, *Boston University*
Field Hockey Division 1, *Syracuse University*
Engineering Ambassadors, *H.W. Smith High School*
Ladles of Love Soup Kitchen, *Volunteer*
Somerset Hospital, *Volunteer*

Jodee Frias

jsfrias@bu.edu ● 774-454-1342 ● linkedin.com/in/jodeefrias ● Boston, MA

EDUCATION

Boston University, College of Engineering — Boston, MA
B.S. in Biomedical Engineering, Minor In Public Health — Expected May 2022

RELEVANT EXPERIENCE

Undergraduate Researcher, Biomedical Optical Technologies Lab — 2020 – Present
Primary Investigator: Dr. Darren Roblyer

- Conducted analysis of lipid spectra to detect discrimination between lipids within tissue
- Created programs using MATLAB to analyze empirical measurements taken in vivo and in vitro
- Demonstrated feasibility of short-wave infrared (SWIR) portable probe

Admissions Coordinator, Boston University Admissions — 2020 – Present

- Oversaw and trained 50+ student representatives during both virtual and in person programming
- Channeled organizational skills into scheduling shifts and keeping an upbeat work environment
- Served as a liaison between student staff and professional staff to maintain work balance

Ambassador, Technology Innovation Scholars Program — 2020 – Present

- Explained complex engineering topics through project-based learning to groups of 30+ students
- Held office hours, individual tutoring sessions, and college guidance sessions

Laboratory Technician, Boston University Clinical Testing Laboratory — 2021 – 2021

- Inactivated, extracted, purified, and processed over 3,000 RNA and DNA samples per day
- Assisted in determination of absence or presence of SARS-CoV-2 in samples

Research Assistant, Brain and Vision Research Laboratory — 2019 – 2020
Primary Investigator: Dr. Lucia Vaina

- Condensed and reorganized clinical testing in MATLAB for future use
- Reassembled the laboratory and increased its online presence

Laboratory Assistant, Boston University Department of Chemistry — 2019 – 2020

- Calibrated, maintained, and arranged laboratory equipment in preparation for experiments
- Troubleshot experiments with students through performing experiments and assessing results

POSTER PRESENTATIONS

- **J. Frias**, S. Spink, A. Pilvar, D. Roblyer, "*Testing of Short-Wave Infrared Probe for Tissue Water and Lipid Monitoring during Hemodialysis.*", 2021 BMES Annual Meeting, Scheduled, poster.
- **J. Frias**, S. Spink, A. Pilvar, D. Roblyer, "*Quantification of Water and Lipid in Clinical Settings using ShortWave Infrared (SWIR) Wavelengths*.", UROP Student Symposium, Scheduled, poster.

HONORS AND AWARDS

Undergraduate Research Opportunities Program Funding Recipient — 2021
Dean's List — 2020

LEADERSHIP POSITIONS

President, Omega Phi Alpha, Alpha Mu Chapter
Dean's Host, Boston University College of Engineering
Member, Society of Women Engineers, Biomedical Engineering Society
Ambassador, Career Development Office, F*ck It Won't Cut It: Public Health Campaign

Ximeng Fu

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EDUCATION

Boston University, Boston, MA — Expected May 2022

B.A. in Biomedical Engineering

· Relevant Coursework: Calculus, Computational Linear Algebra, Multivariate Calculus, Differential Equations, Probability Stat Data, Clinical Applications of Biomedical Design, Molecular Bioeng

· Dean's list for 2018 and 2019

PROJECTS

Designing Novel Disruptors of SARS-Cov-2 Viral Spike Protein Function by Targeting the Chaperone Protein GRP78 — Sep 2021 - May 2022

Tutor: Diane Joseph-McCarthy, Professor of the Practice, Biomedical Engineering, Boston University

· Set up and perform virtual screens of target binding sites to identify potential hits

· Iteratively optimize known ligands and hits from virtual screenings and literature to enhance binding affinity and drug-like properties

Online Research on Biostatistics and Data Analysis with R — Jun - Sep 2021

Tutor: Shuangge Ma, Professor of Biostatistics, Yale University

· Performed correlation analysis with R to determine effectiveness of vaccines

· The manuscript research paper has been accepted by the 2021 International Conference on Statistics, Applied Mathematics and Computing Science (CSAMCS 2021), and published on SPIE

Laboratory Biological Experiments Training — Feb 2018

Central China Normal University, Wuhan, China

· Participated in advanced biological experiments, including anatomy, DNA electrophoresis, electron microscopy

· Developed ability of making specimens of invertebrates and plants

EXPERIENCES

Hubei Provincial Hospital of TCM, Wuhan, China — Feb 2017

Operation Assistant Intern, Obstetrics Department

· Assisted doctors in preparing for Caesarean birth, measuring blood pressure, pulse, and body temperature, nursing

· Recorded operation plan, reported estimated operation time, anesthesia method, incision selection, and method

EXTRACURRICULAR EXPERIENCES

Red Star Chinese Theater Club, Wuhan, China — Sep 2018 - Aug 2021

Actress

· Attended drama 3 times in major events: stage drama "Hua"; National Holiday Performance etc

· Played leading actor two times and volunteered a short movie for protagonist

SKILLS

Computer: Matlab, R, Arduino(Basic), Stella Architect(Basic), PyMol(Basic), Fiji(Basic), Excel, PowerPoint

Languages: English (Fluent), Mandarin (Native), Spanish (Basic)

Eden Gideon

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EDUCATION

Boston University Boston, Massachusetts
Bachelor of Science in Biomedical Engineering Expected January 2023

- Awards: Richard D. Cohen Scholarship recipient

EXPERIENCE

George Sherman Union Boston, Massachusetts
Senior Student Manager January 2020 - present

- Oversee daily operations and organize scheduling for over 100 student employees by problem solving and encouraging team building within the work environment
- Process all invoices and budget tracking for retail products
- Facilitate the hiring and interviewing process for new prospective employees
- Approve and process student payroll for 4 retail locations

Residence Hall Council Boston, Massachusetts
Vice President September 2019 - May 2020

- Managed the budget of the hall council by working closely with the Student Activities Office
- Facilitated allocation of budget for an annual period and compiled computerized data on student interest and participation
- Built relationships with the overarching executive council and other Residence Hall Councils to execute outreach programs for the student body
- Organized experiences to assist students during Mental Health Week and enhance the smooth transition into college for underclassmen

PROJECTS

40Hz Light Cognitive Enhancement Study Boston, Massachusetts
Researcher September 2021 - present

- Design a protocol to determine the effect of 40hz on the improvement of cognitive performance of subjects in a state of fatigue or cases of cognition impairing conditions
- Identify qualified candidates and collecting data using an 8-trial based cognitive test
- Analyze data to find an alternative non-intrusive method of improving cognitive performance in subjects

Design Project Boston, Massachusetts
Steam Sterilization Device September 2021 - December 2021

- Designed and prototyped a medical instrument sterilization device catered to low- and middle-income countries that met the price, feasibility, and maintenance constraints
- Evaluated design based on failure modes identified through interviews with preliminary stake holders and made changes accordingly
- Produced a looks-like and works-like prototype of the device by collaborating with a team of engineers

SKILLS

- Languages: English, Amharic
- Software: MATLAB, C++, Adobe Cloud, Lab Scribe, Microsoft Office Suite

Isabelle Goode

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https://www.linkedin.com/in/isabelle-goode

EDUCATION

Boston University, *B.S.* in Biomedical Engineering, Concentration in Technology Innovations May 2022

EXPERIENCE

Connizzo Lab at Boston University, *Undergraduate Research Assistant* June 2021 – Present

- Conduct research studies on tendon injury using murine tendon explant models.
- Document and communicate findings through oral and visual presentations at weekly lab meetings.

Questrom School of Business, *Teaching Assistant* Sept. 2021 – Present

- Enhance learning of 40 students by providing feedback on assignments and discussing strategic concepts.

Boston University Fitness and Recreation Center, *Student Manager* Feb. 2021 – Present

- Oversee orientation and training of 50 student employees.
- Engage in weekly machine maintenance checks, laundry duties, and document attendants' hours.

DAMP Lab, *Programming Student Intern* Jan. – May 2020

- Developed Ruby scripts for automation of 3 laboratory protocols, including modular cloning.

PROJECTS

Sex Dependency of Cellular and Tissue Level Responses to Inflammation June 2021 – Present

- Culture murine tendon explants in media containing inflammatory cytokines and measure effects on elements of tendon health such as cell viability, metabolism, and gene expression over a 5-7 day culture.
- Analyze sex-related differences in the effects of 3 different pro-inflammatory cytokines on tendon health in order to further development of specified therapeutics and treatments for tendon injury.

Robinhood Strategic Analysis and Recommendations Jan. – May 2021

- Coact on a team of 5 to analyze the e-trading industry and Robinhood, an investing platform.
- Developed, described, and defended a set of 3 strategic recommendations that will help Robinhood create a long-term strategic advantage and attain important company goals.

Remotely Monitored Weather Station Sept. – Dec. 2019

- Collaborated with a team of 4 students to design and build a remotely monitored weather station prototype capable of measuring temperature, humidity, precipitation, wind speed, and wind direction.

SKILLS

Computer: MATLAB, C++, Microsoft Office Suite, Arduino, Solid Works, OnShape, Fiji, GraphPad

Lab: Sterile animal tissue harvest, explant and cell culture, counting and passaging cells, RNA isolation, cDNA conversion, PCR, confocal microscopy, cryosection procedure, gel electrophoresis, bacterial transformation

LEADERSHIP

Boston University Division I Cheerleading Squad *Captain* May 2020 – Present

- Cooperate with coaching staff to lead a team of 20 peers to the NCA Collegiate National Championship.
- Organize and facilitate weekly schedules, including team practices, workouts, spirit events and varsity athletic events.

Theta Tau Psi Delta Chapter *Brotherhood Chair* Sept. – Dec. 2020

- Partnered with a co-chair to formulate a budget and facilitate unique virtual social events.

Garrett Greaves

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EDUCATION

Boston University, College of Engineering | Boston, MA — Expected May 2022
B.S. in Biomedical Engineering

- GPA: 3.74
- Dean's List: Spring 2019, Fall 2019, Spring 2020, Fall 2020, Spring 2021
- Cardinal Medeiros Scholar
- *Relevant Coursework:* Machine Learning, Quantitative Neuroscience, Device Design, Principles of Neuroscience, Signals and Controls, Systems Physiology

B.U. Study Abroad, Dresden Engineering Program | Dresden, DE — Feb 2020 – Jun 2020
B.U. Study Abroad, Shanghai Internship Program | Shanghai, CN — Jun 2019 – Aug 2019

EXPERIENCE

Boston University Residence Life | Boston, MA — Sep 2020 – present
Resident Assistant

- Lead residents in acclimating to university life, responded to resident needs and crises
- Developed and coordinated events for residents for community development

Insulet Corporation | Billerica, MA — Jul 2021 – Jan 2022
Co-op, Systems Engineering, Design Verification

- Executed test runs to verify product meets requirement specifications
- Used application lifecycle and document management software to assist with design verification and validation

Shanghai Jiangxin Industrial Co, Inc. | Shanghai, CN — Jun 2019 – Aug 2019
Engineering Intern

- Designed database organization application with MatLab app designer
- Read and presented on ISO standards for medical devices

PROJECTS

Neuroprotectant Autoinjector | Boston, MA — Sep 2021 – Dec 2021
Device & Diagnostic Design Class Project

- Researched medical need for emergency ischemic stroke treatment option in the form of novel neuroprotectant
- Designed and fabricated prototype using CAD, conducted FMEA, wrote product design specifications, and presented design review to class

Laboratory of Comparative Cognition | Boston, MA — Jan 2021 – May 2021
Data Tracker for the Scott Lab

- Tracked migrating neuroblasts through a time-lapse dataset in living transgenic zebra finches using FIJI

SKILLS

Office:	Microsoft Office Suite, Adobe Creative Suite, Helix PLM, Arena, Confluence
Languages:	English (Native), Mandarin (Basic), German (Basic)
Analytical:	MatLab and MatLab App Designer, R, FIJI, Programming in C, Arduino, Solidworks, Onshape

Andrew Gross

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EDUCATION

Boston University, Boston, MA — Expected September 2022
B.S. in Biomedical Engineering — GPA: 2.93
Relevant Coursework

- Molecular Cell Biology and Biotechnology
- Device Diagnostics and Design
- Introduction to Materials Processing/Product Development
- Electric Circuits
- Systems Physiology
- Signals and Control Systems
- Thermodynamics
- Fluid Dynamics

SKILLS

Programming: Proficient in C++, MATLAB, Microsoft Office (Word, Excel, PowerPoint)
Technical: Proficient in Soldering (Circuit Design), Pipetting, Dilution, Welding, Prototyping, Measuring Blood Pressure

ENGINEERING PROJECTS

SPRi Bacterial Infection Detection | College of Engineering, Boston University — Feb - May 2021

- Developed prototype device collaboratively to sample blood from the hemodialysis circuit and rapidly detect presence of infection via Arduino-processed changes in light refraction off an SPRi biochip.

Truss Design | College of Engineering, Boston University — Jan - May 2020

- Undertook several design stages to construct a planar truss to maximize load-cost ratio to meet specifications, such as span, minimum load, and cost.

Smart Rodent Trap | College of Engineering, Boston University — Oct - Dec 2019

- Designed, coded, constructed a humane autonomous trap utilizing a Particle Photon microcontroller, promptly notifies users of capture and remotely releases creatures within a mobile application.
- Collaborated with colleagues to prepare and present function-means, functional analysis, and mathematical models for battery life and servo motor torque.

LEADERSHIP EXPERIENCE

Boston University Hillel — Oct 2018 – May 2021
Reform Social Engagement Chair

- Conduct outreach programs/events to bring students together for holidays and community/social engagement.

Boston University Representative

- Coordinated Boston University's participation in a Boston-wide event to connect four neighboring Hillel communities.

WORK EXPERIENCE

Taco Bell Cantina | Brookline, Massachusetts — Oct 2020 – Jan 2021
Food Champion

- Pioneered six person team to launch the Cantina concept in its first Boston location, communicated clearly and positively with management, imparted team-based culture among coworkers.
- Suggested initiatives to improve operational excellence, multitasking, and adaptation in fast-paced environment.

Camp Daisy and Harry Stein | Prescott, Arizona — Summer 2018, 2019
General Counselor and Archery Specialist

- Generated archery competitions of accuracy, taught safe and proper techniques, and maintained equipment/range.

Elizabeth Hanchar

ehanchar@bu.edu • (518) 982-6122 • https://www.linkedin.com/in/elizabeth-hanchar/

EDUCATION

Boston University College of Engineering — Boston, Massachusetts
Candidate for Bachelor of Science in Biomedical Engineering — Expected May 2022
Technische Universität Dresden, Dresden, Germany — Spring 2020
GPA: 4.00, Dean's List (all semesters)

EXPERIENCE

Research Assistant, Nia Lab at Boston University — Boston, MA • September 2019 – January 2022

- Co-authored BMES Abstract: "Biophysical Contribution to Tumor Progression and Incidence in Lung Cancer"
- Spearheaded development of methodology to improve diagnosis of tumor growth pattern in lung cancer by evaluating hundreds of pathology and CT images to identify growth pattern hallmarks
- Investigated link between lung cancer and COPD in a team of five. Examined CT scans identifying, labeling, and organizing over 2,000 tumor occurrences with MATLAB

Combination Product Labs Intern, Regeneron Pharmaceuticals Rensselaer, NY • May – August 2021

- Developed a test method for a medical device applying both design of experiments and continuous improvement principles and worked on test method validation for a device
- Analyzed test data using JMP and applied Gauge R&R and Normality Testing
- Designed fixturing using Solidworks for medical device testing and utilized prototype in testing
- Gained experience with medical device documentation, test method development and validation

PROJECTS

Novel design of polymeric nanoparticles for targeted drug delivery — September 2021 – May 2022

- Analyzed existing glial cell gene expression datasets using principal component analysis to determine uniquely enriched cell-specific transporters for nanoparticle targeting in a team of four
- Synthesized and characterized polymers with a novel monomer to bind to SLC2A5 transporter on microglia
- Formulated and characterized polymeric nanoparticles with potential for therapeutic delivery

Quiet Camera Boom: — Fall 2019

- Designed a remote-controlled robotic arm with three-dimensional movement capability to film using an iPhone
- Machined a functioning product prototype in a team of five
- Utilized engineering design process to meet client's demands and design and construct a prototype

Additional Projects: Drug Delivery System Design**,** Truss Construction and Optimization

SKILLS

Computer: MATLAB, C, Solidworks, JMP, QuPath, Stella Architect, Microsoft Excel, Microsoft Project
Lab: Dynamic Light Scattering (DLS), Flash Chromatography, Fourier-Transform Infrared Spectroscopy (FTIR), Instron Universal Testing Machine, Polymerization Reactions, Spectrophotometer, Thin Layer Chromatography (TLC), Pipetting, Zwick Universal Testing Machine
Manufacturing: Lathe, Drill Press, Miter Saw, Bandsaw

LEADERSHIP & ACTIVITIES

Sophomore Mentor Program Coordinator, BU College of Engineering — May 2021 – Present
Member, Tau Beta Pi Engineering Honor Society — December 2020 – Present
Member, Alpha Eta Mu Beta Biomedical Engineering Honor Society — December 2020 – Present
Fundraising Chair, Society of Women Engineers — May 2020 – Present
Member, Biomedical Engineering Society — September 2018 – Present
Sophomore Mentor, Boston University College of Engineering — August 2020 – May 2022

Emily Hill

emhill@bu.edu • (909) 266-6230 • www.linkedin.com/in/emilyhill027 • Boston, MA

EDUCATION

Boston University Boston, Massachusetts — Expected May 2022
B.S. in Biomedical Engineering

EXPERIENCE

Research Assistant — Nov 2018 – Present
Laboratory of Zebrafish Genetics and Cancer Therapeutics, Boston University School of Medicine

- Clone inducible split-Cre recombinase system with MultiSite Gateway technology; received UROP funding for Summer 2021 and Spring 2022
- Sequence 4 cloned constructs and inject into zebrafish embryos; visualize fluorescent output to validate viability of tool *in vivo*
- Genotype hundreds of zebrafish through zebrafish husbandry, fin clipping, DNA extraction, and PCR
- Image tumor growth over several months to elucidate role of SHMT2 gene in MYCN-amplified neuroblastoma

Anesthesia Technician — Jul – Sep 2021
Boston Medical Center, Boston, MA

- Completed turnovers and restocked anesthesia machines for 33 rooms and tested anesthesia breathing circuits
- Set up and calibrated necessary equipment (anesthesia machines, airway management devices, ultrasounds)
- Responded to pages from anesthesia providers during surgery; performed blood glucose checks

Laboratory Assistant — Oct 2018 – May 2019
Celenza Lab, Boston University

- Prepared agarose gels and solutions and raised *Arabidopsis thaliana* and *Camelina sativa* plants
- Collected and maintained data tracking root growth of seedlings after exposure to abiotic and biotic stressors

VOLUNTEER

Redlands Community Hospital Redlands, California — Jun 2016 – Present

- Cooperate with hospital staff to respond to needs of patients in Emergency Department; communicate with care teams; clean and restock 21 patient rooms; and transport lab specimens, surgical instruments, and patients
- Trained 9 new volunteers in Labor and Delivery and Emergency Department (received RCH Auxiliary Scholarship)

LEADERSHIP

EK 100 Student Advisor, Boston University College of Engineering — Aug 2021 – May 2022

- Advise group of 15 freshmen engineering students with faculty advisor regarding social and academic affairs

Co-President, Undergraduate Women in Science and Engineering — Aug 2020 – May 2021

- Oversaw 100+ members, planned biannual faculty networking event, and hosted biweekly club meetings

Co-Lead of Connections Initiative and Small Group Leader, The Navigators — Jan – Dec 2020

- Facilitated weekly small group meetings and coached mentee through 15 weeks of leadership training

SKILLS

Lab: Gateway cloning, Microinjection, Mammalian cell culture, Polymerase Chain Reaction (PCR), DNA extraction, Fluorescence *in vivo* imaging, Zebrafish husbandry, Gel electrophoresis, Fin clipping, Genotyping, IR spectroscopy, Flow cytometry
Computer: MATLAB, Arduino, Microsoft Office, PyMOL, LabScribe
Other: Spanish (Professional working proficiency; Recognition by Inland Empire Foreign Language Association; California State Seal of Biliteracy)

Sydney Holder

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EDUCATION

Boston University — Boston, MA
Master of Science in Biomedical Engineering — *Expected May 2023*
Bachelor of Science in Biomedical Engineering; Minor in Music Performance — *May 2022*
Honors: *cum laude* (GPA: 3.70/4.00)

Universidad Pontificia Comillas – ICAI School of Engineering, Semester Abroad — Madrid, Spain
BU Madrid Program — *Spring 2020*

Relevant Coursework: Signals and Controls, Fluid Mechanics, Clinical Applications of Biomedical Design, Engineering Device Applications, Biomedical Materials Science, Mechanical Vibrations

PROFESSIONAL & WORK EXPERIENCE

Gong Lab, Boston University School of Medicine, Boston, MA — *May 2021 - Present*
Glaucoma Research Lab, Research Assistant
Current projects: — *Aug 2021 - Present*

- Conduct quantitative analysis of cellular physiology in ~3,800 SBF-SEM images of the trabecular meshwork of eyes with primary open-angle glaucoma
- Reverse-engineer current perfusion system to design a new one
- Co-author two expected publications

Self-directed project: — *May - Aug 2021*

- Improved speed and accuracy of 3D volume generation for giant vacuoles via new automated method; verified method from analysis of ~10,000 SBF-SEM images of the trabecular meshwork
- Trained seven students on new automated 3D volume generation method
- Guided three students through statistical analysis using R

Typhoon Texas, Katy, TX — *Jul - Aug 2019*
Waterpark, Front Gate Worker

- Greeted guests and managed bag check while communicating in welcoming and efficient manner
- Performed sales using point of sale system and accompanied guests around park grounds

CO-CURRICULARS

Chamber Quartet, BU College of Fine Arts — *Sep 2020 - Present*
Cellist

- Collaborate with three musicians on selected musical works during 2-hour weekly rehearsals, culminating in a performance each semester

All-Campus Orchestra, BU College of Fine Arts — *Sep 2018 - Dec 2019*
Cellist

- Collaborated with ~50 members of the BU community on selected musical works during 4-hour weekly rehearsals and performed two full-length concerts each semester

SKILLS & INTERESTS

Computer: MATLAB, R, SolidWorks, Reconstruct, LabVIEW, ImageJ, Microsoft Office
Technical: Soldering, Electric Circuits, Statistical Analysis
Other: Spanish (Advanced)

Meghan Howard

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EDUCATION

Boston University, College of Engineering, Kilachand Honors College — Boston, MA
B.S. in Biomedical Engineering — May 2022
Semester Abroad, **University of Sydney**, Sydney, Australia — Spring 2020
GPA: 3.64/4.0

EXPERIENCE

Head Teaching Assistant, BU College of Engineering — Sep 2021 – Present
- Assist with classes of up to 30 students in *EK210: Introduction to Engineering Design*
- Lead communication between course directors and other TAs to provide feedback to students according to university standards
- Tutor struggling students individually and in small groups to reinforce learning concepts during office hours

Undergraduate Research Fellow, Boston Medical Center — Jun – Sep 2021
- Created efficient systems to organize and manage experimental data while following best practices and scientific protocol to reach defensible conclusions based on solid evidence
- Prepared and delivered monthly presentations to senior researchers and nephrologists on findings based on extensive data analysis

R&D Engineering Intern, Contactile, Inc. — Feb – Jun 2020
- Prepared design documents, alignments, specifications, and criteria details for and relating to robotic grip sensors
- Generated 3D renderings and animations for use on company website and in product demos

PROJECTS

Elastic Scattering Spectroscopy (ESS) for Accessing Kidney Health, Senior Design Project — Sep 2021 – Present
- Study diagnostic effects of optical scattering methods on kidneys to gain a greater understanding of how tissue microarchitecture presents in spectral readings
- Collaborate with a team of 3 engineers to design, fabricate, and test needle probe
- Construct robust algorithms to automate finding spectrum biomarkers corresponding to disease progression in rat models of chronic kidney disease

Design-A-Thon — Jul 2021
- Won first place in a competition among five teams competing in the Biomedical Engineering Society Design-A-Thon
- Designed a novel wearable device for early detection of chronic kidney disease

Three-Axis Robotic Camera Boom — Sep – Dec 2019
- Designed and manufactured a working prototype that could support a smart phone, according to client specifications
- Fostered amicable team environment with engineers from diverse backgrounds
- Developed machine shop skills including: power tools, drill press, lathe, laser cutter, etc.

SKILLS

Laboratory: ECG, Optical Fiber Fabrication, Elastic Scattering Spectroscopy (EES), Data Analysis, Experimental Design, Microscopes, Pipetting, Attention to Detail, Laboratory Safety
Computer: MATLAB, SolidWorks, Microsoft Office, Google Office Suite, LabVIEW, Adobe Creative Suite

LEADERSHIP & ACTIVITIES

Technology Innovation Scholars Program, Inspiration Ambassador — Sep 2020 – Present
Kilachand Honors College Peer Mentor — Jun 2020 – Present
Biomedical Engineering Society, Member — Sep 2021 – Present

Jonathan R. Hutton

jrhutton@bu.edu | **(443) 440-0343**

EDUCATION

Boston University College of Engineering, Boston, MA May 2022
Degree: *Bachelor of Science, Biomedical Engineering*
Cumulative GPA: 3.57, Deans List

RESEARCH EXPERIENCE

Computational Drug Discovery - Fractal Therapeutics September 2021 - Present

- Design novel COVID-19 antiviral drug targeting SARS-COV-2 spike RBD interface with GRP78 SBD to disrupt cell-surface viral entry using virtual screening methods
- Visualized and prepared ligands obtained from PDB in Maestro within Schrodinger platform
- Performed *in silico* protein-protein docking of GRP78 to SARS-COV-2 Spike RBD utilizing ClusPro 2.0 and Haddock web servers
- Analyzed active residues and identified key amino acids for ligand docking to disrupt GRP78 function
- Executed computational virtual screening by docking database of thousands of ligands to identified binding pocket using Glide within Maestro

PROJECTS

Early Treatment for Ischemic Stroke Device September 2021 - December 2021

- Designed and prototyped ischemic stroke treatment auto-injector for novel neuroprotectant drug NA-1
- Created novel peptide dissolution system with visual indicators in device for long-term storage capability and effectiveness while accounting for stakeholder feedback from vascular neurologists, EMTs, and PCPs
- Modeled device in SOLIDWORKS and fabricated device in the SILAB at Boston University

Machine Learning Image Classification
December 2020

- Developed and implemented machine learning algorithm based on large dataset for differentiating between cat and dog pictures in MATLAB
- Utilized principal component analysis, linear discriminant analysis in conjunction with other classifiers to achieve an error rate of 9.6%

Patient Automotive Response to Stimuli November 2020 - December 2020

- Proposed and carried out experiment to determine patient response to visual and auditory stimulus
- Measured EMG signaling data in LabScribe 3, heart rate and blood pressure by hand; performed data analysis in MATLAB

Bacteria Plasmid Bioengineering January 2020 - March 2020

- Cultured E-coli bacterial cells and induced GFP plasmid gene in wet lab setting

AWARDS

Boston University Presidential Scholarship, National Merit Scholar

LEADERSHIP

16k Strong Committee Against Sexual Assault November 2018 - March 2020
Scholarship Chair - Phi Kappa Tau January 2021 - December 2021

SKILLS

Computer: MATLAB, C, Python, R, Excel, PyMOL, LabScribe 3, SOLIDWORKS, Maestro, ClusPro 2.0, Haddock
Lab: Gel electrophoresis, DNA extraction, Cell culturing, Spectroscopy, Titration
Hobbies: Rock Climbing, Guitar, Skiing, Chess, Writing

Rebecca A Janes

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Natural leader and problem solver. Motivated to achieve goals and take initiative to complete tasks. I am seeking a role in the medical device industry where I can apply my skills to make a difference to peoples' lives.

EDUCATION

Boston University College of Engineering, Boston MA Expected May 2022

B.S. in Biomedical Engineering

GPA: 3.58/4.0, College of Engineering Dean's List (Fall 2019 - Spring 2021)

PROJECTS

Microdevice for Drug Sensitivity Testing in Tumors, Team Leader Fall 2021 - Spring 2022

- Fabricated, designed, and tested multiple iterations of a plastic microdevice on CNC machine from CAD
- Collaborated with clinicians to obtain feedback on device performance and implement improvements
- Redesigned a device for minimally-invasive retrieval via a smaller needle in high-risk tissues

Race to Graduation (3rd Prize Lutron Lighting Innovation Competition) Spring 2022

- Designed and built an interactive light display, utilising LEDs, Arduino, and various circuitry elements
- Machined parts to improve visual appeal and user interface

Humidifying Clothing to Treat Psoriasis Fall 2021

- Utilized needs finding, rapid prototyping, and FMEAs to design and improve the product
- Created parts and drawings in SolidWorks

Electronic Broad Jump Measuring Device Summer 2021

- Programmed an infrared reflective sensor to easily measure and report broad jump distance
- Prototyped wearables to determine which resulted in the most accurate and reliable measurement

COVID-19 Protective Hat (2nd place in COVID Solution Design Competition) Spring 2021

- Programmed ultrasonic sensors using Arduino IDE to detect objects close to the face
- Developed an effective method to alert user of object proximity using piezoelectric devices and LEDs
- Utilized rapid prototyping to incorporate sensors into the hat and troubleshoot based on testing

Smart Rodent Trap, Team Leader Fall 2019

- Utilized 3D printing and machining for rapid prototyping of device parts
- Navigated conflict and built consensus around project solutions in a group of six

SKILLS

- **Technical and Lab**: machining, rapid prototyping, 3D printing, cell culture, biochemical assays
- **Computer**: MATLAB, C++, SolidWorks, Arduino IDE, MasterCam, Microsoft Office

EXPERIENCE

Laboratory Assistant, University of Sydney May 2019 – July 2019

- Performed basic cell culture techniques and Folch lipid extraction methods
- Analyzed data through a range of biochemical assays including cell viability (MTT), protein quantification (BCA), triglyceride quantification and immunoblotting (SDS-PAGE)

LEADERSHIP

Division 1 Field Hockey, Team Captain Aug 2018 – present

- Led a team of 23 players by communicating and implementing strategies as Team Captain

Bloom Family Leadership Academy Aug 2020 – present

- Selected by coach as top 20 emerging leaders among all student athletes

Learning Assistant, Boston University Spring 2022

- Guided 3 groups of 6 students through the design process from needs finding to prototype testing

Tiana Jazirian

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Education

Boston University **Jun 2022**
B.S., Biomedical Engineering

- Courses: Device Diagnostics and Design, Biomedical Signals and Control, Circuits, MATLAB, Physiology, Anatomy
- Dean's List

Academic Projects

Remotely Controlled Weather Station **Aug 2019 - Dec 2019**

- Collaborated in a team of 4 to design and create a functioning Arduino controlled weather station using 3D printing and Mech lab tools
- Built circuits to measure temperature, humidity, wind speed and direction, and soldered circuit components to Arduino

Experience

Student Researcher (Senior Project) **Aug 2021 - Present**
Beth Israel Deaconess Medical Center

- Collaborate with a group of two students and PIs to create novel designs for a device to treat pelvic organ prolapse
- Use Onshape (CAD Software) to create device design models
- Use Abaqus Simulation Software to create a finite model of environmental parameters and test device designs
- Create a 3D model of pelvic organs via segmentation software (ITK-SNAP)
- Organize meetings and reach out to field experts

Emergency Medical Technician (EMT-B) **Aug 2019 - Jan 2022**
Transformative Healthcare

- Conducted ambulance checks prior to each shift, ensuring all medications are up to date and all equipment is in working condition
- Administered medications per protocol
- Delivered oral and radio reports with accuracy
- Assessed patient conditions and decided on best course of action for patient's health and comfort

Mechanics (EK301) Learning Assistant **Jan 2020 - Jan 2021**
Boston University Engineering Department

- Managed group activities and guided students in solving statics problems
- Led and organized midterm review sessions prior to major exams
- Held office hours twice a week over Zoom
- Implemented and organized a system for students to receive one on one tutoring prior to exams
- Received high ratings from students on a learning assistant performance survey

Skills

- MATLAB and Python
- Segmentation/Imaging Software
- Onshape CAD
- Languages: English and Farsi

Zhuojian Jiang

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EDUCATION Expected Dec 2022

B.S Bachelor of Science, Boston University
Major in Biomedical Engineering
GPA: 3.33
Coursework: Protein Engineering and Drug Design, Molecular Cell Biology and Biotechnology, Biomechanics

SKILLS

Computer Software: Microsoft Office/SolidWorks/Mimics/Abaqus/Matlab/nTopology
Laboratory: Pipetting/Bacterial culture/Micro-CT scan technique
Language: Chinese/Japanese

PROJECTS

Senior Project, Beth Israel Deaconess Medical Center Sep 2019 – present
Undergraduate Research Intern

- Developed mathematical model that describes effect of inflammatory phase on bone fracture healing process.
- Utilized both RNA sequences activities and mechanical modeling to describe bone healing process.

Truss Design Project, Boston University Jan 2021 – May 2021

- Designed and constructed a physical truss that utilized beam theory which holds maximum loading.
- Wrote a Matlab program for the computational analysis of this specific truss.

Infant Incubator, Boston University Sep 2020 – Dec 2020

- Designed and built an infant incubator prototype with limited budgets and materials.
- Wrote an Arduino code for controlling the climate in the incubator and vital monitoring system.

Deep Learning Pet Classification Sep 2020 – Dec 2020

- Trained a series of models to classify dogs and cat images in Matlab. Highest accuracy was 97.7%.

EXPERIENCES

City Lab, Boston University Medical School Jun – Jul 2017
Summer Intern

- Practiced basic laboratory skills such as pipetting, bacteria culture growing, experiment designing and research management techniques.
- Gained experience on microscopes, genomic DNA extraction, bacterial transformation and gel electrophoresis.

LEADERSHIP EXPERIENCE

Boston University B2BU Mentor Jan 2019 – Present
Mentor/Head Mentor

- Acted as a mentor for three consecutive years, contributed constructive suggestions to improve program's quality by reallocate resources which increase participants' experiences and outstanding feedbacks.

Atlanta Chinese Culture School Summer Camp, Atlanta Jul 2017 - Present
Counselor/Head Counselor

- Participated as counselor for three years which design culture courses for K-12 students to experience, collaborated with other counselors and teachers to design and lead youth development courses that involves Asian culture and leadership training.

Brian Jung

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EDUCATION

Boston University College of Engineering, Boston, MA September 2018 - May 2022
Kilachand Honors College, Bachelor of Science in Biomedical Engineering, Minor in Computer Engineering
Extracurricular Activities: Microsoft Student Partners, IBM Z Ambassador, Undergraduate Research Opportunities Program recipient, Teaching Fellow for EK381 (Probability, Statistics, and Data Science), Engineers Without Borders, Dean's List, Theta Tau

TECHNICAL SKILLS AND CERTIFICATIONS

Programming: Proficient in Python, C++, JavaScript, MATLAB, Experience with R, C, Swift, Node.js, HTML, CSS, Verilog
Technologies: Amazon Web Services (AWS), Visual Studio Code, Onshape, Solidworks, Autodesk Fusion 360, XCode
Languages: English, Korean, Mandarin
Certifications: AWS Certified Cloud Practitioner (August 2020)

WORK EXPERIENCE

Philips, Boston, MA June 2021 - Present
Design Engineer Intern
- Leveraged programming languages like C# and Python to create hospital patient monitoring application, by collaborating with the Quality & Regulatory and Verification & Validation teams to formulate and execute on design requirements
- Facilitated clinical study as a technical consultant, by conducting 20+ clinical trials to better understand problems with patient monitoring, sensing technologies, and existing data quality parameters for current products on the market

IOT Senior Project
- Orchestrated an IoT project to develop wireless ECG sensors interconnected with a React native phone application using AWS lambda functions, AWS IoT Gateway, AWS API Gateway to pursue digitalization

Galea Health, Boston, MA September 2020 - January 2021
Full Stack Developer
- Developed backend for a more interactive website using AWS Code Commit, AWS Serverless, REST APIs, and Node.js, Which resulted in more readable and functional code
- Created frontend user interface in Angular.js using website design best practices to improve and optimize user experience

Massachusetts General Hospital, Boston, M November 2020 - Present
Computational Research Assistant at Takahashi Laboratory
- Programmed in Python to convert data to NIFTI files and extract diffusion pathways to locate Superior Longitudinal Fasciculus in the brain using image processing through TrackVis and Diffusion Toolkit

LEADERSHIP

Cooperation Act – Boston University, Boston, MA October 2019 - Present
Founder and President
- Founded a community service group that focuses on helping students financially and emotionally through workshops and scholarships at Boston University
- Collaborated with Fiji Nasikawa Vision College, and organized a Global Outreach project to donate 3 library research computers for their campus

Engineering Product Innovation Center, Boston, MA January 2021 – May 2021
Laboratory Advisor
- Assisting students with design and manufacturing processes, and instructing technical aspects of hardware prototyping to ensure a safe learning environment

Lujain Tarek Khusheim

Lujainkh@bu.edu • (617) 955-9877 • https://www.linkedin.com/in/lujain-khusheim-6156bab8/

EDUCATION

Bachelor of Science in Biomedical Engineering May 2022
Boston University, Boston, Massachusetts

- GPA: 3.54/4.0
- Relevant Coursework: *Chemistry I & II, Calculus II, III & IV, Linear Algebra, Physics I & II, Electric Circuits, Mechanics, Cell Biology, Systems Physiology, Probability and Statistics, Biomedical Signals and Controls*

HONORS & AWARDS

Recipient – *KAUST Gifted Student Program (KGSP) Scholarship* Aug 2018 - Aug 2022

- A prestigious scholarship program that provides funding for students to study abroad

Recipient – *Boston University*

- Dean's List – Fall 2021 Sep 2021 – Dec 2021
- Dean's List – Fall 2020 Sep 2020 – Dec 2020
- Dean's List – Spring 2020 Jan 2020 – May 2020

EXPERIENCE

KGSP Summer Internship, *King Abdullah University for Science and Technology* Jun 2021 – Aug 2021

- Engineered electrode biosensors at Professor Khalid Salama's lab

Photonics Center, *Boston University,* Feb 2020 – Mar 2020

- Interned for Professor Michael Albro researching growth factor mechanobiology

Rajen Kilachand Center for Integrated Life Sciences & Engineering, *Boston University* May 2019 – Jun 2019

- Conducted research in Summer Internship in Dr. Xue Han's lab researching Parkinson's disease in mice

PROJECTS

Oxmedica, *King Abdulaziz Foundation for Giftedness and Creativity,* Jul 2017 – Aug 2017

- Completed a 4-week college-level Biochemistry course

Saudi Arabian Research and Science Initiative, *Dammam University* Jul 2016 – Aug 2016

- Performed research in a 5-week program exploring the relationship between vitamin D3 and diabetes in adults

Center of Talented Youth, *King Abdulaziz Foundation for Giftedness and Creativity,* Jul 2015 – Aug 2015

- Participated in a 4-week program studying the Introduction to Biomedical Sciences course

EXTRACURRICULAR ACTIVITIES

Secretary Deputy General of Logistics, *Model United Nations* Jan 2016 – May 2017

- Represented Estonia for "The Hague International Model United Nations" in Qatar
- Represented Mauritania for "The Hague International Model United Nations" in Singapore

People to People Leadership Program, *Harvard University* Jul 2014 – Jul 2014

- Attended a 7-day leadership skills workshop for networking skill development

SKILLS

- Proficient in MATLAB, C and Arduino Programming
- Proficient in Microsoft Word, PowerPoint, Excel, and video editing
- Fluent in English and Arabic
- Able to grasp new concepts quickly
- Great time management and decision-making skills
- Excel in effective and positive communication

Krishna Kotak

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Education

Boston University Expected Jan 2023
Bachelor of Science in Biomedical Engineering
Cumulative GPA: 3.32/4.00

Relevant Coursework

Principles of Molecular Cell Biology and Biotechnology, Systems Physiology, Transport Phenomena in Living Systems, Biomedical Measurements, General Chemistry, Organic Chemistry, Thermodynamics, Calculus III, Differential Equations, Probability, Statistics and Data Science, Electric Circuits, Computational Linear Algebra, General Physics, Introduction to MATLAB, Introduction to Software Programming, Engineered Drug Delivery

Skills

Languages: Java, MATLAB, C, C++
Software: MestreNova, SnapGene, Zen Black, LabScribe, Arduino, Stella Architect, AutoCAD Inventor, Microsoft Office (Word, Excel, Powerpoint), Adobe Photoshop, GIMP, ImageJ, Audacity, Digication.
Lab Techniques: Spectroscopic Analysis (IR, NMR, GC-MS), Plasmid Sequencing and Mapping, Cell Culture Bacterial and Human), Colorimetric and Fluorescent assays, Viability Assays, TEER/Permeability Assays, ELISA Assay, Western Blotting, DNA/RNA extraction, PCR, Pipetting, Laser Scanning Confocal Microscopy.

Experience

Grader, Boston University Jan 2020 - Jan 2021

- Graded computational Linear Algebra problem sets and MATLAB codes and inputted student homework grades into Excel and Blackboard in a timely manner.

Projects

Human Vasculature Organ-on-a-chip Model, Charles Stark Draper Laboratory Sep 2021 - May 2022

- Determining and implementing factors to increase a human vascular co-culture organ-on-a-chip model's lifespan in a team of three students.
- Assessing cell viability by staining cells with LIVE/DEAD Viability and Immunostaining assays; imaged and analyzed endothelial and smooth muscle cells via laser scanning confocal microscopy and ImageJ.
- Quantifying barrier function of co-culture model over a 2-3 month period using macromolecular tracer assays and trans-epithelial electrical resistance assays to determine model health.
- Communicating experimental plans and results through written reports and oral presentations.

Water Filtration and Purification System, Boston University Feb 2020 - May 2020

- Coordinated a team of five in constructing a motorcycle battery-powered water purification system targeted towards giving cleaner and more portable water to refugee camps in third world countries.
- Collaborated with students in coding programs utilizing water sensors and UVC lighting systems with Arduino, and designing circuit schematics and three-dimensional water filter models through AutoCAD.

Pulse Oximetry, University of Illinois at Urbana Champaign Nov 2018 - Dec 2018

- Led a team of three students in a study of blood oxygenation levels and pulse rates before and after food consumption within a small student population using pulse oximeters.
- Performed T-tests to determine if there's a correlation between blood oxygenation level and consumption as well as pulse rate and consumption.

Activities

- **Member, Premedical Society, Boston University** Jan 2021 - May 2022
- **Mentor, Biomedical Engineering Society, Boston University** Sep 2019 - Dec 2021
- **Active Member, Alpha Phi Omega, Boston University** Aug 2018 - Dec 2020

Landon Kushimi

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(808) 599-0508

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86 Linden St #1 Boston, MA 02134

EDUCATION:

Boston University College of Engineering
Bachelor of Science in Biomedical Engineering | GPA: 3.70 | Cum Laude **exp. May 2022**
Master of Engineering in Biomedical Engineering **exp. May 2023**

WORK EXPERIENCE:

Boston University Clinical Testing Laboratory | Laboratory Assistant **Spring 2022**

- Prepared and processed COVID-19 samples for testing.
- Inactivated and pooled samples in biosafety cabinet.
- Operated aliquot robots for sample preparation.
- Extracted RNA and ran PCR on pooled samples to detect COVID-19.

Boston University Wilson Wong Laboratory | Research Assistant **Spring 2022**

- Created novel plasmid constructs via PCR cloning and Gibson Assembly.
- Transformed novel constructs into E.coli for replication.
- Performed gel electrophoresis to quantify and verify presence of desired DNA.
- Analyzed sequencing data to determine success of cloning process.

Boston University Growth Factor Mechanobiology Laboratory | Research Assistant **2019 - 2020**

- Ran various types of biochemical assays and conducted histological staining to quantify biochemical contents of engineered cartilage tissue.
- Organized and interpreted ~100 point datasets in Excel to draw conclusions from raw testing data.
- Employed digital correlation Matlab software to process images.
- Received UROP funding award for summer 2020.

PROJECT EXPERIENCE:

Imaging System for Precision Cut Lung Slices **Spring 2022**

- Prototyped and developed system for real time imaging of 10-micron beads adhered to PCLS.
- Developed code for tracking displacement of center of mass of beads.

Parameter Optimization for Genetic Circuits **Spring 2021**

- Utilized scipy's dual annealing package to optimize inputs for genetic circuits.
- Applied limited set of operations to mimic feasible genetic engineering techniques.

Machine Learning for Image Processing: Dog or Cat? **Fall 2020**

- Employed various types of statistical analyses, such as linear discriminant analysis and perceptron analysis, for machine learning.
- Implemented a binary classifier script to analyze a database then guess whether an input image was a dog or a cat.

RELEVANT SKILLS:

Coding: Matlab, C++, Python, Arduino, Git.
Wetlab Skills: Biochemical assays (ELISA, DMMB, etc.), histology, PCR, Gibson Assembly, cell culture.
Other Applications: Microsoft Office, FreeCad, SolidWorks.

LEADERSHIP EXPERIENCE:

Boston University Allegrettos - A Cappella | Treasurer and Business Manager **Sep 2018 - Sep 2021**

- Responsible for booking gigs, scheduling rehearsals, managing calendar, transactions, and email.

Jed Lartey

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Worcester MA 01606

EDUCATION

Boston University, Boston, MA *May 2022*

Bachelor of Sciences: Major in Biomedical Engineering

Relevant Coursework: MATLAB, Probability Statistics, Electrical Circuits, Differential Equations, Biomedical Engineering Design, Signals and Controls, Drug Delivery, Computational Synthetic Biology, General Chemistry, Organic Chemistry 1 & 2, Computational Linear Algebra

SKILLS & CERTIFICATIONS

Computer: MATLAB, C, C++, CAD, Arduino Microcontroller programming, Oscilloscope, Microsoft Word, Microsoft Excel, Microsoft Powerpoint, Adobe products, Electrophoresis
Languages: Native in English and Ga with some level of understanding in Spanish

EXPERIENCE

Boston University, Boston *September 2018 - Present*

Research Trainee

- Recorded systolic blood pressure, diastolic blood pressures and heart rates of 7 subjects during pre- and post-exercise for 3 separate postures (sitting, standing, supine)
- Calculated changes to subjects mean arterial pressure during 3 separate postures (sitting, standing, supine) relative to post-exercise postures
- Analyzed significance of data for exercise 3 separate postures on recovery rate

SMC Ltd, Devens *June 2021 - August 2021*

Quality Control Management

- Collected and assembled medical device parts made from various injection molding machines
- Inspected medical device parts and maintained various injection molding machines

University of Massachusetts Memorial, Worcester *June 2019 - August 2019*

Volunteer Patient Care Assistant

- Checked in and eased patients for Heart Ultrasound Appointments
- Sanitized, organized, monitored and distributed physical therapy instruments along various departments of UMass
- Organized paperwork pertaining around the hospital

LEADERSHIP & PROFESSIONAL DEVELOPMENT EXPERIENCE

Engineers Without Borders, Boston *September 2018 - Present Chapter*

Project Management Assistant

- Participated in a four year Program devoted to providing engineering aid to local and global problems
- Researched designs for development of rain catchment systems
- Fundraised for trips to international sites
- Assembled with in a network of undergrad engineers across New England Region and across the Globe

Aksel Laudon

alaudon@bu.edu • (480) 352-2222 • www.linkedin.com/in/aksel-laudon/ Phoenix, AZ, 85044

Education

Boston University College of Engineering, Boston, MA — Expected May 2022

- B.S. Biomedical Engineering (GPA 4.00)
- Two-year Modular Medical/Dental Integrated Curriculum (MMEDIC)

Experience

Lu Lab, Boston University School of Medicine, Nephrology, Boston, MA — June – August 2021

Student Researcher – Undergraduate Research Opportunities Program

- Collected, stained, imaged mouse kidney sections with confocal, Stimulated Emission Depletion (STED) microscopy to quantify glomerular protein colocalization
- Spoke at 2021 Genome Science Institute Symposium, presented posters at 2021 BU School of Medicine Evans Research Day, BU Undergraduate Research Symposium

Bifano Lab, Boston University Photonics Center, Boston, MA — February – September 2020

Research Assistant

- Engineered device for hands-free, vacuum-enclosed molding of PDMS tissue scaffold
- Designed, constructed low-cost device to simultaneously mature four hiPSC-derived cardiomyocyte tissues for downstream research through cyclical uniaxial strain, electrical stimulation

BIONICS Lab, Arizona State University Biodesign Institute, Tempe, AZ — May – August 2019

Undergraduate Researcher

- Modeled, synthesized novel DNA origami to enable gold nanoparticle conjugation
- Developed protocol for gold nanoparticle labeling of DNA origami arrays for field microscopy

Projects

Senior Design Project, Boston University — September 2022 – present

- Digital Biopsy for Glomerular Ultrastructural Measurement in TEM Images: led development of machine learning model, image processing algorithm to automatically segment, measure kidney morphology

Robotic camera jib, Boston University — October – December 2019

- Collaborated with four co-members to assess client needs then design, build two-jointed robotic arm

Co-curriculars

Boston University Cross Country, Track and Field — September 2018 – present

Team Captain, SAAC Team Representative, SAAC/Athlete Ally Executive

- Served teammates through communication with coaching staff, peer mentorship
- Advocated for student-athletes, coordinated campaigns for increased LGBTQIA+ visibility, education

Brigham and Women's Hospital, Boston, MA — November 2019 – March 2020

Volunteer, Medical Career Exploration Program

- Guided patients, transported samples throughout hospital (4.5 hours/week)

Skills

- **Wet lab:** mouse dissection, sectioning, PCR, ELISA, cell culturing, confocal and STED microscopy
- **Programming:** Python (proficient), MATLAB (proficient), C (basic)
- **Prototyping:** Arudino, CAD (Solidworks, KiCad)

Maria Lazou

mlzs@bu.edu • (857) 891-0568 • www.linkedin.com/in/lzs • Boston, MA

Education

Boston University, College of Engineering
Boston, MA
B. S. in Biomedical Engineering — Expected May 2022
Relevant Coursework:

Statistics & Data Science
Machine Learning
Cell Biology & Biotechnology
Software Engineering
Biomedical Measurements I and II
Thermodynamics
Signals & Systems
DNA Nanotechnology
Systems Physiolog

Research Experience

Bioimaging & Informatics Lab, BU School of Medicine — September 2021 – March 2022

- Optimized binomial classifier in MATLAB to predict whether MCI patients transfer to AD within 5-year window
- Applied p-test and correlation functions to test sensitivity of classifier
- Employed combinations of 100 imaging features to improve classifier's accuracy to 79%

Vertex Pharmaceuticals Inc., Boston, Preclinical Safety Department Intern — May – August 2021

- Developed strategies for ECG data extraction of machine-readable and image-based clinical toxicology studies
- Collaborated with Integrated Safety and Data Analytics department to standardize and integrate ECG datasets to predictive toxicology database
- Analyzed more than 10,000 ECG datapoints on variability, detection sensitivity and implications to improve dog and NHP cardiotoxicity studies

Projects

Design of SARS-CoV-2 Viral Spike Protein Disruptors Targeting GRP7 September 2021 – Present

- Researched and visualized 26 GRP78 structures utilizing Maestro/Schrodinger Software
- Analyzed 30 research papers on PubMed to gather GRP78-targeted virtual screening data published
- Wrote and presented NIH-style proposal

Rapid SARS-CoV-2 Viral Diagnostic, NIH Proposal — November – December 2021

- Wrote an NIH-style proposal for SARS-CoV-2 viral particle diagnostic method
- Developed and proposed methods and experiments to test sensitivity and accuracy of method proposed

Global Engineering Brigades Service Trip, Honduras — May 2019

- Collaborated with 20 volunteers to take 13 house distance measurements
- Employed EPANET to design a sewage system design
- Presented deliverables to village representatives in Spanish

Skills:

Computer: Matlab, C, C++, Python, SQL, R, PyMol, Maestro, Rosetta, Haddock, CaDNAno, CanDO, Freesurfer, SolidWorks, Arduino
Laboratory: PCR, Gel Electrophoresis, Experimental design, Pipetting, ImageJ, LabScribe, Image Processing, Image Analysis, Data Analysis, ECG

Leadership:

Sigma Delta Tau, Standards Board Representative — September 2020 – Present
Global Engineering Brigades, President/Volunteer — January 2019 – Present

Harin Lee

Boston, MA | harinlee83@gmail.com | (774) 551-6775
linkedin.com/in/leeharin

EDUCATION

Boston University, College of Engineering (Boston, MA) Expected May 2022
Bachelor of Science in Biomedical Engineering GPA: 3.94/4.0
Activities, Honors, and Societies: Tau Beta Pi (Chapter President), Dean's List (6 Semesters)
Coursework: Software Engineering, Statistics, Molecular Biology & Biotechnology, Organic Chemistry, Engineering Design, Signals & Controls, Circuits

RESEARCH EXPERIENCE

Undergraduate Student Researcher at BU Material Robotics Lab
Mechanisms for Variable Stiffness in Catheter Applications September 2019 – December 2021

- Designed CAD molds for a novel, helical pneumatic actuator on a soft catheter used in interventional bronchoscopy procedures
- Introduced new fiber jamming fabrication strategies and developed miniaturized prototypes to achieve variable stiffness in a soft catheter
- Tested mechanical stabilization of pneumatic actuators and fiber jamming mechanisms using an Instron low force universal testing system
- Presented research at BU's 24th Annual Undergraduate Research Symposium

Finite Element Analysis of Soft-Robotic Stabilization Mechanisms May 2020 – September 2020

- Simulated inflation of various pneumatic actuators in bronchial tree by researching mechanical properties of lung tissue and collaborating with graduate students
- Funded by Kenneth R. Lutchen Distinguished Fellowship

PROJECTS

Sensing Systems Engineer at Airflow Seating Systems Technologies (Start-up)
Pressure Sensing Mat May 2021 – Present

- Led the development of a pressure sensing array for an air cell cushioning system to prevent pressure ulcer formation in bed-ridden hospital patients
- Assembled, programmed, and calibrated custom PCB sensors using mechanical testing equipment and software

SKILLS

Technical: MATLAB, C, C++, Python, HTML/CSS, SQL, Git, CAD (Autodesk Fusion 360), Finite Element Analysis (Abaqus), LaTeX (Overleaf), Microcontroller (Arduino), Adobe Illustrator
Languages: English (Native), Korean

HONORS & AWARDS

Tau Beta Pi Scholarship (2021) – Tau Beta Pi Engineering Honor Society
Nordson BUILDS Scholarship Award (2020, 2021) – Nordson Corporation
Provost's Scholars Award for Academic Exploration in the First Two Years (2020) – Boston University
Kenneth R. Lutchen Distinguished Fellowship (2020) – Boston University College of Engineering

Megan Minju Lee

720-556-1526 | MINJUL0501@GMAIL.COM

www.meganminjulee.com

EDUCATION

Boston University College of Engineering, Boston, MA **Expected May 2022**

Bachelor of Science in Biomedical Engineering & Minor in Mechanical Engineering
Concentration in Technology Innovation & Management

- **Relevant Coursework:** Static, Dynamics, Probability & Statistics and Data Science, Electrical Circuits, Product Design, Signals & Controls, CAD & Machine Components, Manufacturing Processes, Material Science

EXPERIENCE

Morphable Biorobotics Lab **Aug 2021 – Present**

Robotics Design and Manufacturing Researcher

- Authored a paper outlining the design and manufacturing of a novel, soft, actuating arm capable of minimally invasive heart surgery
- Awarded a $2500 research grant to integrate components of the surgical device like the actuator, end-effector, and stabilizer in preparation for ex-vivo and in-vivo testing
- Fabricated the soft actuating arms using 3D Printing and laser cutting
- Performed tensile and compression tests on these actuators using the Instron Testing System
- Conducted Finite Element Analysis (FEA) through SolidWorks and ABAQUS to simulate and collect data

Lockheed Martin **May 2021 – Aug 2021**

Space PCB Design Engineering Intern

- Designed mechanical and electrical layout of highly reliable multi-layer Printed Circuit Boards (PCBs) for Lockheed Martin's Space department using Zuken
- Created and revised over 30 Circuit Card Assembly (CCA) and Printed Wiring Board (PWB) drawings using CAD software tools like Blueprint, ensuring high performance aerospace designs
- Verified schematic entries and created detailed bills of materials using Microsoft Excel

College of Engineering Robotics Department **Jan 2021 – Aug 2021**

Research Assistant for BU Robotics Lab

- Developed an algorithm via Python to implement Kalman filtering for position estimation and feedback control
- Built a framework using Robot Operating System (ROS) to capture and process motor parameters

PROJECTS

Engineers Without Borders (Sustainable Water Supply) **Sep 2018 – Jan 2022**

Co-President of BU Chapter

- Led the design and installation of a sustainable water supply in Tinet, Kenya at 2 schools in the community providing about 6,000 students and surrounding residents access to clean water
- Collaborated with stakeholders and team members to implement a borehole well at Kapkeet Primary school
- Managed a post-assessment on well and implementation of rainwater catchment system at Sotiki secondary school

PUBLICATION

Rogatinsky, J., Gomatam, K., Lim, Z.H., **Lee, M.**, et al. A Collapsible Soft Actuator Facilitates Performance in Constrained Environments. *Advanced Intelligent Systems* (2022) *under review

SKILLS

Technical: MATLAB, CAD (SolidWorks, Blueprint, Creo, AutoCAD), Abaqus, Arduino, Python, LabVIEW
Mechanical: Basic Machining (Lathe, Bandsaw, Milling, Laser Cut), 3D Printing, Instron

Jiazhen Liu

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EDUCATION

Boston University| Boston, MA
Bachelor of Science in Biomedical Engineering (Expected May 2022)
Coursework
Bimolecular Architecture | Biomaterial | Nanotechnology | Fluid Dynamics | Clinical Design

SKILLS

Programming: MATLAB | Python | Javascript | MySQL | HTML5
Synthetic Biology: ELISA | rt-PCR| Ligation | Primer Design | Gel Extraction | CRISPR/Cas 9
Graphic Arts: Photoshop (PS) | Illustrator (Ai) | Aftereffect (AE) | DaVinci Resolve | Premiere (PR) | Figma

RESEARCH & COURSE PROJECTS

Genetic Circuits for Early Cancer Detection | Wilson Wong Lab, Rajen Kilachand Center for Integrated Life Sciences & Engineering, Boston University 2020.2-Present
Undergraduate Research Assistant

- Formulated conceptual models and simulations of plasmid sequence via Benchling platform.
- Designed primers corresponding to constructed sequence.
- Generated functional DNA plasmid from simulation.
- Verified functionality and fluorescence response via transfection.

Cloud-based Framework for Organizing and analysis of fNIRS Datasets | Department of Biomedical Engineering, Boston University 2021.9 - Present
Senior Design

- Developed a robust SNIRF and BIDS dataset validator.
- Established workflow to capture all required metadata in fNIRS-BIDS dataset.
- Created a user interface mock-up for cloud framework with BU SAIL team.
- Implemented functionality to calculate quality metrics of uploaded datasets.

EXPERIENCE

Department of Biomedical Engineering | Boston University 2022.2-Present
Lab Assistant for BE755: Molecular System and Synthetic Biology Lab

- Conducted 14 lab protocols about Transfection, RNA purification, cDNA synthesis, and rt-PCR for teaching.
- Prepared experiment materials for class.
- Tested and verified protocols for teaching.

Interactive Online Platform for Bacteria Identification Based on Genetic Sequence | Department of Analytical Instruments, Autobio Diagnostics Co., LTD 2021.7 - 2021.9
Front-end Developer Intern

- Built a comprehensive microbial data base for a certain type of antibiotic susceptibility testing device.
- Designed front-end of data base searching platform.
- Managed to record more than 12,000 types of microorganisms.

Monoclonal Antibody for Potential Hepatitis B Treatment | Department of Genetic Engineering, Autobio Diagnostics Co., LTD 2019.7 - 2019.9
Research Assistant Intern

- Developed a monoclonal antibody for Potential Hepatitis B treatment.
- Performed immune binding test on BALB/C mice and confirmed effectiveness of antibody based immune responses.

HONORS & AWARDS

The Nelson and Vicky Fong Scholarship Fund | Boston University 2018.9 – 2022.5
Awarded $20,000 annually for 4 years.

Tiffany Lukmantara

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EDUCATION

Boston University College of Engineering, USA Expected May 2022
Bachelor of Science in Biomedical Engineering, Minor in Computer Engineering
GPA 3.91

Awards & Honors: **Presidential Scholarship Awardee, Dean's List** (Fall 2018, Spring & Fall 2019, Spring & Fall 2020, Spring & Fall 2021)**, Tau Beta Pi – Engineering Honor Society**

Relevant Coursework: AI in Systems Biology, Applied Algorithms, Nucleic Acid Engineering, Systems Physiology, Software Engineering, Device Diagnostics and Design, Computational Synthetic Biology

Extracurriculars: ENG Student Government, Mars Rover Club, miXx Dance Crew, PERMIAS MA

Université Grenoble Alpes, FR Spring 2020
Boston University Engineering Study Abroad Program

PROFESSIONAL EXPERIENCE

Research Trainee | *Brigham and Women's Hospital – NTEL, Boston, USA* Sep 2021 – Present
- Developing novel photo-crosslinked 3D bioprinting technique using next-generation biomaterials

Undergraduate Research Intern | *Mass General Hospital – Martinos Center, Boston, USA* Feb – Sep 2021
- Conducted research on translating multimodal DOT technology for non-invasive breast cancer diagnosis
- Programmed a UI in **MATLAB** to analyze and evaluate DCE–MRI data (500,000+ elements)
- Acquired semi-quantitative descriptive indices such as time to peak, wash-in, wash-out rate of 3D breast

Shopee Apprentice Program – Business Development Intern | *Shopee, IDN* Jun – Aug 2021
- Selected as 1 of 20 interns from 5,000+ candidates to participate in competitive internship program
- Analyzed 500+ data and identified 5 pain-points local MSMEs experience in supply, operations, marketing
- Evaluated 3 potential solutions and formulated strategic plan based on insights generated from case study
- Acted as project management office and maintained effective communication between BD, HR, and IT

LEADERSHIP & ACTIVITIES

Scholars & Careers Officer, PERMIAS Massachusetts | *Boston, USA* Apr 2021 – Present
- Organized a 5-part workshop series 'Hack the Internship' and achieved 30+ participants each session
- Curated workshop content and identified industry experts from Google, Microsoft, McKinsey as speakers

Member, BU Mars Rover Club – Autonomous Traversal Team | *Boston, USA* Sep 2020 – Present
- Designing and building an autonomous Mars Rover to compete in annual University Rover Challenge
- Implemented path planning, obstacle avoidance, and AR Tag analysis using **OpenCV** in **Python**

VP of External Affairs, BU Engineering Student Government | *Boston, USA* Sep 2020 – May 2021
- Communicated with external relations for events directed towards welfare and career of ENG undergrads
- Spearheaded planning of a biweekly career webinar where BU engineering alumni are invited to speak

PROJECTS

Genetic Circuit Design Automation Program May – Apr 2022
- Developed a GUI in **Python** that creates a genetic circuit from user-defined parts (input, response function, output)
- User can visualize circuit as a graph and perform operations which simulate DNA and protein engineering

Metformin's Effect on Mouse and Human Gene Expression Dec 2021
- Investigated Metformin as a wellness-promoting drug through differential gene expression analysis
- Performed K-means clustering of 22,000 genes based on insulin resistance (IR) in **MATLAB** and **Python**
- Utilized **GEO2R** and **Ensembl BioMart** to study gene expressions between metformin treated mice groups
- Designed a Bayes network trained on ~300 genes of interest between human and mice to predict likelihood of IR

Dr. Reminder Sep 2021
- Developed a shareable personal prescription manager and reminder web app in **Python** for MedHacks
- Programmed the NLP algorithm to transform prescription instructions into a calendar
- Collaborated in a team of 4 to build web app in under 48 hours and won Popular Choice award

Remote Release Smart Rodent Trap Oct – Dec 2019
- Designed a rodent trap with a SMS notification system to indicate presence of captured rodent in under 15s
- Created a notification system and remote release door algorithm using **Arduino**
- Planned and strategized timeline and project's budget to accelerate completion in 3 months

SKILLS & LANGUAGES

Programming:	C++, MATLAB, Python, C, Arduino, Verilog
Wet Lab:	Practiced Micropipetting, Sterile techniques, and Cell Culture techniques
Languages:	Fluent in English, Proficient in Mandarin & Bahasa Indonesia, Beginner French

Stefan Eduardo Lütschg Espinosa

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Education

Boston University College of Engineering, Boston, MA
Bachelor of Science in Biomedical Engineering, GPA: 3.47 Expected May 2022
Boston University Presidential Scholarship Recipient, Dean's List (Fall 2019, Spring 2020, Fall 2021)

Relevant Coursework
Quantitative Neuroscience, Neuroscience Design Lab, Introduction to Machine Learning, Biomedical Signals & Control, Modern Control in Biomedical Engineering, Biomedical Ethics, Introduction to Software Engineering, Applied Algorithms for Engineers, Clinical Applications of Biomedical Design

Skills

Computer: MATLAB, Microsoft Office, C/C++, Python, Unity 3D, C#, Arduino, Object Oriented Programming, Machine Learning
Languages: Fluent in English & Spanish, Basic/Conversational German

Projects

Optimization of EEG Reference Layer | Boston University September 2021 - May 2022
- Designing reference layer to be used in simultaneous Electroencephalography (EEG) & functional Magnetic Resonance Imaging studies as part of Senior Design capstone project
- Surveying electrically conductive inks and insulating fabrics to be used with EEG electrodes
- Assessing experimental performance of new design in comparison with previous models

COVID-19 & General Health GUI Application | Boston University Fall 2021
- Developed prototype Graphical User Interface application built on wxWidgets GUI framework in C++ that can be used to locally record COVID-19 related data and general health information
- Designated as Project Lead of small team, tasked with organizing team meetings, project outlines, maintaining GitHub repository, recorded demo video Engineering course

American Sign Language Interpreter Glove | Boston University Spring 2021
- Built prototype glove device with six flex sensors used in combination with Arduino hardware to interpret the American Sign Language alphabet for Neuroscience Design Lab course
- Wrote Arduino code featuring algorithm to collect voltages from flex sensors on glove, compare data to calibrated averages, returning letter which is output via computer screen and speaker

Experience

Laboratory Assistant | Bioengineering Tech. & Entrepreneurship Center September 2021 - May 2022
- Managed electronics and wet laboratory equipment including PCR machines, Cell Imaging devices, Mixed Signal Oscilloscopes, Function Generators, Cell Incubators, and microscopes
- Assisted in developing and implementing new protocols for testing and data collection on cell culture and imaging devices
- Wrote and edited Standard Operating Procedures (SOPs) for laboratory operations

Product Safety Engineering Intern | Philips Andover Standards & Reliability Center Summer 2021
- Developed procedures and trained engineers on using Invasive Blood Pressure (IBP) monitoring equipment to do product safety testing according to standard IEC 60601-2-34
- Performed Measurement of Uncertainty study on IBP test station as per standard ISO/IEC 17025

Undergraduate Teaching Assistant | Boston University College of Engineering Spring 2021
- Lectured 1st year engineering students on neuroscience and statistics topics in EK131 Introduction to Engineering: Human Brain Mapping
- Implemented neuroscience experiment assigned as homework to develop students' skills in MATLAB programming and statistical analysis

James Maher

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EDUCATION

Boston University *Expected May 2022*

- B.S., Biomedical Engineering, Minor, Public Health
- Coursework: Signals & Controls; Fluid Mechanics; Epidemiology; Software Engineering; Computational Synthetic Biology; Data Science in R; Analysis of Variance; Biomedical Measurements & Instrumentation

PROJECTS & RESEARCH

Optimization Algorithm for DNA Assembly Production *March 2022 - April 2022*

- Designed and iterated algorithm to find protocol options with lowest cost, shortest computation time, and most efficient (weighing both cost and computation time equally) for DNA assemblies given desired product
- Created user interface to present information generated from algorithm in a clear, concise fashion and allow customization of inputs and constraints

Boston University Senior Design Project *September 2021 - April 2022*

- Working in a team of three students to design and refine a mobile application to simulate conversation for individuals with autism and allow clinician to more carefully observe patients
- Document design process and communicate findings to develop next steps for application should development continue beyond current academic year

School of Chemical & Biomolecular Engineering, University of Sydney *February - June 2020*

- Analyzed geometrical structure of chicken gizzards and began development of two 3D models of gizzards for use in laboratory experiments

EXPERIENCE

Boston University College of Engineering *January 2021 - May 2022*

- Undergraduate Teaching Fellow and Grader for EK 381: Probability, Statistics, & Data Science
- Led homework help sessions and answered student questions about assignments and lecture concepts, graded completed homework assignments within one week
- Assisted professor in leading students through example problems in class applying probability theory and statistical methods to real-world problems

Rockland County Department of Health *June - August 2021*

- Performed and documented inspections of both regulated bathing facilities and residential swimming pools to ensure compliance with both state and local law
- Assisted in documentation of health insurance information for the purpose of reimbursement from insurance providers at in-house COVID-19 vaccine clinic

Boston University Student Employment Office *May - December 2019*

- Organized job status reports and student information in BU student job service in online database, assisted both students and community members in using the student job service
- Worked with payroll to resolve student compensation issues in a timely fashion

COMPUTER SKILLS

- Proficient in Matlab, C, C#, C++, Python, SAS, R, Microsoft Office
- Proficient in multivariable statistical analyses and statistical modeling using SAS and R

LEADERSHIP & ACTIVITIES

Boston University Athletic Bands *September 2018 - present*

- Pep Band manager since 2021; serve as point of communication between students and staff, conduct outreach, assist directors in running rehearsals and performances, organize student-led banquet at end of year
- Tuba section leader since 2020; ensure all section members are familiar with music and responsibilities and facilitate communication of changes to schedule and/or procedure for performances as it relates to the section

Engineers Without Borders, Boston University Chapter *September 2019 - May 2021*

- Outreach team leader 2020-2021; Scheduled, organized and led panels for middle and high school students, answer questions about STEM, college applications, and our work
- Work with a team of 20-30 members to design, build, and finance a sustainable, low-maintenance water filtration system for community use in Tinet, Kenya

Laura Mazuera

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EDUCATION

Boston University College of Engineering Boston, MA
Bachelor of Science in Biomedical Engineering Expected May 2022
Semester Abroad, **Comillas Pontifical University**, Madrid, Spain Spring 2020
GPA: 3.40

PROFESSIONAL EXPERIENCE

Boston University Women in Science & Engineering *Boston, MA* Sep 2021 – Dec 2021
Office Assistant
• Organized women in stem networking events to connect professionals to current BU students
• Monitored 16+ mentor/mentee groups to ensure exchange of information

Boston University Engineering Tutor *Boston, MA* Sep 2020 – Sep 2021
Academic Tutor
• Explained undergraduate engineering courses to students with doubts
• Led students through examples, past assignments, and assisted with homework problems

Boston University CAS Biology *Boston, MA* Feb 2020 – May 2021
Laboratory Assistant
• Prepared ecological/environmental samples for stable isotope analysis
• Performed water extraction from soil samples for analysis

PROJECTS

Senior Project: "Automated Neuron Identification in Functional Microscopy" Sep 2021 - present
• Technologies Used: ImageJ, Micro-Manager, MATLAB, confocal and DiSPIM microscopy
• Executed use of NeuroPAL transgene, optical and fluorescent microscopy, and algorithm implementation in 2-person team to automatically label neurons in hermaphrodite C. elegans

Personal Project: "Colombia STD Clinic" Sep 2020 - postponed
• Organized alternative spring break experience to initiate pop-up STD testing site in impoverished zones of Bogotá in 3-person team with assistance from Northeastern University
• Consulted international medical professionals associated with Pontifical Xaverian University on logistics

LEADERSHIP EXPERIENCE

Sophomore Mentorship, *Boston University* Sep 2019 - present
Academic Mentor
• Coordinated mentor/mentee events for 60+ sophomore engineering students
• Communicated with mentee and provided guidance and resources for college transition

University Ambassador *Boston University* Jan 2020 – May 2020
Student Representative at ICAI Madrid
• Represented 30+ study abroad students at Comillas Pontifical University's School of Engineering
• Acted as liaison between professors, faculty, and students

TECHNICAL SKILLS

Lab Skills: Pipetting, centrifuging, culturing bacteria, chromatography: thin layer and column, DNA extraction, staining techniques, IR and NMR Spectroscopy, distillation, recrystallization, sample preparation, vacuum water extraction, microscopy: fluorescent, optical, phase contrast, DIC, TPE
Computer Skills: Proficient in Microsoft Office, MATLAB, ImageJ, Adobe Creative Cloud, Intermediate in Programming language C
Languages: Native in English and Spanish, Intermediate in Mandarin

Ashley McFarlane

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Education

Boston University College of Engineering, Boston, MA
Bachelor of Science Biomedical Engineering Expected May 2022

Experience

Research Assistant - Orthopedic and Developmental Biomechanics Laboratory Feb 2021 - Present

- Operating MITK-GEM software to segment vertebra and intervertebral disc in MRI scans
- Building finite element models in FEBio to analyze behavior of intervertebral disc
- Processed and refined 5 DICOM scans of vertebra using ImageJ to produce 3D models of displacement of vertebra under force
- Detected failure points by creating a video representation from image data of vertebra bearing loads

Lab Processing Technician - Boston Children's Hospital Feb 2022 - Present

- Performing routine operations in the Bacteriology department such as centrifuging, planting specimens on media plates, and freezing
- Assessing and preparing blood, urine, and other tissues for further modification and manufacture

Undergraduate Researcher - Boston University & Boston Medical Center Jun - Aug 2021

- Observed approx. 7 physicians from the BU/BMC Kidney Technology Research and performed rounds and nephrology procedures
- Partnered with a team of 4 to identify ways of improving biopsy procedures and dialysis machines
- Performed 10-15 hours of didactic training in kidney disease and treatment technology
- Researched and presented findings of transplant technology to develop a low resource organ transport device

Skills

- Programming: Matlab, C, LabScribe, Arduino, ImageJ, Python, SketchUp, MITK-GEM, FEBio
- Laboratory: Soldering, Planting Specimens on Media Plates, Centrifuging Specimens
- Languages: English, Spanish (Intermediate)

Projects

Point of Care (POC) Diagnostic for Chronic Kidney Disease Sep 2021 - Present

- Collaborating with a team of 4 to develop a POC device that indicates a risk of CKD
- Implement Jaffe reaction and identify affordable materials to test creatinine levels in low resource settings
- Using OnShape to 3D print components of device
- Drafted proposals and presented them to project advisors and principal investigator

Permanent Implant for Dialysis Patients Jan - May 2021

- Developed a model of implant which increases access to fistula for CKD patients
- Collaborated with 3 engineers to brainstorm and iterate through device design/verification process
- Interviewed a handful of patients and physicians to gain insight on needed specifications, community limitations, and medical guidelines

Save An iPhone Sep - Dec 2019

- Led a team of 3 to make an iPhone case that electromechanically deploys upon detection of motion
- Sketched and designed prototype within OnShape for iPhone case
- Composed engineering reports and presentations documenting progress of final product

Leadership and Volunteer Experience

National Society of Black Engineers, Vice President of Internal Affairs Sep 2018 - Present
Technology Innovation Scholars Program, Ambassador Sep 2020 - Present

Cécile Meier-Scherling

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EDUCATION

Brown University, Providence, RI — Expected May 2027
Incoming Ph.D. Student in Computational Molecular Biology

Boston University, College of Engineering, Boston, MA — Expected May 2022
Bachelor of Science in Biomedical Engineering, Concentration in Machine Learning

RESEARCH EXPERIENCE

Dana-Faber Cancer Institute, Harvard Medical School, Boston, MA — May 2021 - Present
Undergraduate Research Student in the Department of Data Science, Michor Lab
- Researched evolutionary trajectories of different cancer types based on tumor evolution modeling
- Simulated and evaluated 1000+ phylogenetic trees to quantify tumor evolution in multiple datasets
- Created machine learning classifier predicting evolutionary trajectory of cancer types in R Studio
- Writing manuscript to be submitted for publication in Spring 2022

Evotec, Hamburg, Germany — Jun 2020 - Jul 2020
Student Intern/Trainee in High Content Imaging Department
- Coordinated a project comparing results of different imaging analysis tools (Cell Profiler, Acapella)
- Showcased self-teaching skills needed to analyze 860,000 images of bone tissue cells in Cell Profiler
- Assessed pros and cons of image resolution versus microscopy efficiency for cell painting assay

Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA — Jun 2019 - Jan 2020
Research Intern at Berenson-Allen Center for Non-Invasive Brain Stimulation
- Researched effects of magnetic non-invasive brain stimulation (TMS) on attention in healthy adults
- Coordinated setup of MRI examinations as well as conducted cognitive tests during MRI
- Analyzed data of 200+ participants and 50+ DNA samples to inspect safety of brain simulation

ACADEMIC PROJECTS

Boston University College of Engineering, Boston, MA — Sep 2021 - Present
Quantitative Modeling of Healthcare Access among Native Americans in Rosebud, SD; Zaman Lab
- Conducted conversations with community leaders to identify health barriers and community trauma
- Designed data- and community-driven model to predict interventions improving patient outcomes

TEACHING EXPERIENCE

***Boston University College of Engineering*,** Boston, MA — Jan 2020 - May 2021
Undergraduate Teaching Fellow for Probability, Statistics, and Data Science
- Coordinated office hours twice a week explaining key concepts and helping with homework

LEADERSHIP EXPERIENCE

Berlin Exchange Medicine Journal (BEM), Berlin, Germany — Nov 2021 - Present
Co-Head of Peer-Review Fellowship Program
- Designed Reviewer Fellowship Program for first German student-led Life Science Journal

German American Conference at Harvard Kennedy School, Cambridge, MA — Oct 2019 - Present
Co-Chair of 40+ person organizing committee
- Organized events with multiple speakers (e.g. Minister of Health of Germany), logistics, fundraising

HONORS & AWARDS

Dean's List Spring 2020, 2021; Fall 2021
Bloom Family Leadership Academy
Patriot League Honor Roll 2019, 2020, 2021
Semi-Finalist Rice 360 Design Competition

SKILLS

Computer: MATLAB, C++, RStudio, Cell Profiler, MS Office, Python, STATA
Laboratory: MRI, TMS, TES, Spectrophotometer, Gel Electrophoresis, ECG, Microscope, Arduino
Languages: German (native), English (native), French (B1), Latin (Latinum)

Maria Merhej

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Boston University, College of Engineering Boston, MA
B.S. in Biomedical Engineering Jan 2023
GPA: 3.80 - Dean's List (Spring'20, Fall'20, spring'21, Fall'21)
Awards: Taekwondo Lebanese Champion | Lebanese Champion in Long Jump, High jump, 4*100m relay, 100m, and 60m | Gymnastics Lebanese Champion | High-school Long Jump record holder | Gymnast Award at graduation
Relevant Coursework: Principles of Molecular Cell Biology and Biotechnology | Device and Diagnostic Design | System Physiology | General Chemistry 2

RELEVANT EXPERIENCE

Benta Pharma Industries, Beirut, LB Jun – Jul 2021
Healthcare Consultant Intern
- Analyzed biocompatibility tests data using excel to enhance compatibility of first Middle Eastern Intraocular Lenses with biological systems and insure long-term uveal and capsular biocompatibility
- Ensured application of safety protocols in production of medical devices using a set of guidelines maintaining efficiency
- Conducted reports to address potential issues in drugs production by inspecting milling, granulation, coating, and tablet pressing processes decreasing possible incidents by 10%

MDH jewelry, Paris, FR Summer 2021
Co-founder, CMO
- Designed company website using Shopify and modifying open-source template language, Liquid, written in Ruby
- Developed marketing strategy for company using Search Engine Optimization (SEO), network of influencer, and Facebook ads, increasing customer lifetime value by 40% and decreasing customer acquisition by 15%
- Structured logistics of company using order processing systems including batch picking and sorting orders before shipping increasing efficiency, customer satisfaction, and reducing delivery cost by 40%

Promer Lab, Beirut, LB Jun – Aug 2019
Dental Prosthetic Intern
- Created Crowns and Bridges using select laser and 3D-scan machines to increase precision in design and client satisfaction
- Manipulated Zirconia milling machines to produce teeth infrastructures in Zirconia stone for greater comfort to patients

SELECTED PROJECTS

"Pulse Oximeter Design", Boston, MA Sep 2020– Jun 2021
- Designed commercial pulse oximeter suitable to measure oxygen level in blood for home family usage
- Generated detailed 2D drawings and 3D models using AutoCAD and Solid Works
- Constructed and customized oximeter's hardware and software using Arduino
- Created water and chock proof casing from standard resins (SDS, TDS) using 3D printer

Additional Projects: Microdevices to Measure Drug responses in cancer patients Project, Device to Reduce Wound Infection in Diabetic Patients, Truss Design Project/Truss Stress Analyzer Program, Caffeine Power on Movement Time & Muscle Strength Research, Covid-19 & Athletes Project

SKILLS & INTERESTS

Skills: C++, MATLAB, Arduino, SolidWorks, Microsoft Office
Languages: Fluent in French, English, and Arabic
Interests: Gymnastics, Track&Field, Drawing and Sketching, Horseback Riding, Tennis, Basketball, Ski, Aerial Yoga, Chess

LEADERSHIP & ACTIVITIES

Member, Tau Beta Pi engineering honor society
Member, BU Society of Women Engineers
Member, BU Biomedical Engineering Society
Member, BU Consulting Group
Mentee, Novartis Young Scientist Outreach Program
Representative, Grades 11 & 12
Leader, Girl Scout movement
Leader, Track & Field Team
Leader, Girl Rugby Team

Andrew Miao

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Education

Boston University College of Engineering, Boston, MA — Expected May 2022
Bachelor of Science in Biomedical Engineering; Pre-Medical
Cumulative GPA: 3.60/4.00, Cum Laude
Dean's List: Spring 2020, Fall 2020, Spring 2021, Fall 2021
Relevant Coursework:
Biomedical Engineering Senior Project | Quantitative Neuroscience | Device Diagnostics & Design | Clinical Applications of Biomedical Design | Transport in Living Systems | Thermodynamics | Quantitative Physiology | Biomedical Ethics | Engineering Mechanics |

Work Experience

University Orthopedics Center, Altoona, PA — June – August 2021
Observational Intern

- Rotated with 10 surgeons, 5 physician assistants, and physical therapy team to build comprehensive understanding of triage, patient interactions, operations and rehabilitation
- Reviewed MRI and X-Ray imaging with surgeons pre- and post-operatively to determine diagnosis and progression of healing
- Observed knee and shoulder arthroscopy, joint replacements, and pain management injections

NewPath Diagnostics, Queens, New York City, NY — June – August 2019
Lab Assistant

- Labeled cassettes and slides with NYU Langone biweekly for 100-150 patients each time
- Received lab specimens from doctors in NYC and performed different staining techniques
- Organized slides for physicians and entered patient information including diagnosis into portal

Leadership & Activities

Helping Hearts Boston University, Boston, MA — October 2020 – Present
Executive Board, Fundraising Chair

- Designed unique monthly fundraisers to fund research for diagnosis, treatment and prevention of congenital heart defects
- Facilitated philanthropy events during a global pandemic including Instagram story fundraiser and partnership with Chipotle to raise over $1,000 in 2020

Boston University Club Ice Hockey, Boston, MA — September 2018 – Present
Vice President, Captain

- Managed team operations with team president, coaching staff, club sports personnel and other collegiate teams to schedule regular season games, team trips, bus times and practice slots
- Conducted gear, jersey and apparel orders for team prior to beginning of season

Projects

"Rotator Cuff Tendon Strain during Glenohumeral Motion" Project — September 2021 – Present

- Obtained surface-strain measurements during glenohumeral motion and rotator cuff mechanical load using NCORR algorithm optimized in C++
- Applied digital image correlation software to images of supraspinatus tendon to analyze potential for tear initiation and progression in cadaveric setting

"Emergency Neuroprotectant Auto-Injector" Project — September 2021 – December 2021

- Designed a portable auto-injector to prevent cell death during ischemic strokes
- Created needs statement, product design specifications, Pugh chart, CAD drawings, schematic drawings, failure modes and effects analysis, technical assessment, and final prototype
- Conducted stakeholder interviews with vascular neurologist, primary care physicians, and EMTs

Skills

- **Language**: Proficient in Chinese; Basic French
- **Software**: Proficient in Matlab, Microsoft Office; Basic Arduino, C
- **Research Techniques**: Proficient in: RT-PCR, Cell Staining, Agarose Gel Electrophoresis, Cell Fluorescence, DNA purification, Protein Absorption and Denaturing

Sahil Mohanty

sahilmo@bu.edu | 617-710-4121 | Boston, MA

EDUCATION

Boston University, College of Engineering | Boston, MA
Expected May 2022
Bachelor of Science in Biomedical Engineering
Academic Projects: Emergency Narcan Dispenser System (Fall 2021), Machine Learning Categorization of Animal Images (Fall 2020), The Effects of Different Types of Exercises on Heart Rate (Fall 2020), Design and Fabrication of a Portable Cell Incubator (Spring 2020), Investigation into How Different Computer Activities Effect EEG Signals (Spring 2019), Investigation into the Crime Rates at Specific Hours in Boston (Fall 2018)
Relevant Coursework: Device Diagnostics and Design, Transport Phenomena in Living Systems, Thermodynamics & Statistical Mechanics, Optical Spectroscopic Imaging, Biomedical Optics, Business of Technology Innovation, Principles of Molecular Cell Biology and Biotechnology, Systems Physiology, Signals and Controls, Probability, Statistics, and Data Science for Engineers, Electric Circuits, Engineering Mechanics, Physics I/II, Chemistry I/II, Differential Equations, Multivariable Calculus, Computational Linear Algebra, Biomedical Engineering Measurements I/II
Technical skills: PCR, DNA Ligation, Electrophoresis, Mass Spectrometry, TLC Analysis, NMR Analysis, MATLAB, Python, Excel, Arduino IDE, C, Scientific Reading and Writing

RESEARCH AND CLINICAL EXPERIENCE

Synthera Health | Boston, MA
September 2021 – Present
Senior Design for Biomedical Engineering
- Conducted wet lab research
- Wrote project proposal

Azzur Group | Waltham, MA May 2021 – August 2021
Operations Intern
- Managed early-phase manufacturing companies
- Executed engineering work-orders

Sampled drug substances, other chemicals

Tufts Medical Center | Boston, MA May 2020 – May 2021
Research Intern
- Assessed research of drug effects of Amantadine in stroke patients
- Analyzed RedCap database, patient records for trend analysis

Administrative Intern to Manager May 2019 – August 2019
- Organized meetings, followed resident trainings, shadowed physicians

Rhode Island Hospital| Providence Rhode Island June 2017 – August 2017
Research Intern
- Devised gels, learned to execute lab equipment/machines, conducted basic lab work
- Procedure development in lab

LEADERSHIP

Azzur Group
Director of Shipments May 2021 – August 2021
- Led domestic and international shipments with QuickStat
- Received materials for shipments into warehouse using WASP inventory system
- Evaluated bill of materials lists
- Performed raw-material cycle counts

Jaspreet Momi

833 Beacon St., Boston MA 02215 | 856-630-2597 | jaspreetkmomi@gmail.com

Education

J.D. with Concentration in Intellectual Property — **Expected 06/25**
American University Washington Law School — Washington, D.C.

B.S. in Biomedical Engineering with Concentration in Tech Innovation — **06/22**
Cumulative GPA: 3.65 — Honors: Cum Laude
Boston University — Boston, MA

Engineering Projects

Philips At-Home Bio Measurement Device - Senior Design Project (Fall 2021-Spring 2022)
- Collaborated with a team of four classmates under Philips Company in Boston to prototype an ECG monitoring device
- Coded a smart phone application using wireless cloud connection to pair with ECG device in order to measure and record heartbeat with sufficient accuracy for medical monitoring

Sound Adapting Lamp - Lutron Electronics Lighting Competition - First Place (Spring 2022)
- Constructed a wireless crystallized LED Lamp Projector connected via WiFi with a microcontroller
- Using Spotify's Application Program Interface, moving colors were displayed on the lamp with varying speed based on Spotify's "danceability" score of the music playing on the user's account

Hemodialysis Fistula Implant Device - Medical Device Design Project (Spring 2021)
- Built an alternative hemodialysis fistula implant device to minimize pain, infection, and clotting as well as improve ease of patient use, interviewing physicians, patients, and conducting research on fistula design in the process

Work Experience

Consultancy Intern — **January 2021-January 2022**
TLE Center for Urban Entrepreneurship — **Boston, MA**
- Organized fundraisers and distributed COVID grant money to underrepresented and underfunded entrepreneurs through a Boston-based nonprofit
- Advised numerous small business owners in transitioning small businesses to online platforms amidst COVID-19

Curriculum Leader — **May 2020-January 2021**
Project Artemis Coding Program — **Boston University**
- Created the first remote course curriculum of the Artemis coding program with two co-coordinators
- Taught thirty incoming 9th grade girls via Zoom to code in HTML/CSS, Python, CAD, and Micro:bit languages
- Organized six guest speaker appearances using personal contacts with IBM, Scratch, Form Labs, Boston University, and MIT

Receptionist — **May 2017-August 2020**
Anu Medical Spa — **Voorhees, NJ**
- Spearheaded the development of social media platforms for the business, aiding in the growth of client base
- Assisted physician in aesthetic medical procedures, gaining a comprehensive understanding of the photonics and physics of technologies used in aesthetic medicine

Skills

- Coding: MATLAB, Arduino Uno, Python, Java, HTML, CSS, MS Excel
- Fluent in Spanish

Joshua Monroy

(978) 697-9589 • Joshuamonroy131@gmail.com Lawrence, MA • www.linkedin.com/in/joshuamonroy

EDUCATION

Boston University College of Engineering, Boston, MA — Expected May 2022
Bachelor of Science in Biomedical Engineering — **GPA**: 3.28/4.00

Relevant Coursework

Device Diagnostics & Design	Signals & Controls	Biomedical Measurements I, II
Application of Biomed Design	Fluid Mechanics in Living Systems	Mechanics I
Probability & Statistics	Thermodynamics	Systems Physiology

WORK EXPERIENCE

Access Vascular Inc, Billerica, MA — Starting June 2022
Engineer I, R&D

Haemonetics, Boston, MA — May 2021 – Present
R&D Engineering Intern

As R&D Engineer, support technical development and design on existing product and engineering projects. Within the framework of the organization's QMS, create and maintain product documentation in support of NPI and sustaining projects.

- Scoped and executed preventative action on disposable tubing, including releasing 13 SolidWorks drawings/specification documents and maintaining ISO 13485 compliant DHF for affected finished goods
- Establish special instructions and protocol documentation for leak/volume testing on disposable; validation of procedure to be confirmed by performing in-house testing prior to approval
- Completed mechanical testing to support establishment of disposable device sterilization protocols
- Learned to efficiently navigate Agile PLM software management system to locate, create, and modify documentation

EvoDenovo inc, Woburn, MA — June – August 2020
Biotechnician Intern

- Implemented data acquisition protocols, increasing automated data collection efficiency by 400%
- Executed calibration of BioStack, MultiFlo FX, and Synergy HTX instrumentation
- Prepared culture media in petri plates, culturing multiple strains of *C. elegans* including cross-progeny
- Picked male *C. elegans* under a microscope for gene crossing; preparing cross-progeny in separate sterile petri plates

PROJECTS

Biomedical Senior Design Project — September 2021 – Present

- Design and prototype a non-invasive imaging device for longitudinal monitoring of infection progression in fruit-flies
- Assessed needs and functional requirements to render preliminary designs
- Wrote and presented NIH style proposal with team members

Clinical Applications of Biomedical Design Presentation — November 2021

- Performed risk-benefit analysis for an IVC filter procedure
- Presented with team to inform peers of current practices and associated risk-benefit ratio

SKILLS & ACTIVITIES

Skills: SolidWorks, AutoCAD, GrabCAD, Minitab, MATLAB, Mechanical Testing, Python, C++

Activities: Global Engineering Brigades (Club Vice-President)

Language: Fluent in English & Spanish

Liam F. Murray

murraylifra@gmail.com · 610-297-2819 · https://www.linkedin.com/in/murraylifra

Education:

Boston University College of Engineering **Expected May 2022**
Boston, Massachusetts **Current GPA: 3.87**
B.S. Biomedical Engineering, Minor in Computer Engineering

Relevant courses: Computational Synthetic Biology, Biomedical Measurements I/II, Applied Algorithms, Biomedical Signals and Controls, Molecular Bioengineering I
Extracurriculars: BU Fencing Club, SPS, LETS

Work Experience:

Researcher | CIDAR Lab | 3DuF Development Team **June 2021**

- Converted code from Javascript to Typescript and to the Vue.js framework for a more robust code-base
- Restructured data import and export pipelines
- Developed UI and frontend elements using paper.js and Vue.js
- Fabricated and tested of microfluidic devices

Researcher | Dries Lab | Giotto Development Team **March 2021 - June 2021**

- Built Rvision-based (OpenCV) image registration functionality for purposes of image alignment and spatial location tracking
- Coordinated function development remotely with collaborators

Projects:

Senior Design **September 2021 - May 2022**

- Converted real-world microfluidic components into parametrized digital representations
- Designed, fabricated, and tested lipid nanoparticle generating microfluidic devices
- Coordinated with external collaborators regarding constraints and design features

SynBioHub Plugin Development Team **March 2021 - April 2021**

- Developed an inter-databank plugin for SynBioHub
- Coded Java and Python for UniProt API data retrieval

Skills:

Software-Related: Experienced in Python, Java(script), C(++), HTML, CSS, MATLAB, R, SBOL, JSON, and Verilog languages; Vue.js; SPSS; Microsoft Excel; Eugene; Cello; Arduino; FPGA programming

Lab-Related: Performed solution preparation, spectrography, PCR, recombinant DNA insertion

Design: Performed device design in group setting; microfluidic device design, fabrication, and usage

Honors & Awards:

- Magna Cum Laude
- Alpha Eta Mu Beta: National Biomedical Engineering Honor Society Membership
- Boston University College of Engineering Dean's List: 5 semesters

Volunteer Experience:

- Lead activities with Stem Pathways for education of youth in STEM

Anushka Murti

amurti2000@gmail.com • (732) 379-7869 • www.linkedin.com/in/amurti • Boston, MA

Education

Bachelor of Science: Biomedical Engineering | GPA 3.63 | Dean's List
Boston University College of Engineering *May 2022*

Projects

Mechanical loading bioreactor and strain data analysis app *Sep 2021 - Present*

- Develop control software for custom-built mechanical loading bioreactor to be used in strain transfer studies
- Develop app that analyzes bioreactor data and processes images from confocal microscope to calculate multiscale strains and strain transfer

Vertigo onset monitor *Sep - Dec 2020*

- Designed a wearable electromechanical device that uses head motion to warn patients of potential vertigo episode through sketches and CAD (*OnShape*)

Medical drawings *Jul 2020 - Jan 2021*

- Sketched language agnostic drawings to educate and guide people on various medical topics, such as how to clean water using readily available resources
- Researched information on different medical topics using Hesperian Health Guides website (https://hesperian.org/) as part of volunteer work through the 5th Village Project

Drug dispenser for low resource settings *Feb - May 2020*

- Designed a liquid drug dispensing device using sketches, CAD (*OnShape*), and mathematical models

Professional Experience

Laboratory Assistant *Sep 2021 - Present*
Boston University Clinical Testing Laboratory- Boston, MA

- Process up to 6,000 COVID-19 tests each day as part of effort to keep track of virus cases within the Boston University Community

Quality Assurance Specialist *May - Aug 2021*
Infinity BiologiX- Piscataway, NJ

- Conducted internal audit of freezers to ensure that labs within company were compliant with relevant protocols
- Supported coordination of internal and external Quality audits to ensure timely completion
- Revised SOPs, including COVID-19 related documents, created training matrices, and handled onboarding

Student Assistant *Jan - Jul 2019*
Rutgers University Cell and DNA Repository (RUCDR Infinite Biologics)- New Brunswick, NJ

- Trained in Quality Assurance, handling biological samples, and Good Laboratory Practices (GLP)

Leadership and Activities

Boston University Science, Technology, Engineering, Arts, Mathematics *Sep 2019 - present*
Treasurer; Vice-president
Boston University Biomedical Engineering Society *Sep 2019 - present*

Skills

Wet-lab techniques, MS Office, MATLAB, Python, CAD, German, Communication, Leadership, Organization

Hayden Myers

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EDUCATION **Boston University, College of Engineering**
B.S. in Biomedical Engineering Expected May 2022

RELEVANT COURSEWORK
Optical Microscopy of Biological Material, Solid Biomechanics, Signals & System Controls, ECM Structure & Function, Medical Device Design, Molecular Cell Biology, Systems Physiology

SKILLS
Software: MATLAB, C++, AutoCAD, FIJI, ITK-SNAP, Microsoft Office, Abaqus
Laboratory: Mammalian Primary Cell Culture, Microscopy, Experimental Design, BSL2 safety

PROJECTS
Microtissue Wound Healing Research July 2021 – Present
- Work independently to design and perform experiments to create an accurate 3D in-vitro co-culture tissue model to study wound healing and scar formation with a focus on ECM mechanics in epithelial layers
- Isolate, culture in-plate, maintain, and cryopreserve mammalian cells, including primary cells, HEK, 3T3, HaCaT, HDF daily and teach new researchers cell culture protocol
- Manufacture arrays of PDMS micro-devices to measure forces produced by microtissues
- Image microtissues with confocal, 2-photon, and immunofluorescence microscopy
- Analyze experimental data, interpret results, & present relevant findings at weekly meetings

Senior Design Pessary Project September 2021 – Present
- Collaborate with small team to design and evaluate an improved biomedical device in silico using extensive biological data and modeling software with a focus on tissue mechanics
- Deliver weekly progress reports and provide feedback to an interdisciplinary professional team which helps strategy formulation to meet deadlines

EEG Neurofeedback Project February – April 2019
- Designed efficient experiment to evaluate quantitative changes in responsiveness based on behavioral stimuli in human study to better understand human attention and focus
- Performed procedure & collected extensive data from consenting subjects using EEG
- Analyzed EEG data in MATLAB and presented all significant observations to peers

LEADERSHIP EXPERIENCE
Boston University Fitness and Recreation Center September 2018 – Present
Deck Supervisor
- Promoted from Lifeguard to Deck Supervisor in 2019
- Management of opening and closing pool facilities and delegation of staff duties during shift
- Write daily reports on incidents and communicate concerns directly to director of aquatics
- Measure and record pH, chlorine levels, alkalinity, and hardness of pools daily

Boston University Residence Life August 2020 – Present
Resident Assistant
- Design programs and events to communicate university policies and resources to peers
- Write weekly reports on relevant changes and status of community
- Document observations and incidents and submit detailed reports for directors

EXTRACURRICULAR ACTIVITIES
Biomedical Engineering Society September 2018 – Present
Boston University Club Water Polo September 2018 – Present

Viet Anh Nguyen

anhnv.2000@gmail.com • (857) 424-6068 • Boston, MA 02134

Education

Boston University | Boston, MA — Expected May 2022
Bachelor of Science in Biomedical Engineering

- GPA: 3.33

Coursework:

- Cell Biology
- Thermodynamics
- Fluid Mechanics
- Systems Physiology
- Optical Microscopy
- Organic Chemistry
- Biomedical Signals & Controls
- Transport Phenomena
- Clinical Applications

Skills

Programming:	proficient in Matlab, C, Arduino
Tools:	proficient in Microsoft Words, Excels, PowerPoint, Imagej (FIJI)
Lab techniques:	General Chemistry, General Physics, Cell Biology, Optical Microscopy

Experience

American Study Education JSC | Hanoi, Vietnam — May – August 2019
Associate Student Counselor

- Designed SAT lesson plan and taught Algebra, Geometry, Physics, Chemistry in English to Vietnamese high school students
- Organized field trips and extracurricular activities for students
- Worked as teaching assistant to help student prepared for TOEFL and IELTS

Projects

Portable weather station | Boston University — September – December 2019

- Created a portable weather station running on Arduino, can record temperature, wind speed and direction, and can withstand extreme weather; able to send data to user using 2G network

Cetaceans' Middle Ear Bones | Boston University — September 2021 – April 2022

- Measured the reduced scattering coefficient of bones using light spectrometer
- Wrote MATLAB script to analyze the data and convert it to number density
- Created a density matrix to show the change in mass density across the bones sample

Volunteer

Bach Mai Hospital | Hanoi, Vietnam — May – August 2017

- Volunteered in taking care of kidney-failure patients receiving hemodialysis in hospital
- Served as leader to plan community events to raise fund for the patients; donating money and food to relief financial stress

Olisamedualim Nwokolo

medualim@bu.edu | 8572689058 | Boston, MA

Education

Boston University, Bachelor of Science in Biomedical Engineering **August 2018 – Expected May 2022**

Activities/Awards

- Engineering Study Abroad in Dresden, Germany **(Spring 2020)**
- BU Inner Gospel Choir **(2020 – Present)**
- Dean's List **(Spring 2020)**
- BU Global Programs Ambassador: International Peer Mentor **(2019 – Present)**

Cardiff Sixth Form College, Wales, UK (High School) **September 2016 – July 2018**

Activities/Awards

- UKMT Senior Maths Challenge: Awarded Silver certificate.
- Cardiff Sixth form Debate Team: Competed in high school and University competitions **(2016 – 2017)**

Professional Experience

Worcester Polytechnic Institute Virtual Internship in Biomedical Engineering **June 2021 – August 2021**

- Designed a non-invasive device to test infant diabetes in premature babies with a team of Biomedical Engineering students.
- Attended professional development seminars and lectures by Biomedical Engineering professors and guest speakers.

Boston University Residence Life Office **August 2020 – Present**

Resident Assistant

- Enforced Covid 19 safety policies and hosted various activities to ensure that residents maintained social interactions.
- Performed Wellness checks on residents as requested by parents or as a result of concerning student activity.
- Performed administrative tasks, enforced BU policies, provided resources and a secure environment for residents.

BU College of Engineering Technology Innovation Scholars Program (TISP) **September 2019 – Present**

- Inspiration Ambassador

- Assisted high school students in recognizing and brainstorming real world engineering problems like Smart lighting.
- Offered STEM enrichment by leading design and building sessions for truss tables, space origami and other engineeringtasks for high school students in Fenway High school.
- Tutored high school students in Calculus homework problems.

- Robotics and Flight School Mentor **June 2021 -July 2021**

- Taught middle and high school kids an introductory JavaScript course and coding in Python using a Virtual Robotics Toolkit.
- Coached students in building gliders using the engineering design process.

-First Robotics Mentor **September 2021 - Present**

- Mentored Belmont high school students for the First Robotics competition.

Projects

Arduino Bluetooth Weather Station

- Collaborated with a team of other aspiring engineers to build a phone monitored weather station.

40Hz Light Therapy for ADHD and fatigued patients, Senior Design Project

- Designed a protocol with senior design team to combat areas of cognitive weakness in fatigued and cognitively impaired individuals by identifying the most effective method of administering 40Hz light simulation.

Skills

Applications: MATLAB, SAS, JavaScript, Wet & Dry Lab Techniques, Microsoft Office
Languages: English, Beginners ASL, Intermediate French and German.

Mackenzie Obenreder

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https://www.linkedin.com/in/mackenzie-obenreder-a43ab8217 Brookline, MA

EDUCATION

Boston University College of Engineering, Boston, MA
Bachelor of Science: Biomedical Engineering Expected May 2022
Dean's List 2019 – Present

Technische Universität Dresden, Dresden, Germany 2020
Study Abroad Program

RESEARCH EXPERIENCE

Boston University 2020 – Present
Dr. Joe Tien's Group- Undergraduate Researcher

- Studied human breast cancer invasion and escape in an engineered 3D microfluidic model through fatty stroma
- Constructed an in vitro 3D microfluidic model of the human breast cancer microenvironment using a microtumor and surrounding extracellular matrix
- Explored the role of obesity on early stage metastatic breast cancer progression using in vitro model
- Collected and analyzed daily progression data of tumor invasion and escape as well as immunofluorescence imaging for model characterization

PUBLICATIONS

1. Dance, Y.W., **Obenreder, M.C.**, Seibel, A.J., Ogony, J. W., Meshulam, T., Radisky, D.C., Layne, M.D., Nelson, C.M., and Tien, J., "The presence of adipose cells, independently of obesity status, induces escape from anengineered human breast microtumor". In preparation.

2. Dance, Y.W., Meshulam, T., Seibel, A.J., **Obenreder, M.C.**, Layne, M.D., Nelson, C.M., Tien, J., "Adipose stroma accelerates the invasion and escape of human breast cancer cells from an engineered microtumor". *Cell. Mol. Bioeng.* **15**, 15-29 (2022).

ABSTRACTS AND PRESENTATIONS

1. **Obenreder, M.C.** "How obesity affects human breast cancer cell invasion and escape in a 3D microfluidic model" [poster], Boston University, Annual Undergraduate Research Symposium 2021 (2021).

2. Dance, Y.W., **Obenreder, M.C.**, Seibel, A.J., Ogony, J. W., Meshulam, T., Radisky, D.C., Nelson, C.M., and Tien, J. "How obesity affects human breast cancer cell invasion and escape in a 3D microfluidic model" [presentation], Biomedical Engineering Society 2021 (virtual; 2021).

3. Dance, Y.W., **Obenreder, M.C.**, Seibel, A.J., Ogony, J. W., Meshulam, T., Radisky, D.C., Nelson, C.M., and Tien, J. "How the obesity-associated microenvironment affects invasion and escape of engineered human breast microtumors" [poster/presentation], National Institutes of Health/National Cancer Institute Cancer Tissue Engineering Collaborative Investigators Meeting (virtual; 2021).

4. Dance, Y.W., Meshulam, T., Seibel, A.J., **Obenreder, M.C.**, Layne, M.D., Nelson, C.M., Tien, J., "Invasion and escape of human breast cancer cells through an adipose stroma" [poster/presentation], Northeast Bioengineering Conference 2021 (virtual; 2021).

Kian Patton

pattonkb@bu.edu • (503) 341-8946 • https://www.linkedin.com/in/kian-patton-9a0a39181 Boston, MA, 02215

Education

Boston University, Boston, Massachusetts Expected May 2022

- Degree: Bachelor of Science in Biomedical Engineering
- Current Honors: Dean's List — (GPA: 3.46)

Skills

- Software: Microsoft Word, Excel, PowerPoint, Eagle, Fiji/ImageJ, MATLAB, C++, Java
- English (native), Spanish and Mandarin (intermediate)
- Laboratory work techniques: Pipetting, Making solutions, Gel electrophoresis, PCR, DNA extraction and purification, Spectrophotometry, Molecular Cloning, Miniprep, Optical Microscopy

Experience

Undergraduate Research Assistant May 2021 – August 2021

- Functioned primarily in a lab technician role in the Shyng Lab at the Oregon Health and Science University, Department of Biochemistry and Molecular Biology
- Maintained lab stock of buffers, media, and materials and performed equipment maintenance

Cornell Farm May 2018 – August 2021

- Served as a retail sales associate on a team of over 40 at a large indoor and outdoor plant nursery
- Coordinated online sales department, cared for a wide variety of plants, educated customers about plant biology, identification, and care, and supported functions and communications across all departments

Undergraduate Research Assistant December 2019 – March 2020

- Collaborated on a small research team as an undergraduate research assistant in the Feng Lab at the McGovern Institute for Brain Research, Massachusetts Institute of Technology
- Researched under Dr. Martin Wienisch to establish Shank2 gene mouse models to study its role in a unique autism spectrum disorder case
- Created Huntington's disease and Fragile X knock-ins for third-party research use

Projects

- Proposed a theoretical nanoparticle-based cranial aneurysm detection
- Investigated and presented the effect of meditation on brain activity using MUSE headband EEG
- Prototyped fall-sensing and self-deploying phone protection device (hardware, circuitry, and coding)
- Designed and presented with a team of 5, a theoretical investigation on flow dependency of the antibiotic tolerance of infective endocarditis biofilms to a class of 35

Leadership & Community Service

- Led and taught first year students on service-oriented outings through the BU Community Service Center
- Volunteered at HomePlate Youth Services to cook meals for dozens of underserved youths in Beaverton, OR

Alexandra Piñeiro-Gonzáles

apineiro@bu.edu | linkedin.com/in/alexandra-piñeiro | 787-379-3060 | Boston, MA

EDUCATION

Boston University, College of Engineering *Boston, MA*
Bachelor of Science in Biomedical Engineering *Expected May 2022*
Semester Abroad, **ICAI School of Engineering** *Spring 2020*

RESEARCH EXPERIENCE

Laboratory Assistant at Clinical Testing Laboratory at BU *Jan 2022 - Present*

- Process COVID-19 tests following standard operating procedures in a CLIA certified laboratory.

Laboratory Assistant at Wilson Wong Lab at BU *May 2021 - Present*
Distinguished Summer Research Fellowship Recipient

- Attach split recombinases to fluorescent protein and place under control of inducible promoter to show that low levels of recombinase and fluorescent protein yield high reporter recombination.
- Designed and built plasmids to create promoter library with variable levels of protein output to build digital analog circuits where a discrete level of output can be specified using simple inputs.
- Trained another undergraduate in molecular cloning.

UCSD Zoom Research Experience for Undergraduates (REU) *Jun - Aug 2020*

- Attended research talks from their 11-program faculty. Participated in 8 research skills workshops, featuring external speakers on research ethics, library resources, and experimental design.

PROJECTS

Senior Project: Novel design of polymeric nanoparticles for targeted drug delivery to glial cells

- Developed in silico pipeline to identify cell surface receptors/transporters uniquely expressed by glial cell types and identify ligands that could be incorporated into design of nanoparticles.
- Synthesized and characterized a polymer with targeting compounds for nanoparticle creation.
- Formulated and characterized formulation space of polymeric nanoparticles.
- Assessed polymer cytotoxicity and cell uptake selectivity.

Smart Rodent Trap

- Developed prototype of a rodent trap with an acrylic cage that depended on mechanical triggers.
- Devised to notify user of trapped rodent using Arduino. Released rodent remotely via bluetooth.

Other projects: SafeWalk App, Truss Design Project

LEADERSHIP & ACTIVITIES

Director of Community Engagement: Society of Hispanic Professional Engineers *Sep 2021 - Present*

- Lead organizer for regional related events. Responsible for member recruitment and retention, as well as community outreach events.

Member: Society of Hispanic Professional Engineers *Sep 2018 - Present*
Member: Alpha Phi Omega, Community Service Fraternity *Sep 2020 - Present*

SKILLS

Laboratory: Molecular Cloning, Flow Cytometry, Use of Restriction Enzymes, Use of PCR Machines, Agarose Gel Electrophoresis, DNA Sequence Analysis, Cell Transfection, Plasmid Construction, Microbial Cell Culture, Thin Layer Chromatography, Dynamic Light Scattering (DLS), Fourier Transfer Infrared Spectroscopy (FTIR), Nuclear Magnetic Resonance (NMR), Statistical Analysis, Experimental Design
Computer: MATLAB, C, C++, ELNs (Benchling and ChemDraw), Arduino, Microsoft Office
Languages: Spanish

Grace (Yingzhe) Qian

yqian@bu.edu | +1 (412) 315-5348 | Boston, MA | www.linkedin.com/in/graceq20

Education

Boston University, College of Engineering Expected May 2022
Bachelor of Science in Biomedical Engineering
Courses: Thermodynamics, Biomaterials, System physiology, Business Technology Innovation

Experience

Boston University COVID Testing Lab – Boston, MA Sep – Dec 2021
Laboratory Assistant
- Performed viral inactivation and performed sample aliquoting using liquid-handling machines
- Pooled samples by manual pipetting; tracked, stored, and processed 7000+ samples per day

AstraZeneca Pharmaceuticals (China) – Shanghai, China Jun – Aug 2021
Data Analyst Intern of the iHospital Strategy Program
- Summarized sales performance of employees corresponding to monthly targets on dashboards
- Built pie charts and line charts to analyze sales distribution for each category and each department

Ferring Pharmaceuticals (Asia) - Shanghai, China Jun – Aug 2019
Office Assistant Intern of Department of Women's Health
- Collected and distributed company sales data using Excel spreadsheet
- Maintained inventory of company partnership and made correction as needed

Projects

Digital Biopsy for Glomerular Ultrastructural Measurement in TEM Image Sep 20201 – Present
- Automate measurement of morphological changes in glomerular cells in TEM images
- Implement U-Net model and image processing for segmentation and measurement
- Manually annotate TEM images and generate test sets for machine learning model

Drug Overdose Death in the U.S. Data Analysis Project Sep – Dec 2021
- Visualized trends of overdose death in U.S from 2015 to 2020 in line graphs and map distribution, performed data wrangling, and created a multiple linear regression model to explore factors of influence using R
- Described data sets and variables in detail and published analysis results to a website

Temperature-controlled Cell Apparatus Design Project Sep – Dec 2019
- Designed a temperature-controlled cell apparatus that maintained temperature at 37℃ ± 0.3
- Utilized machinery tools, including CAD, CNC, and laser cutting machines to create a prototype

Leadership & Activities

Director of Marketing Committee, Boston University Analytics Club Dec 2020 – Present
- Design graphics for marketing, communicate with members through emails, and organize events
- Lead workshops on Excel data analytic skills, and collaborate with other E-board members to facilitate Tableau and R data analysis workshops

Member, Boston University MiXx Dance Crew Jan 2019 – Present
- Perform in K-pop dance cover projects and semester showcases; attend practice 8 hours per week
- Pay attention to details in choreography and provide insights for project ideas

Member, Boston University Consulting Club Dec 2020 – May 2021
- Conducted market research, SWOT analysis, competitor profiling, and industry analysis in semester-long project; analyzed data collected from primary research using Qualtrics and Excel
- Presented analysis, proposed solution, and mitigation for hypothetical client with a team of 4

Skills

Computer: MATLAB, Python, R, C, iMovie, Microsoft Office Suite, Google Suite
Lab & Workshop: Pipetting, CAD, CNC, laser machine
Language: Proficient in Chinese and English

Selina Qin

LinkedIn/selina-qin-45b212158 | sqin@bu.edu | 8572065757 | 771 Beacon street, Boston, MA

EDUCATION

Boston University | **B.S.** in Biomedical Engineering
Minor: Business Administration and Management **Concentration:** Tech. Innovation **May 2022**
Coursework: *Software Engineering, Physics, Electric Circuit, Mechanics, Thermodynamics,Molecular Cellular Biology, Drug Design and Delivery, Engineering design, Device Diagnostics & BioDesign, Clinical Biomedical Design, Calculus, Differential Equations, Probability & Statistics, Bloomberg Market Concepts, Economics, Business Strategy, Finance, Accounting, Marketing, Management*
Crofton House School - British Columbia Dogwood Diploma **May 2017**

Professional Experience

General Electric Service Marketing Internship **June-July 2021**
- Responsible for multiple events such as product brochure, medical equipments exhibition.
- Learned how to work in a team and operations management within a company.

Mindray Private Medical Services Presidential Academy **Nov 2020**
- Obtained knowledge in company's ownership structure as well as stock market on the current micro and macro scale: took deep analysis in HuaWei's shareholding ratio and Alibaba's Ant Group Crisis
- Briefly understood Mindray's medical equipment's flow line productions

Research Attendant for Sam Kunes At ShangHai Jiao Tong University **July-Aug 2019**
- Finalized research proposal on Microglial cells
- Throughly reviewed and analyzed with Professor Kunes (Harvard University) in his field of research – Neuroscience in degenerative diseases
- Given presentations on CRISPR technology and Cloning Instrumentation
- Analyzed Drosophila's effects in nervous systems plasticity

Laboratory Assistant at University of British Columbia Neuroscience Labs **Aug-Nov 2016**
- Performed neuron synapses experiments including DNA sequencing, DNA extraction
- Familiar with cellular and bacterial environments
- Managed laboratory sanitation of all equipments and required materials

Engineering Projects

Computational Simulation for Mechanical Homeostasis of Focal Adhesion (2022): Matlab program for simulating temporal fluctuations of cell FA on the sub-cellular level to predict homeostasis when cell reacts to mechanical stimuli. Skills used: Matlab, and micro-biology
EMS sleeve for patients with Parkinson's (2021): EMS induced sleeve to aid in delaying onset of Parkinsonism in patients diagnosed with Parkinson's Disease within the first 10 years of the prognosis.
Exoskeletal Robotic Glove Component (2019): Built from scratch muscular movement amplifier aimed to aid patients with ALS disorders and other muscle failures. Skills used: Arduino, Java Script, Matlab, EMS pads, Mechanical Measurements, CAD, 3D printing, Oscilloscopes
Feminine Hygiene Dispenser (2019): Hand-built feminine tampons and pads dispenser from scratch. Objectives achieved: anti-theft, signals empty, 10+ years in longevity, cost efficient, total privacy. Skills used: Arduino, Particle Photon, Electrical Circuits, Torque Analysis, CAD, Twilio API, and Mechanical Measurements
Crime Away GPS (2018): Application for real time data of crimes sorted into violent, non violent and sexual offences graphed across a heat map using Google Maps API in Boston. Languages involved: Matlab and Javascript and C

Skills

Programming Languages: Java, Matlab, C++
Engineering: Soldering, Machining, CAD, Circuit Design
Business: Critical thinking, Accounting, Marketing, Management, Excel, Case Study
Languages: Fluent in English, Mandarin Chinese, and literate in French
Interests: Artificial Intelligence, Quantum Physics, Travelling, Classical Music, Piano, Swimming, Volleyball, Floral Design, Art showcase

Matthew P. Reynolds-Tejeda

linkedin.com/in/matthew-reynolds-tejeda
820 Beacon Street, appt. 602 (925) 826-6843
Boston, MA 02215 mrtejeda@bu.edu

Education

Boston University School of Engineering | Boston, MA May 2022
Bachelor of Science in Biomedical Engineering, Concentration in Nanotechnology

- GPA: 3.35

Relevant Coursework: Nanomedicine, DNA Nanotechnology, Nucleic Acid Engineering, Nanotechnology, Thermodynamics and Statistical Mechanics, Biomedical Materials Science, Fluid Mechanics

Experience

Mass Eye and Ear, Boston, MA Fall 2021 - Present
Research Trainee in Nanoemulsion Formulation for Drug Encapsulation & Delivery

- Formulated 12 different nanoemulsions with varying oils/surfactants and ratios to encapsulate drug
- Measured nanoemulsions PDI, Zeta potential, and Size via Dynamic Light Scattering (DLS) to ensure particles are applicable in-vivo studies
- Utilized Thin Layer Chromatography (TLC) to qualitatively examine purity of drug
- Thawed, cultured, and passaged ARPE-19 cells into T75 flasks to be used for future experiments
- Performed an LDH-assay to measure drug protective effects in treated cell groups vs. non-treated groups

BU COVID Clinical Testing Laboratory, Boston University Fall 2021 - Present
Lab Assistant in BSL-2 CLIA setting

- Inactivated samples to denature COVID and keep a safe working environment
- Prepared samples by pooling 5 samples into a single strategic tube
- Extracted RNA from prepared samples followed by centrifuging and hand off to qPCR
- Ran qPCR using aseptic techniques to verify COVID presence in samples
- Maintained CLIA regulations throughout every step of sample processing

Airflow Seating System Technologies, Boston University Summer 2020 - Fall 2020
Project Manager

- Designed a moldable 3D CAD model of medical device to be used for prototype
- Connected with 50+ doctors and nurses about current medical mattresses and current treatment for pressure ulcers to aid in the design process
- Collaborated with ventured capitalists and set dates to finish prototype by
- Gained insight into FDA approval process for class II medical devices and helped with filing for provisional patent

Projects

Nanoemulsion of lipophilic drug for Intra-ocular delivery, Senior Design Project Fall 2021 - Present

- Designed and optimized nanoemulsions to increase drug encapsulation efficiency and stability
- Completed In-vitro training to test nanoemulsions and their effects on ARPE-19 cells, with and w/o drug

Nanomedicine: Gold nanowire w/Gene Therapy R01 Proposal, Graduate Project Winter 2021 - Spring 2021

- Designed and proposed a novel spinal cord treatment via gold nanowire with attached AAV loaded with mChABC to provide axon growth, degrade glial scar tissue, and recruit OPCS
- Reviewed 60+ scientific journal articles to support methodology/expected outcome

Skills

Lab: HPLC, UV-Vis, TLC, DLS, qPCR, Cell-culturing, Nanoemulsion Formulation, RNA extraction, CLIA & BSL-2
Programs: Stella, Inventor, MatLab, Arduino, kiCAD, PyMOL, NUPACK, caDNAno, Excel
Management/Customer service (Former manager at Starbucks)

John Rim Jr.

jjrim@bu.edu • (650) 622-6568 • www.linkedin.com/in/johntaekrim Hillsborough, CA, 94010

Education

Boston University College of Engineering — Boston, MA
B.S. in Biomedical Engineering, Concentration in Nanotechnology — Expected May 2022
GPA 3.34 (Dean's List)

Relevant Coursework:

Molecular & Cell Biology	System Physiology	Molecular Bioengineering
Biomedical Measurements	Intro to Nanotechnology	Clinical Biomed. Design
Thermodynamics	Intro to Solid Biomechanics	Strategy for Tech. Firms

Experience

Han Labs — Boston, MA
Research Associate — Sep 2021 – Present
- Imaging spontaneous neuronal mitochondria dynamics using calcium indicator and voltage dye
- Processing images of mitochondria, extracting traces of displacement due to ultrasound response with an SNR > 50
- Formulated neuromodulation protocols for ultrasound stimulation on neurons

GenEdit — South San Francisco, CA
Formulation Summer Intern — May – Aug 2021
- Performed titrations and genomic sequencing for novel polymers
- Generated a pKa value calculator for optimal polymer formulation with 96% accuracy compared to literature
- Evaluated cargo delivery for several polymers through DLS physical characterization
- Volunteered and constructed a new waste management protocol for lab setting, leading to 40% waste reduction

BU Information Technology Help Center — Boston, MA
IT Support Specialist — Aug 2020 – May 2021
- Troubleshot technical audio/visual problems in a hybrid (remote & in-person) classroom setting
- Resolved software issues, removed malware, troubleshot third-party application for faculty, students, and alumni
- Partnered with customer care team to improve technical incident management and reduce technical issue by 30%

Samsung Biologics (SBL) — Song-do, KR
Global Summer Intern — Aug 2020 – May 2021
- Completed basic cGMP, GDP, and SOP training
- Analyzed over hundreds of data points on JMP and presented technical findings to DSP MSAT department
- Created a prospective analytical system to better quantify buffer safety margin during tech transfers: an average of 25% in savings

Skills

Laboratory: UV Spectrophotometry, ELISA Assay, Gel Electrophoresis, Ouchterlony Test, PCR, DNA Extraction, Viral Vectoring, Chromatography, Calibrating Lab Instruments, SDS-PAGE, PI Utilization – Processing Monitoring, Mammalian Tissue Culturing, Balance and pH meters, EKG, Pipetting, Molecular Cloning, Confocal Microscopy, BSL-2 Certified

Computer: MATLAB, C, Python, CAD, SolidWorks, Microsoft Applications (Word, Excel, PowerPoint, Teams), Finite Element Analysis, Arduino, JMP, COMSOL, Mathematica

Select Projects

CrankThat – Assistive Medical Device, Device & Diagnostics class — Sep – Dec 2021
- Prototyped and modeled an adaptable and portable lever arm for those with impaired grip strength
- Demonstrated CAD prototype iterations in written / oral design reviews with professors, peers, and stakeholders
- Evaluated and determined product efficiency using FMEA analysis and Pugh chart comparisons

Independent Camera Boom, Engineering Design class — Sep – Dec 2019
- Built a prototype for a filmmaker to position and move an iPhone in three dimensions (a hemisphere with a radius of 0.5 meters) to film with a portable, stand-alone device that takes the place of a jib operator

Christianna Roggeveen

9 Academy Ln, Nantucket MA | www.linkedin.com/in/christiannaroggeveen | (508) 901-3171 | croggeve@bu.edu

Education

Boston University College of Engineering — Expected May 2022
- Bachelor of Science in Biomedical Engineering, Dean's List

Technische Universität Dresden — February 2020 - July 2020

Villanova University College of Arts and Science — August 2018 - May 2019

Skills

Laboratory: Human Cell Culture, Transepithelial/ Trans-endothelial Electrical Resistance, PCR, Gel Electrophoresis, Immunofluorescence Staining, LIVE/DEAD Staining, Confocal Imaging, Clinical Research, Data Monitoring, Data Integrity, Statistical Analysis, Pipetting, Microscopy

Technologies and Programming: Microsoft Suite, Citrix, Stella Architect, ImageJ, Adobe Creative Suite, MATLAB, C

Languages: Spanish – Limited working proficiency

Extracurricular: Cambridge Half Marathon 2021, Boston Half Marathon 2019, Lacrosse, Soccer, Swimming, Embroidery

Professional Experience

The Charles Stark Draper Laboratory, Senior Design Research — September 2021 - Present
- Designing in vitro organ-on-a-chip model of placental barrier to simulate drug transfer across maternal-fetal interface
- Demonstrating proof of concept for potential pharmaceutical testing in a preclinical setting

Boston University WISE-Circuits Lab, Research Assistant — September 2021 - Present
- Developing a soft, wireless, transpyloric sensory systems for long-term monitoring of duodenum
- Executing fabrication and testing of the PCB used in device

Boston University College of Engineering, Grader — September 2021 – December 2021
- Course grader for Biomedical Signals and Controls (BE403)
- Assisting students in understanding linear time invariant systems, Laplace, and Fourier representations

Tatte Bakery & Café, Sales Associate — May 2021 - August 2021
- Coordinated with other team members to effectively process and fulfill customer orders efficiently and accurately
- Served as point of contact for costumer resolutions, deescalated most issues without involving management

Born Global Foundation, Intern — May 2020 - August 2020
- Directed a team of five to conduct research on medicinal plants and Levantine practices
- Prototyped a mobile gaming application to educate about Beirut's Alchemist Garden

Research Experience

The Effects of Backpack Placement on Erector Spinae Muscles — September 2020 - December 2020
- Investigated the effects of backpack placement and load weight on the activity of the erector spinae muscles
- Performed two-way ANOVA, Tukey HSD post hoc test, and t-tests to determine statistical significance

Delivery Methods of Ivacaftor — November 2019 - December 2019
- Modeled Patches and Injectable Spheres with Stella Architect for delivery of Ivacaftor

The Effects of Nicotine and Temperature on the Life Cycle of Painted Lady Butterflies — January 2019 - June 2019
- Assessed impact of temperature on effectiveness of nicotine in insecticides against Painted Lady Butterflies

Leadership Experience

Technology Inspiration Scholars Program (TISP) Ambassador — August 2020 - Present
- Designing and teaching interactive outreach to get K-12 students involved and excited about engineering

Transfer-Student Resources and Advising Community (TRAC) Mentor — April 2020 - Present
- Mentoring students transferring to Boston University College of Engineering

New Member Educator: Psi Delta Chapter of Theta Tau Professional Engineering Fraternity — September 2019 - Present
- Fostering and promoting fraternity's values while guiding new member class

Sidekick for Villanova NOVAdance — November 2018 - May 2019
- Raised $522,316.43 for The Andrew McDonough B+ Foundation fighting childhood cancer

Olivia Clair Rose

ocrose@bu.edu | 615-559-2587 | Boston, MA

EDUCATION

Boston University, College of Engineering Bachelor of Science in Biomedical Engineering Expected May 2022

PROJECTS

"Novel Evaluative Probe for Hydration Real-time Observation" September 2021 - Present

Biomedical Optical Technologies Lab

- Create short wave infrared probe collaborating with group of four to test hydration levels in skin for hemodialysis
- Integrate and utilize accelerometer and pressure sensor to detect motion and pressure artifacts in optical signal
- Program analysis for raw optical, pressure, and accelerometer signal data
- Accepted for Conference: Presentation at the Design of Medical Devices Competition

"Micro-CT spine visualization" February 2021 - October 2021

Orthopaedic and Developmental Biomechanics Lab

Converted raw micro-CT scan using Scan and Save Reconstructor Program

- Analyzed mechanical loading data and applied to corresponding loading step visualization
- Adjusted and aligned images using Amira Programming
- Compiled individual loading scans and created a visual final project

"Effects of Caffeine and Exercise on Heart Rate," September 2021 - December 2021

Systems Physiology

- Researched and experimented using physiology techniques with group collaboration
- Collected and Analyzed ECG and Stethoscope subject data to observe short term effects of caffeine and exercise on heart rate
- Wrote Grant Proposal, Call for Subjects, Results Analysis, and Postlab analysis of data project

Additional Projects: Pet Classification Machine Learning Analysis, Tensile Strength Matlab Analysis, Microscopy and Image Analysis, Human Powered Battery Charger, Go Baby Go Adaptive Engineering

RESEARCH

Researcher, Orthopaedic and Developmental Biomechanics Lab February 2021 - December 2021

- Obtained micro-CT scans and crated visual explanation of experimental failure of osteoporotic vertebral fractures
- Sequenced raw CT image data, output CT images, and translated to 3-Dimensional image renderings

Volunteer, Gardner Pilot Academy Robotics Project July - August 2020

- Instructed Fourth and Fifth Grade students using legos and code.org to learn basic robotics
- Planned instruction over Zoom and adapted learning environment for virtual advising and teaching

Intern, Nanophotonics Lab at Vanderbilt University May - August 2017

- Synthesized mixed halide perovskites nanocrystals using a hot-injection method
- Researched methods of synthesis action and planned trials of synthesization of nanocrystals
- Tested nanocrystals for characterization and absorb spectra

SKILLS

Laboratory: Hot-Injection method of Synthesizing Nanocrystals, Anion Exchange Reactions, Pipetting, Copper Grid Drop Casting, Centrifuging, Steady State PL Spectroscopy, EMG, ECG, BP
Computer: Matlab, Java, C, Labscribe, Arduino, Javascript, Amira, ImageJ
Design: Prototyping, function analysis, design creation, soldering, Arduino, circuits, wood machining, Tinkercad, 3D Printing

LEADERSHIP

Inspiration Ambassador, Technology Innovation Scholars Program September 2019 - Present
Student Advisor Coordinator, EK100 Student Advisor Program January - November 2021
Vice President, Boston University Panhellenic Council January - September 2021
Student Facilitator, Boston University Orientation Program April - August 2021
President, Boston University Panhellenic Council December 2019 - February 2021
Student Advisor, EK100 Student Advisor Program September 2019 - January 2021
Director of Ritual Education, Alpha Delta Pi December 2019 - December 2020

Safin Rouf

safrouf@bu.edu| 469-612-1629| Boston, Massachusetts

EDUCATION

Boston University College of Engineering, Boston, MA
Bachelor of Science in Biomedical Engineering with Concentration in Technology Innovation
MAY 2022
Cumulative G.P.A: 3.14 / 4.0

Relevant Coursework: Mechanics I, Device Diagnostics & Design, Principles of Tissue Engineering, Clinical Applications of Medical Devices, Thermodynamics & Statistical Mechanics, Circuit Design, Biomaterials, Biomedical Instrumentation

SKILLS

Mechanical & Lab: Soldering, Circuit Design, Centrifuging, Microbial Assaying, Cell Culturing
Computer: SolidWorks, OnShape, C++, MATLAB, Java, Arduino, PyMOL, Microsoft Office

EXPERIENCE

Design Intern | Worcester Polytechnic Institute | Worcester, MA **JUN 2021 – AUG 2021**

- Designed and developed novel phototherapy device to address public health issue of neonatal jaundice in low-middle income countries, with insufficient resources, by providing a more accessible form of treatment
- Performed disease fundamental research along with stakeholder analysis to identify specific pain points
- Created a final CAD model of the device on SolidWorks, alongside developing a simulation to show functionality
- Lead team in filming and editing video showcasing our device and the development process behind it

Sustainability Innovation Intern | Born Global Inc. | Portland, ME **MAY 2020 – AUG 2020**

- Conducted research on methods to produce filtration materials, animal feed supplements, and soil amendments through expert interviews, and technology evaluations
- Prototyped ideas inspired by biomimicry that can be implemented to reduce waste streams at Shell plants
- Created research and economic proposals that were suggested to the client for implementation on-site

PROJECTS

Microneedle Blood-Drawing Device | Synthera Health | Cambridge, MA **AUG 2021 – PRESENT**

- Surveyed relevant literature to research possible designs for our device
- Designed and prototyped microneedle arrays which were then tested on phantoms as part of a parametric study

Bacterial Infection Detector | Boston University Medical Campus **JAN 2021 – MAY 2021**

- Coordinated a team in development of a medical device prototype that could detect abnormal levels of bacteria in a dialysis patient's blood for preventing blood infections
- Conducted interviews with doctors, dialysis patients & nurses as part of stakeholder analysis to help in design
- Designed iterative CAD models of device prototypes to get feedback from stakeholders
- Machined & sanded various parts of the device so that it would fit required dimensions before assembly

Additional Projects: Cystic Fibrosis Monitoring Patch, Prosthetic Joint Replacement, Weather Station, Mechanical Straw Truss, Random Walk Simulator

Julia Roy

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EDUCATION

BS, Biomedical Engineering--GPA 3.56/4.00 Expected May 2022

Relevant Coursework:

Device Design and Diagnostics Biomaterials Intro to Machine Learning Signals and Systems Principles of Tissue Engineering

PROJECTS

- **Senior Project–Classifying actives and inactives of GSK3α and GSK3β, Broad Institute**
  - Mined chemical databases such as ChEMBL for known ligands and inactives of GSK3
  - Responsible for comparative data visualization through t-SNE plots, Tanimoto similarity plots, and histograms of molecular weight, rotatable bonds, and other physical properties
  - Created a stacked algorithm (from SVM, random forest, and multilayer perceptron) to predict the binding efficiency of random chemical inputs to GSK3α and GSK3**β** separately
- **CaviScan–A Novel Device for Stage I Dental Caries Detection**
  - Handheld wand that shines near UV light on teeth and captures an image that shows difference in fluorescence between healthy and demineralized enamel
  - Responsible for stakeholder outreach and integration of their feedback
  - Conducted FMEA analysis and proposed mitigation strategies
  - Designed the commercial killer experiment for the device
- **Bioactive Total Jaw Replacement**
  - Currently working on the design of a patient-tailored 3d printed hydroxyapatite jaw implant seeded with osteoblasts
  - Target community is patients with otofacial syndrome, with severe trauma to the entire jaw, or those who would otherwise undergo segmental mandibulectomies with a fibula free flap

SKILLS

Technical: MATLAB, Python, Machine Learning, Solidworks, NMR/IR/Mass Spectrometry, Literature Review

Additional: Written/Oral Communication, Project Organization/Leadership, Teaching/Lesson Plan DevelopmenT

WORK EXPERIENCE

Undergraduate Teaching Assistant, Boston University September 2021-Present

- Graded homework for students in course EK381 (Probability, Statistics and Data Science for Engineers)
- Ran weekly help sessions to explain/reteach concepts to students who had difficulty with the material

Marketing Assistant, Boston University Office of Alumni Relations September 2018-March 2020

- Helped organize fundraising and alumni events on campus as well as prepare materials for department meetings
- Regularly updated database of alumni information
- Made phone calls to alumni to notify them of upcoming events
- Hand-wrote thank you letters to alumni and donors

Freelance SAT/ACT Tutoring April 2018-August 2020

- Independent of a company/self-advertised; tutored students in all 4 subject areas of the standardized tests

LEADERSHIP

Division I Women's Openweight Rowing, Athlete September 2018- May 2022

Treasurer, Boston University Navigators February 2020- December 2020

International Peer Mentor September 2020- May 2021

Event Coordinator, Friends of Internationals June 2021-Present

Cedric J. Salame

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Brookline, MA 02446
linkedin.com/in/cedsalame
(857) 352-7949
cedric17@bu.edu

Education

Boston University School of Engineering, Boston, MA — Expected May 2022
Bachelor of Science in Biomedical Engineering

- GPA: 3.91
- Dean's list (Fall 2018 – present)
- Tau Beta Pi Member

Relevant Coursework: Nanomedicine, Biomaterials, Thermodynamics and Statistical Mechanics, Organic Chemistry, Cellular Biology and Biotechnology, Differential Equations, Micro-fluidics, Data Science, Signals and Controls, Product Design and Manufacture, Nanotechnology, Human Physiology.

Experience

Coker Group, Department of Chemistry, Boston University — Sep 2019 – Present
Undergraduate Researcher in Quantum Mechanics and Molecular Dynamics

- Inspected the nature of interactions behind cohesion and transport properties of ionic liquids to model the material accurately using the LAMMPS material simulation package.
- Developed and used algorithms to extract knowledge from large trajectory data sets allowing to analyze it and interpret it into free-energy surfaces and models to communicate results thoroughly.
- Increased the efficiency of Parallel Tempering and Monte Carlo algorithms through parallelization and domain decomposition.

Moderna, Norwood, MA — Jul 2021 – Dec 2021
Co-op in Analytical Development

- Designed experiments to monitor lipid nanoparticle surface dynamics in response to changes brought to the environment using a FRET assay.
- Monitored the secondary structure and stability of nucleic acid interacting with small molecules using various biophysical tools.
- Developed and optimized assays to calculate the permeation and encapsulation efficiency of lipid nanoparticles using fluorescence spectroscopy.

Universidad Iberoamericana, Veracruz, Mexico — Jun – Aug 2018
Workshop in Biomimicry

- Explored 10 different ecosystems, ranging from cloud forests to desertic areas, to inspect the evolution of nature's processes and learn how it overcomes environmental constraints.
- Led an interdisciplinary team to apply nature processes which led to the creation of sturdy and flexible prosthetic joints based on emulating the structures of nacre and spider web.

Selected Projects

Nanoemulsion for Intra-Ocular Delivery of Mitoprotective Drug — Sep 2021 – Present
Senior Design Project

- Prepared and optimized nanoemulsion formulations to obtain batches with increased stability and encapsulation of drugs.
- Mastered the workflow of in-vitro experiments to measure and determine effect of drug product on mitochondrial activity, cell death, and decrease in oxidative stress of cells.

Skills

Lab: Soft-Lithography, PCR, DLS, Spectroscopy, Membrane labelling, CD, Confocal Microscopy, nanoemulsion preparation, cell culture and handling, cGMP/GDP.
Technology: Image Processing, Machine Learning for classification, Filtering, Signal Sampling, Fourier Transform.
Softwares and Languages: Arduino, GROMACS, LAMMPS, C, Python, MATLAB, Prism, Microsoft Office.
Languages: English (native), French (native), Arabic (native) and Spanish (professional proficiency).
Interests: Boston University Equestrian team (Lebanese National Champion 2016), Biomedical Engineering Society, ski racing, diving, playing the violin and traveling.

Taylor Schissel

tschisse@bu.edu • (562) 666-1362 • https://www.linkedin.com/in/taylor-schissel/ • Boston, MA

EDUCATION

University of Michigan Rackham Graduate School, Ann Arbor, MI
PhD Pre-Candidate, Biomedical Engineering — May 2028

Boston University College of Engineering, Boston, MA
Bachelor of Science in Biomedical Engineering — May 2022

- G.P.A.: 3.94/4.00
- College of Engineering Dean's List, all semesters

RESEARCH EXPERIENCE

Senior Design Project, Boston University Zaman Lab — Sep 2021 - present
Systems analysis and model to improve access to healthcare among Native American Communities in Rosebud, SD

- Synthesized preliminary pseudocode model of patient experience in the Rosebud IHS hospital
- Constructed iterative model incorporating numeric data and community input regarding non-quantifiable behavioral factors and historic distrust
- Recognized as a semifinalist in Rice360's 2022 Global Health Technology Challenge

Laboratory Technician, Boston University DAMP Lab — Spring 2020

- Investigated start-to-finish Gibson Assembly procedures for seven plasmid destination vectors
- Wrote and executed procedures for semi-automated approach using Aquarium software
- Analyzed gel electrophoresis imaging and sequencing results of plasmid vectors on Benchling
- Presented weekly progress reports at cross-functional staff meetings

WORK EXPERIENCE

Technology Consulting Intern, EY — Summer 2021

- Evaluated best practices and emerging technologies for inventory management systems to prepare a product vision plan for client
- Designed Agile boards on MIRO for PI planning
- Wrote test scripts, built an interactive test result dashboard, and incorporated a new performance testing tool into project pipeline in support of quality assurance team

LEADERSHIP & ACTIVITIES

Grader, Boston University — Sep 2021 - present

- Dr. Andy Fan's EK103 Linear Algebra course
- Dr. Ahmad Khalil's BE 403 Signals and Controls course

Biomedical Services Volunteer, Red Cross Boston — Jun 2021 - present

Tau Beta Pi Engineering Honor Society, Secretary — Sep 2020 - present

Kappa Alpha Theta, President, Vice President of Education — Feb 2019 - present

- Panhellenic Honors Society
- Panhellenic President of the Year

Equestrian Team, Vice President, Events Coordinator — Aug 2018 - present

Summer Program for Humanitarian Education and Research Exchange (SPHERE) Summer 2021

SKILLS

Technical: Thin Layer Chromatography, Column Chromatography, Organic/Aqueous Extraction, FTIR, NMR, Basic Titration Techniques, PCR
Computer: MATLAB, C++, Java, Arduino Interfaces, GitHub, Microsoft Office, some Python

Thomas Fitzgerald Settelmayer

tsettelm@bu.edu • (626) 437-5434 • Linkedin • Boston, MA, 02108

EDUCATION

Boston University College of Engineering — Boston, MA
Bachelor of Science in Biomedical Engineering — Expected May 2022

RELEVANT COURSEWORK

Signals, Systems and Controls	Biomedical Optics	Biomechanics
Biomedical Measurements	Optical Microscopy of Biological Materials	Device Diagnostics & Design

PROFESSIONAL EXPERIENCE

The Andermann Lab — Boston, MA
Lab Assistant — October 2020 – May 2021

- Labeled and trained data sets using a deep-learning algorithm DeepLabCut.
- Conjointly utilized python and DeepLabCut to analyze and gather data on movement of malnourished and anxious mice.
- Data collected gives insight on how human needs determine which sensory cues are attended to, learned and remembered.
- Maintained various Jupyter notebooks and collaborated through Google Colaboratory.

Children's Hospital Los Angeles — Los Angeles, CA
Research Observer — July 2017 – July 2018

- Performed guided research with an emphasis on understanding lung development in mice embryos. Research focused on organogenesis, tissue repair, regeneration and engineering.
- Observed research on clinical correlations of lung idiopathic fibrosis, COPD, and emphysema.
- Harvested tissues and processed samples for analysis. Utilized lab techniques such as PCR and immunohistochemistry.
- Maintained accurate and organized laboratory records, stocks and laboratory supplies.

Pathways to Stem Cell Science — Los Angeles, CA
Regenerative Medicine and Disease Modeling Program — June 2017 – July 2017

- Studied human induced pluripotent stem cells (iPSCs) at Lab Launch Inc., a commercial laboratory used by biotech start-up companies to conduct research.
- Differentiated human iPSC lines into cardiomyocytes using advanced lab techniques.
- Trained in laboratory and data acquisition skills: stem cell culture, cell line derivation, RNA extraction, cDNA synthesis, flow cytometry, fluorescence microscopy and antibody labeling.

PROJECTS

Takeda Pharmaceuticals — Boston, MA
Senior Design Project — September 2022 – Present

- Assisting in the development of an *in silico* model for subcutaneous bleb formations caused by large volume infusions.
- Performing extensive in-depth literature reviews on the subcutaneous tissue and its associated non-uniformities and nuances.
- Developing a physical model of the subcutaneous tissue at Boston University's Interfacial Fluid Lab to obtain data for computer model development.

SKILLS AND QUALIFICATIONS

- Computer: MATLAB, basic python, SolidWorks, ImageJ, Fiji.
- Technical Skills: RNA Extraction, PCR, Electrophoresis, Flow Cytometry, Circuitry.
- Proficient in Microsoft Office, Excel and PowerPoint.

Jose Miguel Sevilla

Boston, MA | (617) 678-8132 | jj.sevilla2000@gmail.com |

Education

Boston University l Boston, MA Expected Aug 2022 B.S. in Biomedical Engineering

Experience

Assistive Medical Device l Boston, MA Sep 2021 - Dec 2021 Research Team Member

• Prototyped and modeled an adaptable lever arm for those with impaired grip strength. • Demonstrated CAD drawings and prototype iterations in written and oral design reviews with professors, peers, and stakeholders. • Evaluated and determined product efficiency using FMEA analysis and Pugh chart comparisons.

Smart Rat Trap l Boston, MA Sep 2019 - Dec 2019 Communications Coordinator and Sustainability Consultant

• Designed a smart rat trap capable of effectively capturing rodents and alerting the user once the rat had been caught • Created mathematical models to calculate how much power was needed to operate the arduino and solenoid • Demonstrated CAD drawings and prototype iterations in order to manufacture the trap

Basilar Membrane Probe l Boston, MA. Sep 2021 - Present Design Team Member

• Successfully wrote a grant proposal in regards to a need to improve the sensitivity and for automation of the probe. • Demonstrated CAD drawings of the current and prospective probe. • Created framework for the automation software in C++.

Leadership Experience

JMP-Trading l Boston, MA July 2020 - Present President

• Generated over $40,000 dollars in gross sales of high-end sports collectibles through a web-store based business model. Oversaw business negotiations, bidding, and acquisitions of collectibles for JMP-trading. Managed thousands of SKUs of inventory in order to help identify, track, and categorize the company's sellable inventory while coordinating shipments.

New Industry Analysis Club l Boston, MA Jan 2019 - Present Vice President

• Coordinated bi-weekly meetings where members engaged in various research projects regarding rapidly expanding industries such as artificial intelligence, non-fungible tokens, and data analytics.

Awards and External Class Credits

• Boston University Professional Etiquette Certification (2019)

Technology and Software Skills

MATLAB, ComSol, C++, Microsoft Office, CAD

Danial Shafi

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A fast learner looking to learn new skills through an applicable job using biomedical engineering.

Education

- Boston University : Major - Biomedical Engineering (BS). May 2022.
- Old Bridge High School : High School Diploma. June 2018.
- Rutgers University : Summer High School Enrichment. August 2017.

Experience

- DaHiMa : Vice President - Communicative leader in family start-up. January 2022.
- Dollar Tree : Manager - Established as a responsible leader in ensuring task completion. August 2021.
- NRG Energy : Inserter Operator - Led and initiated tasks with a team to enable others. August 2019.

Projects

Data Analysis Project: Assessed the strategies of trading management and training delivery in technology businesses and how it can be improved.

Design Project: Developed a new way to measure the observed density of the middle ear bone with a Project Manager.

Skills

Personal: Great prioritization, Work in fast-paced environments, Excellent communication, Experience in medical terminology, Strong leadership, Attention to detail, Consulting, Presentations, Scientific report writing, Skill development, Needs analysis.

Computer: Adobe Photoshop, Excel, Word, Teams, PowerPoint, MatLab, Zotero, Slack, Eagle, PicoScope 6, Arduino, GitHub, SolidWorks, Google Docs, CAD

Languages: English(Native), Spanish(Fluent), Arabic(Basic), Japanese(Basic).

Certifications

Certified to do laser work, wet lab work, fire & safety, and chemical lab work.

Volunteer Experience

Analyzed complex situations ensuring safety for others.

Leadership & Activities

Lead an internationally renowned marching band to win multiple awards.

Zakarey O Sharif

zsharif@bu.edu • (617) 304-0340 • Boston, MA, 02118

EDUCATION

Boston University College of Engineering Boston, MA
Bachelor of Science in Biomedical Engineering Expected May 2022
GPA: 3.48/4.00
Dean's List (Top 30% of Class in GPA) Spring 2021, Fall 2021

RELEVANT COURSEWORK

Intro to Programming for Engineers	Molecular & Cell Biology	Systems Physiology
Signals & Controls Systems	Thermodynamics & Statistical Mechanics	Intro to Biomaterials

PROJECTS

Senior Design Capstone Project

- Analyze mRNA data to construct a temporal map of gene expression in a rat following fracture
- Use Biphasic Finite Element Modeling to recreate mechanical environment of a fractured bone during healing
- Develop mathematical relationships between mechanical environment and biological data
- Create a mechanobiological model to simulate bone healing from early stages to complete healing

Truss Design Project

- Studied important structural features of truss making to construct a working design
- Utilized MATLAB programming to test effectiveness of truss design
- Presented findings to professor before a final evaluation was conducted to corroborate results

Human Powered Energy Source, Engineering Design Class

- Created a model for an eco-friendly human powered, low maintenance battery that generates and stores power for use by a village
- Brainstormed a variety of ideas; Selected a model which was both cost-effective and easy to employ
- Hand-Sketched physical model and developed mathematical models to present final product to class

CO-CURRICULARS

Volunteer, Boston Cares September 2020 – Present
Boston, MA

- Organize events for youth
- Prepare food for the severely ill during the Pandemic
- Conducted food drives across Boston for the less fortunate

Leader, ISBCC December 2014 – Present
Boston, MA

- Promote community events through use of social media and youth engagement
- Collaborate in Islamic studies i.e., Prayer, and Quran
- Managed discussions on how to improve community

ADDITIONAL EXPERIENCE

Security Officer, Northeast Security January 2019 – Present
Valet, VPNE January 2018 – January 2019

SKILLS

Computer Skills: MATLAB, MIMICS, SOLIDWORKS, ABAQUS

Avani Sheth

asheth@bu.edu • (908) 809-2258 • www.linkedin.com/in/avani-sheth Basking Ridge, New Jersey, 07920

EDUCATION

Boston University, College of Engineering
Boston, MA
Bachelor of Science in Biomedical Engineering September 2018 – May 2022

- **GPA**: 3.72 / 4.00
- **Skills**: Arduino, MATLAB, SolidWorks, C++, Python, C, Java, Microsoft Office

WORK EXPERIENCE

Material Robotics Laboratory
Boston, MA
Research Assistant September 2021 – May 2022

- Fabricating a soft robotic sensor capable of detecting bleeding and hemorrhage for interventional endoscopic procedures
- Integrating the device onto an endoscope while conducting *in-vitro* testing to ensure maximum patient comfort, maneuverability, and surface area

Capgemini Invent
New York City, NY
Life Sciences Consulting Intern June 2021 – August 2022

- Worked closely with Urovant Sciences and Sunovion Pharmaceuticals to support medicinal product rollout
- Designed a plan for navigating pharmaceutical product launch and harnessing data indicators

PROJECTS

Peritoneal Dialysis Scale and Clamp
Boston, MA
Electrical and Mechanical Engineer January 2021 – May 2021

- Conducted disease state research, stakeholder interviews, and designed a product to improve the lives of late-stage chronic kidney disease patients with a team of engineers
- Built an Arduino motor control system with weight inputs from an HX711 and load cell scale circuit
- Engineered a CAD modelled clamp to rotate with the motor to stop blood flow during peritoneal dialysis and prevent drain pain in CKD patients after a certain volume of blood is exchanged

Temperature Control 96 Well Plate Incubator
Boston, MA
Project Lead, Electrical Engineer September 2019 – December 2019

- Combined Arduino programming, voltage-divider circuit building, temperature and power models, and machine shop equipment to create a temperature-controlled incubator for a 96 well plate
- Surpassed all requirements for a device that could heat up to 37 degrees Celsius and sustain temperature within 0.2 degrees, could display real time temperature settings and met design height and weight specifications

ACTIVITIES

Engineers Without Borders Boston University
Boston, MA
President September 2018 – December 2021

- Led a student organization consisting of international programs, domestic programs, and fundraising
- Collaborating with the community of Tinet, Kenya to design, build, and implement solutions for improving their access to clean water (e.g., rainwater catchment system, borehole well, water purifying bucket filters)

Cooper J. Shifrin

860.428.8866 shifrinc@gmail.com www.linkedin.com/in/coopershifrin

EDUCATION

Boston University Boston, MA
Bachelors of Science in Biomedical Engineering *Expected May 2022*

Relevant Coursework: Programming for Engineers (MATLAB), Computational Linear Algebra, Molecular Cell Biology and Biotechnology, Drug Delivery, Probability Statistics and Data Science, Device Diagnostics and Design, Biomedical Measurements, Biomedical Signals and Controls, and Business of Technology Innovation

EXPERIENCES

Rebion Boston, MA
Quality Systems Coordinator *August 2021 - Present*
• Coordinator for the quality system of a Class II medical device that detects amblyopia and micro-strabismus
• Assists in the administration of clinical trials for a mild traumatic brain injury detection device
Quality Systems Intern *June 2021 - August 2021*
• Facilitated the transition to a digital quality management system including revision of standard operating procedures, design controls, risk management, and testing protocols

Boston University Summer Accelerator Boston, MA
Team Lead *June 2020 - August 2020*
• Developed a medical device project to help prevent bed sores for patients with compromised mobility
• Conducted over 35 customer interviews with medical professionals and presented weekly on venture business planning

Livelo Sydney, NSW
Project Management Intern *January 2020 - May 2020*
• Coordinated the rollout of three new locations for luxury road bike rentals with global partners, planning rental locations, hotel partnerships, and pricing

Great Neck Country Club Waterford, CT
Grounds Crew *Seasonal May 2018 - August 2019*
• Maintained greens, rotating and planning pin placement locations
• Serviced bunkers and helped with brush clearing and general course maintenance

Bailey's Garden Lebanon, CT
Event Organizer *May 2012 - May 2019*
• Organized multiple events including road races and music festivals to raise over $300,000 in funds for an ADA compliant playground
• Assisted in developing a foundation to benefit disabled children through grants for specialized equipment

CO-CURRICULARS

First-Year Innovation Fellowship
Participated in workshops on startup development and attended multiple networking events, engaging with local innovators.
Biomedical Engineering Society
Professional society of aspiring biomedical engineers engaging with industry professionals and taking part in career preparatory events.
Boston University New Venture Competition
Finalist in a university-wide startup competition where participants are eliminated in a four round series of pitches judged by professional investors.

SKILLS

Autodesk Inventor, Autodesk Fusion 360, Stella Architect, Arduino, C++, C, MATLAB, Autodesk Eagle Circuit Schematics, PCB Design, Soldering, 3D Printing, MS Office Suite

Zachary Silfen

zsilfen@bu.edu | 561-901-6012 | Boston, MA

EDUCATION

Boston University, College of Engineering | Boston, MA — Expected Graduation May 2022

Bachelor of Science in Biomedical Engineering

Academic Projects: Emergency Narcan Dispenser System (Fall 2021), Machine Learning Categorization of Animal Images (Fall 2020), The Effects of Different Types of Masks on Heart Rate (Fall 2020), Design and Fabrication of a Portable Baby Incubator to be Used in Refugee Camps (Spring 2020), Investigation into How Different Computer Activities Effect EEG Signals (Spring 2019), Investigation into the Variable Cost of Medical Procedures at Different Hospitals (Fall 2018)

Relevant Coursework: Biomedical Materials Science, Biomedical Engineering Senior Design Device Diagnostics and Design, Transport Phenomena in Living Systems, Thermodynamics & Statistical Mechanics, Optical Spectroscopic Imaging, Biomedical Optics, Business of Technology Innovation, Principles of Molecular Cell Biology and Biotechnology, Systems Physiology, Signals and Controls, Probability, Statistics, and Data Science for Engineers, Electric Circuits, Engineering Mechanics, Physics I/II, Chemistry I/II, Differential Equations, Multivariable Calculus, Computational Linear Algebra, Biomedical Engineering Measurements I/II, Medical Ethics, Medical Debates

Technical skills: PCR, DNA Ligation, Electrophoresis, Mass Spectrometry, TLC Analysis, NMR Analysis, LCMS Analysis, MATLAB, Python, Ansys ICEM & Fluent, Excel, Arduino IDE, C, Scientific Reading and Writing

RESEARCH AND CLINICAL EXPERIENCE

Draper Laboratory | Cambridge, MA — September 2021 – Present

Senior Design for Biomedical Engineering

- Led testing and device design team of current industry surgical adhesives and performed comparison analysis
- Automated and consolidated the testing and data acquisition systems using LABVIEW

The Joseph-McCarthy Group | Boston, MA — March 2021 – Present

Undergraduate Research Opportunity Program (UROP) Awardee
UROP Global Challenge Research Award Recipient
Engineering Summer Term Alumni Research Scholar (STARS)

- Developed CT-scan based geometries for computational fluid dynamics using Ansys ICEM & Fluent
- Creation of machine learning model to predict deposition efficiency at different anatomical regions in synthetic geometries using WEKA

Boca Raton Regional Hospital | Boca Raton, FL — May 2019 – August 2019

Radiology Intern

- Interpreting MRI, PET, X-ray, and CT scans alongside a M.D. and preparing patients for imaging with a radiology technician

Minimally Invasive Surgery | Boca Raton, FL — May 2018 – August 2018

Medical Assistant

- Performed preliminary evaluation of patient health, record vitals, and share the patients' relevant concerns with physician
- Transcribed physician recommendations and prescriptions during visit in a logical and concise manner

CONFERENCE ABSTRACTS

- **Z. Silfen**, M. M. H. Akash, M. Cherepashensky, A. Chakravarty, S. Basu, and D. Joseph-McCarthy. *In Silico* Prototyping for Intranasally Administered Agents for COVID-19 and Other Respiratory Pathogens. *Bulletin of the American Physical Society*, 2022
- M. M. H. Akash, A. Mituniewicz, Y. Lao, P. Balivada, P. Ato, N. Ka, **Z. Silfen**, A. Chakravarty, D. Joseph-McCarthy, and S. Basu. A better way to spray? –A Model-Based Optimization of Nasal Spray Use Protocols. *Bulletin of the American Physical Society*, 2021

Michael Sisk

40 Gardner Tavern Rd., Coventry, CT, 06238 msisk23@bu.edu (860) 680-2107

Education

B.S., Biomedical Engineering, Boston University — Expected May 2022
Minor: Computer Engineering
Cumulative GPA: 3.71, Dean's List: Fall 2018, Spring 2020, Fall 2020, Fall 2021

Skills

Computer: MATLAB, Python, C++, C, C#, JavaScript, NodeJS, Verilog, Sockets Library, KLayout, Fusion 360, SBOL, Eugene, Cello, Microsoft Office
Platforms: Windows, Linux, Cloud Computing (AWS, Mass Open Cloud)
Laboratory: CNC Milling, Data Processing, Soft Lithography, Arduino, Basic Cloning Skills, PCR

Projects

Miniaturized Microfluidic Device to Create High Throughput Lipid Nanoparticles — 2021 - 2022

- Utilized microfluidic computational modeling systems and G-code to accurately mill microfluidic devices into polycarbonate
- Modeled custom mixing mechanism through KLayout and developed fabrication protocols using PDMS and soft lithography

PCADA (Plasmid Cloning Assembly Display Application) — 2021

- Designed a Python-based application allowing for input DNA sequences to show cheapest design
- Developed a primer scoring system for PCR parts using Python's primer3-py library

Building a Communication Layer for Multi-Party Computation — 2021

- Allowing for competing cloud parties to compute secure data in a more efficient manner
- Implemented communication threads using pthreads library in C to push/pull data to various parties involved in computation

Research and Work Experience

BU CIDAR Lab, 3DμF Open-Source Contributor, Boston, MA 02215 — 2021 - 2022

- Designed curved channel component through Paper.js library to handle all user inputs
- Integrated components and new tools into fellow researchers code to further development of new versions

BU Educational Resource Center, Peer Tutor, Boston, MA 02215 — 2019 - 2021

- Provided physics and chemistry instruction for Boston University students
- Facilitated meaningful conversation to place significant focus on problem solving

Coventry Public Works, Town Engineer Intern, Coventry, CT 06238 — 2020

- Assisted managing town construction sites and surveyed town signs to update GIS map
- Restructured town permit system with Town Manager using Microsoft Excel

Leadership & Activities

Boston University Biological Design Center, CIDAR Lab, Undergraduate Student — 2021 - 2022
Boston University Biomedical Engineering Society, Member — 2018 - 2020
Boston University Sports Business Club, Member — 2018

Blaire K. Smith

bksmith@bu.edu | 562.544.9450 | linkedin.com/in/blaire-smith-739b89180

Education

Boston University College of Engineering, B.S. Biomedical Engineering — Expected May 2022
Minor: Biology
Université Grenoble Alpes Grenoble, France — Spring 2020

Coursework

Cell Biology, Systems Physiology, Biomedical Signals & Controls, Probability & Statistics, Biology of Neurodegenerative Diseases, Quantitative Neuroscience, Nucleic Acid Engineering

Honors & Awards

Engineering Dean's List Fall 2019; Living Computing Project funding award through STEM Pathways Summer 2020 & 2021 and Spring 2021

Work Experience

Laboratory Assistant Boston University, MA — **Sep 2021 - Present**

- Work as an assistant in the new Bioengineering Technology and Entrepreneurship Center (BTEC) at the Boston University College of Engineering.
- Train students using BTEC with wet lab equipment and machines with specified knowledge in ThermoFisher QuantStudio5 qPCR and Invitrogen iBright1500 gel imaging including developing SOPs.
- Develop and upkeep inventory in several spaces for multiple types of equipment.

Khalil Lab Boston University, MA — **Jun 2020 - Aug 2021**

- Performed experiments as an in-person research assistant to design a biologic AND gate using doxycycline- and cumate-inducible systems during summer 2021.
- Conducted previous studies on effects of phase separation on epigenetic regulation, mainly its function and organization with analysis on proteins involved in neurodegenerative disease.

Projects

Modeling and constructing coherence detection synthetic gene circuits based on protein oligomerization

- Done as a Senior Design Project for the Boston University Biomedical Engineering Department in conjunction with the Khalil Lab.
- Aim to model and construct synthetic gene circuits in *S. cerevisiae* to act as coherence detection for homo- and heterodimer oligomerizing systems.

Skills

Biology:
Samples: *E. coli*, human cheek swabs, sheep blood, Jurkat and HEK cells, *S. cerevisiae*
Assays: PCR, gel electrophoresis, mammalian cell culture on plates, Gibson Assembly
Engineering/Computer:
MATLAB, PyMol, some experience in C and Python, MacOS 10, Microsoft Office

Activities

Engineering Sophomore Mentor
Provide guidance to current sophomores in the Boston University College of Engineering
Tau Beta Sigma
Current Vice President of Membership of the Eta Gamma chapter of the national coeducational band service organization; Active Member since March 2019; Past Web Master and Parliamentarian
Marching Band and Pep Band
Led the flute section in the Boston University Marching Band and the Boston University Pep Band since fall 2020; played flute since age 10

Ethan Strauther

ethanstr@bu.edu • (910) 964-6754 • linkedin.com/in/ethan-strauther

Education

Boston University College of Engineering | Boston, MA
Bachelor of Science in Biomedical Engineering — May 2022
GPA: 3.79/4.0
Honors**:** The Posse Foundation Scholarship (2018-2022)
Comillas Universidad Pontificia | Madrid, ES
Semester Abroad — Jan - May 2020

Leadership

National Society of Black Engineers (NSBE) | Boston, MA
President — Apr 2021 - Present

- Lead a fourteen-member executive board of multidisciplinary engineers and STEM students
- Collaborate with corporate sponsors, alumni, and BU departments for chapter programming
- Manage chapter finances, academic retention, and professional growth of membership

Work Experience

Boston University | Boston, MA
Lab Assistant – Clinical Testing Laboratory — Jan 2022 - Present

- Retrieve and inactivate nasal samples for safe human processing
- Conduct PCR procedures such as sample aliquoting and RNA extraction, utilizing Hamilton Micro Lab
- Digitize lab samples into an online database for organization and tracking

Merck | Wilson, NC
Intern – Lab Quality and Data Services — May - Aug 2021

- Assembled data on standard work and standard hours for Wilson NASU Quality Team
- Assessed annual capacity versus demand of the Data Services department to predict business needs
- Retrieved finished products and APIs for periodic lab stability testing to monitor compliance with FDA and company regulatory standards

Bank of America | Charlotte, NC
Intern – Global Technology and Operations — Jun - Aug 2020

- Analyzed large data sets within Microsoft Excel and Tableau to find solutions for account backlog
- Led teams of 4-5 to suggest improvements for increased company efficiency
- Presented project work and findings to company executives and project managers

Project Experience

Senior Project — Sep 2021 - Present

- Create point of care diagnostic device, detecting creatinine in small blood samples with > 97% specificity
- Construct a mini spectrophotometer for serum samples, correlating to creatinine concentration
- Conduct statistical analysis, comparing data to gold standard lab testing

ReGa Business Plan — Sep - Dec 2021

- Led a team of four to develop a business plan for ReGa, a climate technology start-up with a focus on reducing methane emissions
- Identified key milestones in business growth and prototype development as the VP of Strategy/Operations
- Conducted financial analysis to maximize profits and manage assets and liabilities

Fetsum Tadesse

ftadesse@bu.edu • 404.518.3514 • Boston, MA

Education

BOSTON UNIVERSITY, Boston, MA — Expected: May 2022

- Biomedical Engineering Major - Technology Innovation Concentration

Professional Experience

Research Assistant, BOAS Lab, Boston University — Feb 2019 - Present

- Improved an angiogram program that images blood vessels in mouse brain scans to model blood flow and quantify tissue oxygenation *in-vivo*
- Developed replicable computational methods for angiogram correction for future undergraduate lab assistants
- Determined potential sources of error in assembly of large data sets
- Assembled optodes and connectors through soldering for electrode cap to later serve as alternative to MRI scan
- Troubleshooted with Static Phantom to ensure proper functionality of single optodes and replaced faulty parts

Intern, Liang Laboratory, Emory University — May 2019 - Aug 2021

- Isolated, purified, and amplified genes that encode for KCC3 protein in *E. coli*
- Processed cryo-electron microscopy images, extracting and analyzing data using RELION
- Collaborated with 17-person team to explore prospective role of KCC3 protein structure in drug development for potential cure to Respiratory Syncytial Virus

Engineering Projects

Drug Dispenser Project — April 2020

- Designed a device in CAD that dispenses liquid drugs in controlled quantities so drug may be orally ingested
- Remediated common and important issues faced in refugee camps

Drug Delivery Design Project — Nov 2019

- Designed transdermal patch as alternative to daily Donepezil pill on Stella Architect to maintain a safe drug level in body
- Weekly patch is more accessible to Alzheimer patients and easier to remember making it more practical

Leadership

President, Ethiopian Eritrean Student Association, Boston University — Sept 2018 - Present

- Planned general body meetings and coordinated fundraiser that raised over $1000 for humanitarian crisis
- Co-choreographed annual culture event dance and organized dance rehearsals

Pre-Collegiate Initiative Chair, NSBE, Boston University — Sept 2019 - Present

- Organized community service opportunities locally
- Coordinated fundraiser that raised over $500 for homeless people in Boston

Honors and Recognition

A Better Chance Scholar

- Connects students of color to private schools after year-long selection process of testing and interviews

Publications

W. Tahir, S. Kura, “Anatomical modeling of brain vasculature by generalizable deep learning,” *BME Frontiers,* November 2020.

Skills

Laboratory: Protein purification, Data Analysis, Soldering
Computer: MATLAB, C, RELION, ImageJ, Stella Architect

Rockwell Tang

rptang@bu.edu • (716) 517-6009 • linkedin.com/in/rptang • Boston, MA, 02215

Education

Boston University – B.S., Biomedical Engineering — Expected May 2022
GPA: 3.91 / 4.0 (Dean's List)

Honors & Awards

Tau Beta Pi – Engineering Honor Society
National Merit Scholarship
President's Volunteer Service Award – Gold Level

Experience

Research Assistant – Boston University — Feb 2021 – Present

- Developed *in vitro* mitochondrial imaging and stimulation protocols, automated image processing pipelines, and performed molecular dynamics simulations of large biological membrane systems.
- Refined parameters of ultrasound neuromodulation, simulated propagation of ultrasound through mouse crania and *in vitro* dishes, and designed setups for simultaneous imaging and stimulation.
- Analyzed murine models of Parkinson's gait disorder, trained and tested neural networks for pose estimation, and designed setups for video recording behavior from two angles.

Inspiration Ambassador – Technology Innovation Scholars Program — Sep 2021 – Present

- Mentor high school students and teach weekly engineering classes.
- Created lesson plans and materials for engineering outreach activities to local K-12 students.

Research Assistant – Boston University Large-Scale Neural Data Analysis — May 2020 – Aug 2020

- Implemented machine learning and signal processing to predict mouse behavior from hippocampal and striatal calcium imaging traces.

Publications

Tseng, H., Sherman, J., Bortz, E., Mohammed, A., Gritton, H.J., Bensussen, S., Tang, R.P., Zemel, D., Szabo, T., Han, X., 2021. Region-specific effects of ultrasound on individual neurons in the awake mammalian brain. iScience 24, 102955. https://doi.org/10.1016/j.isci.2021.102955.

Tang, Rockwell. "Resisting Indigenous Stereotypes in Media." WR: Journal of the CAS Writing Program 11, 2019.

Projects

Ultrasound Neuromodulation, Senior Design Project

- Assessing mitochondria as a mechanotransduction pathway for ultrasound-evoked neural activity by calcium imaging, voltage imaging, and molecular dynamics simulations.

Human-Powered Charger

- Designed and prototyped a phone charger powered by human exercise.

Boston At-Risk Housing GUI

- Deployed program to inform of socioeconomically at-risk communities based on housing data.

Skills

Coding: MATLAB, Python, Java, C
Software: SolidWorks, ImageJ, CellProfiler, GROMACS (Molecular Dynamics), DeepLabCut
Hardware: 3D Printing, Arduino/Raspberry Pi, Circuit Board Fabrication, Confocal Microscopy

Activities

Member, Biomedical Engineering Society
Volunteer Activity Leader, Clarence Youth Bureau

Zakiah Tcheifa

Zakiah17@bu.edu | (347) 801-5998 | linkedin.com/in/zakiaht

EDUCATION

Boston University *Boston, MA*
Bachelor of Science in Biomedical Engineering *Expected May 2022*

SKILLS & CERTIFICATIONS

Technical: Microsoft Office Suite, Google Suite, Adobe Creative Cloud, MATLAB, Salesforce, SQL

WORK EXPERIENCE

Retail Vendor Manager Intern, Amazon *May 2021 – August 2021*

- Designed pitch decks and spreadsheets to close gaps in B2B selection, add vendor-funded discounts, and improve customer experience on Amazon Business - Home Entertainment (HE)
- Utilized SQL and Excel to develop marketing strategies, manage category profitability, and improve top-line growth for vendors which is expected to increase HE's selection goal by 46%
- Coordinated with internal groups such as in-stock management, marketing, and finance to drive long-term objectives and maintain strong vendor partnerships

Lab Assistant, Boston University Medical Center *April 2020 – March 2021*

- Investigated the development of mature megakaryocytic cells in the hematopoietic lineage
- Performed cell culture and analyzed tissue and blood samples from mice
- Attended lab meetings to gain familiarity with research tools and strategies and discuss current research projects in the lab

Sustainability Innovation Bioengineer, Born Global Foundation *May 2020 – August 2020*

- Develop a product which optimized energy efficiency for a solar energy plant with a team of 5
- Created a techno-economic analysis by sourcing material estimates from manufacturers to establish product's cost of operation
- Conducted interviews with clients to establish product specifications and product needs

PROJECTS

Chronic Kidney Disease Diagnostic *September 2021- Present*

- Collaborating with a team of 3 to develop a point of care device which indicates risk of CKD
- Outsourcing cost-effective materials to expand the accessibility of the device to low resource communities for mass testing
- Interview researchers and physicians to gain insight on needed specifications, community limitations, and medical guidelines

Tesla Strategic Firm Analysis *February 2021 – May 2021*

- Created a strategic plan with a team of 5 to lower Tesla's R&D cost and grow profit margins with premium and low price buyers
- Analyzed Tesla's business plan and constructed company recommendations to grow its market share and global presence using SWOT

LEADERSHIP

Vice President - National Society of Black Engineers (NSBE) *May 2020 – May 2021*

- Led a committee of 4 in charge of planning professional development workshops, community service projects, and fundraising events to increase STEM in underrepresented communities
- Increased membership by implementing marketing strategies for 25+ programs

Juan Luis Ugarte Nunez

jugarte@bu.edu || linkedin.com/in/juan-luis-ugarte-nunez || (857-261-8432) || Boston, MA

EDUCATION

Boston University College of Engineering
Expected May 2022
Bachelor of Science, Biomedical Engineering
Cumulative GPA: 3.68

Honors and Awards: Dean's List

Boston University Community Scholarship Sep 2018 - Expected May 2022
- Merit based Scholarship that requires maintenance of great academic standing
- Performance of at least 25 hours of community service per semester

EXPERIENCE AND LEADERSHIP

Boston University B.O.A.S Lab, Boston, MA Nov 2020 - Present
Research Lab Assistant
- Studying impacts stalls have on the hemodynamics of the brain and effects thereof
- Detect abnormalities in full view of capillaries over long periods of time using Fiji application
- Analyze identified oddities and validate time intervals of occurrence with Fiji and MATLAB code
- Process analyzed data in capillaries of stroked mice using a MATLAB GUI
- Training and handling mice for imaging

BU-BPS College Awareness Ambassador, Boston, MA Sep 2019 - Dec 2019
- Mentored BPS Sophomore, gave advice and general guidance for college competitiveness
- Counseled mentee weekly to create the most individualized and customized experience possible
- Contacted and arranged meetings with various faculty to collect useful information for mentee

PROJECTS

NinjaNIRS 2022 Backpack System*: Senior Design Project* Sep 2021 - Present
- Coordinated with 2 members to make detailed timeline to facilitate fast-prototyping process
- Created designs for ergonomic backpack prototypes incorporating EEG, fNIRS, and eyeglass system

Weekly Planner Application: *Software Design Project* April 2021 - May 2021
- Coded with C++ a weekly task tracking application through collaboration of 3 other members
- Implemented and debugged time tracking system and data retention for the user with the coordination of another member

“Smart” Mousetrap: *Engineering Design Project* Feb 2019 - May 2019
- Directed and contributed in design process and presentation of a functioning “Smart” Mousetrap
- Created mechanical portion of prototype using general machining tools in EPIC machine shop
- Handled milling machine to carve in desired grooves and implement appropriate positioning of slots
- Used laser cutter to obtain prototype components and constructed full prototype

Additional Projects: Interdisciplinary CAPSTONE project, Truss Bridge Project, Artificial Heart Valves Project Proposal, Nanotechnology Research Project Proposal, Device & Diagnostics Design Project

SKILLS

Computer: MATLAB, Fiji**,** Microsoft (Office), Google (Suites), Python, C++
Laboratory/Technical: Fluorescence Imaging, OCT Imaging, animal handling, Stall Identification, Stall analysis, Soldering
Language: Spanish, English

Rishi R. Vaidya

655 Stony Lane, Paramus, NJ 07652 | 201-258-9032 | rishiv@bu.edu

EDUCATION

Boston University | Boston, MA — May 2022
Major: Bachelor of Science in Biomedical Engineering
Conc.: Technology Innovation
Cumulative GPA: 3.45
Coursework: Senior Design Project, Clinical Applications Biomed Design, Biomed Instrumentation, Strategy Tech-Based Firms, Thermodynamics, Device Diagnostics and Design, Business of Tech. Innovation, Biomed Measurements I/II, Signals and Controls, Systems Physiology

EXPERIENCE

Medtronic | Boston, MA — September 2021 – December 2021
Software Engineering Intern, Integration, Surgical Robotics

- Designed an internal dashboard application displaying project updates, system metrics, and active tasks using the Python Dash library
- Developed a script to access pull request data from a Git repository via a REST API and organize information in a JSON file format
- Incorporated Dash components such as dropdown selectors, custom sections, and application callbacks in order to display user selected project information stored in the JSON files
- Presented a working dashboard web application and PowerPoint presentation to the integration team upon completion of the internship

Medtronic | Boston, MA — February 2021 – August 2021
Software Engineering Intern, User Flow, Surgical Robotics

- Developed Simulink Stateflow feature for identifying why a surgeon is unable to continue with robotic assisted surgery using elements of logic design, multi-level Stateflow charts, and data returned from the robotic system
- Responsible for software testing, hardware testing, drafting design documents, and presenting updates regarding feature implementation to the User Flow team in biweekly meetings
- Helped close out scoped tickets regarding code implementation, software unit test design, hardware testing, and document creation in the design process

Mareana Inc. | Princeton, NJ — June 2020 – July 2020
Data Science Intern

- Developed a time series forecasting web application to forecast order duration based on various user input parameters using Python
- Worked with a team of interns to explore time series forecasting tools and create a forecasting model using client data
- Responsible for developing functions integrating the forecasting model with user input from the web application
- Tested various forecasting models and selected XGBoost Regression as the most viable model for the web application
- Presented working web application to the leadership team at Mareana upon completion of project

PROJECTS

Medical Device Design | Boston, MA — September 2020 – December 2020
Device Diagnostics and Design Student

- Worked with a team to prototype a spirometer for low resource settings with the goal of creating a cost-effective design and using available materials
- Researched current solutions and interviewed various stakeholders in order to develop a consumer-based design
- Responsible for creating CAD drawings and developing the spirometer resistance mechanism
- Presented a prototype along with a project report to the professor and the class

Truss Design | Boston, MA — January 2020 – April 2020
Engineering Mechanics Student

- Designed a truss system to support a maximum load while adhering to time and budget constraints
- Used MATLAB to analyze and optimize truss design though individual member analysis and maximum force predictions
- Responsible for translating truss design into .MAT files and developing a program to analyze various designs

LEADERSHIP

BU EK100 | Student Advisor — May 2019 – Present

- Led class discussions and taught a class of 13 students to support incoming engineering freshmen students
- Organized group activities for meetings in order to educate freshmen about various aspects of the BU College of Engineering
- Advised students on how to plan and organize class schedules, explore extracurricular activities, and get involved on campus

BU Biomedical Engineering Society | President — October 2018 – Present

- Lead contact to BU Alumni and local biotech companies for events such as panels and company site visits
- Drive day to day operations including communications, logistics, and cross organization event coordination to enable networking with alumni and professionals in biomedical engineering related roles

SKILLS

- Computer: Python, MATLAB, Simulink, Stateflow, MS Office, CAD, Linux Environment (Ubuntu), Git

Darya (Dasha) Veraksa

dveraksa@bu.edu • (781) 708-1532 • https://www.linkedin.com/in/darya-veraksa Boston, MA

EDUCATION

Boston University, College of Engineering
B.S. in Biomedical Engineering, Summa Cum Laude *Expected May 2022*
GPA: 3.93/4.00 – Dean's List, Tau Beta Pi

RESEARCH EXPERIENCE

Asimov *June 2021 - August 2021*
Synthetic Biology Intern

- Conducted 60-generation stability test on high producing CHO cell line
- Performed DNA library prep for Next Generation Sequencing; ran Miseq; analyzed NGS results
- Designed and executed NGS wash buffer optimization experiment that halved library prep turnaround time, increased output DNA concentration, and decreased cost

Dragonfly Therapeutics, Inc. *June 2020 - August 2020*
Protein Expression Intern

- Maintained ExpiCHO cell culture lines; transfected with plasmid DNA; harvested proteins
- Created lab management software that performs tasks using data stored in Benchling
- Automated antibody humanization workflow to speed up sequence numbering and IgBLAST

BU Design Automation Manufacturing Prototyping (DAMP) Lab *June 2019 - Dec 2019*
Undergraduate Student Programmer

- Facilitated the certification of DAMP Lab as the first US academic bio-foundry accepted to the International Gene Synthesis Consortium (IGSC)
- Created a software tool called SBOL-Sample-Designer to allow researchers to upload, visualize, and share their experimental data on SynBioHub. Presented work in a first-author poster at the 2019 BU Undergraduate Research Symposium

TEACHING EXPERIENCE

Boston University Mechanical Engineering Department *Feb 2019 - present*
Teaching Assistant for EK125—Introduction to Programming for Engineers

- Implemented and programmed MATLAB Grader
- Led weekly course discussions; Proctored and graded exams for 500+ students
- Instructed students on how to use MATLAB during class time and while holding office hours

LEADERSHIP

- **Theta Tau - Psi Delta Chapter** *Sept 2018 - present*
  Finance Chair, Active Member
- **Boston University Rocket Propulsion Group** *Sept 2018 - May 2019*
  Safety Officer

SKILLS

Computer: C/C++, Python, MATLAB, Jupyter Notebook, pySBOL, projects with ESP32 microcontroller.
Laboratory: molecular biology: plasmid transformation, restriction digests, DNA cloning and purification, protein purification; mammalian cell culture: cell passaging and sterile technique, maintenance of cell lines, endotoxin testing, transient transfections, protein harvesting.
Fluent Languages: Russian, Spanish

Chi Chiu Victor Wong

ccvwong@bu.edu • (978) 809-0826 • http://www.linkedin.com/in/chi-chiu-victor-wong Boston, MA

EDUCATION

Boston University (Cumulative GPA: 3.81/4.0; Major GPA: 3.90/4.0; GRE Quant: 168) ***Boston, MA***
B.S. in Biomedical Engineering, Minor in Business Administration & Management *Expected May 2022*

- Honors: Tau Beta Pi, Alpha Eta Mu Beta, Dean's List (All Semesters)
- Activities: Hong Kong Student Association (Treasurer), Phi Chi Theta, BU Consulting Group
- Coursework: Mathematics of Financial Derivatives, Computational Biology, Biomedical Signals and Controls

EXPERIENCE

PricewaterhouseCoopers (PwC) ***Hong Kong SAR***
Advisory Consultant Intern (Technology Consulting) *July – August 2021*

- Evaluated and modeled cost savings (5-Year NPV of $16.7M) for feasibility study of IT Shared Service Center located in Philippines for Asia-based conglomerate; Determined labor arbitrage potential (~81.5%), efficiency gains from labor consolidation (~13.1%), and further savings from RPA automation (~15.2%)
- Collaborated with a team of four and developed vendor assessment framework to shortlist 15 potential vendors for non-profit welfare organization seeking to custom build job and rostering management system; Estimated benefits of reducing work load by ~1,800 hours/year and cost savings of ~$130,000/year

Value Partners Group (Asset management firm, ~$14B AUM) ***Hong Kong SAR***
Investment Management Summer Analyst (Reported directly to Chief Strategy Officer) *May – July 2021*

- Authored extensive investment analysis on Cryptocurrencies as an institutional asset class; Proposed multi-asset fund with 2.5% quarterly rebalanced cryptocurrency exposure, increasing Sharpe ratio by +0.21
- Evaluated synergies and financial condition reports of target company for potential Transaction Value of ~$1.49B+; Forecasted market share of business units using financials and insights on distribution channels
- Performed analysis on prospective mutual fund offering to 15+ institutional clients in Latin America; Resulted in proposition to approach the largest bank in Brazil and pension funds in Chile & Mexico via equity brokers

RELEVANT PROJECTS

Control and Data Processing Program for Mechanical Loading Bioreactor ***Boston, MA***
Capstone Project (Supervised by Professor Connizzo) *September 2021 – April 2022*

- Developed MATLAB program to evaluate strain transfer of murine tendon explants from ECM to the cell and cell to nucleus using cell-tracking algorithm on images from confocal microscope and data acquired from bioreactor
- Led team of 3 to develop interactive control software for mechanical loading bioreactor using MATLAB

Computational Biology Algorithm Implementation ***Boston, MA***
Individual Project *September – December 2021*

- Utilized Multilayer Perceptron and Limited-Memory BFGS algorithm to model catalytic ratios of isoform-1 Rubisco sequences resulting in R^2 of 0.71; Predicted 4,000+ C3 plants yielding mean ratios of 4.12 ± 2.34
- Simulated 10,000 DNA sequences from Markov chain and classified CpG islands using Bayesian classifier
- Programmed Python program capable of multi-dimensional K-means and Fuzzy K-means clustering
- Utilized Python to implement Needleman-Wunsch algorithm for pairwise protein-coding sequence alignment; Parsed FASTA files and determined optimal alignment of HoxA13 genes

ADDITIONAL INFORMATION

Technical Skills: MATLAB, R, Python, C++, Excel (DCF, Sensitivity Analysis), Word, PowerPoint
Languages/Dialects: English, Cantonese, Mandarin, Latin
Community Service: Rotary Club of Causeway Bay, The Neighborhood Advice-Action Council
Interests: Cryptocurrency Trading, Running (Half-Marathon: 1:33:16), Soccer (Arsenal F.C), Golf
Additional Courses: Digital Acumen (PwC), Economics for Capital Markets, Math for Capital Markets

Kevin D. Wu

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EDUCATION

Boston University, College of Engineering | Boston, MA *Expected May 2022*
*Bachelor of Science in **Biomedical Engineering***
GPA: 3.84; College of Engineering Dean's List (6 semesters)
Relevant Coursework: Device Diagnostics and Design, Clinical Applications of Biomedical Design, Introduction to Engineering Design, Business Technology Innovation, Strategy for Technology-Based Firms, Modern Controls in Biomedical Engineering, Biomedical Measurements
Study Abroad, Universidad Pontificia Comillas - ICAI | Madrid, Spain *Spring 2020*

EXPERIENCE

BU Department of Pathology and Laboratory Medicine | Boston, MA *May 2021 - September 2021*
Undergraduate Research Intern
- Conducted immunofluorescence staining on tissues to study effects of various therapeutic drugs on tumor size and T-cell proliferation via ImageJ and fluorescence microscopy

Boston University School of Medicine | Boston, MA *June 2019 - October 2019*
Department of Ophthalmology Undergraduate Research Intern
- Investigated and visualized endothelial cells within Glaucomatous eye samples via imaging software Reconstruct; generated 3D models of endothelial cells and giant vacuoles

SELECTED PROJECTS

Burst Pressure System for Surgical Adhesives, Draper Laboratory *September 2021 - Present*
- Developing testing apparatus to quantify and visually analyze burst pressure of surgical adhesives using standard protocols adhering to ASTM guidelines
- Generated scopes and needs of project through interpersonal communication with team members and Draper personnel; presented weekly updates to principal investigators regarding project

Emergency Narcan Dispenser System, Device Diagnostics and Design *Fall 2021*
- Prototyped and constructed Emergency Narcan Dispenser apparatus for innovating drug overdose treatment in public settings
- Created and tested proposed designs in Solidworks to improve user interface for treating overdose victim as efficiently as possible

Smart Rodent Trap, Introduction to Design *Fall 2019*
- Implemented micro-controllers for door locking mechanism and utilized 3D printing via CAD to construct Smart Rodent Trap components for maximizing cost efficiency; applied machining and design testing to optimize device performance

PUBLICATION

Contributed to *"Schlemm's Canal Endothelial Cell Dimensions in High Flow and Non-Flow Areas with Increasing Pressure"* under Boston University Undergraduate Research Opportunities. Boston University School of Medicine Department of Ophthalmology

SKILLS

Computational: MATLAB, Python, C-Programming
Software: Solidworks, Microsoft Suite (Word, PowerPoint, Excel), Arduino IDE, ImageJ, ReConstruct

LEADERSHIP & ACTIVITIES

BU BME Society, Member *September 2021 - Present*
BU Alpha Eta Mu Beta Engineering Society, Member *November 2020 - Present*
BURPG High Powered Rocketry, Member *September 2018 - May 2019*

Ziwen Xie

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https://www.linkedin.com/in/ziwen-xie-444663195/ | https://github.com/ziwen-xie | Personal Website: https://ziwenxie.com/

EDUCATION

Boston University College of Engineering Expected May 2022
Boston, MA
Bachelor of Science in **Biomedical Engineering**,
Bachelor of Science in **Computer Engineering**
Cumulative GPA: 3.47/4.00

Related Coursework:
Machine Learning, IoT, Computer Networking, CAD and Manufacturing Process, Optical Microscopy, Structure and Function of Extracellular Matrix, Protein Design

SELECTED PROJECTS

Multispectral 2D Imaging for Oxygen Saturation in Tumor Detection Sep 2021 - present

- Design an optimized method to perform two-dimensional SO2 mapping over a targeted superficial human tissue by collecting image data.

Engineering Molecular Binders to Prevent SARS-CoV-2 Spike Protein from Adopting a Conformation Competent to Bind its Human Receptor May 2021 - present

- Engineer molecular binders that block the Spike protein-ACE2 interaction in its receptor inaccessible (closed) form to prevent conformational change.

ComforTemp Jan 2020 - Feb 2020

- Prototyped an intelligent temperature control system to create a comfortable room environment.
- Wined several awards: Winner of TechTogther2020 **CBRE challenge** - Best Hack to build an efficient building with healthier indoor climates and user convenience; Winner of **Best IoT Hack.**

WORKING EXPERIENCE

Resident Assistant at Engineering Floor Aug 2020 - present
Boston University Residence Life

- Plan events regularly and prepare educational materials for 42 residents.
- Conduct administrative tasks for the Residence Life and build a healthy special community.

Grader Sep 2019 - Jun 2020
Boston University Math Department

- Performed grading of course homework and quizzes for Calculus for the Life and Social Sciences.

Market Researcher intern Mar 2019 - Jul 2019
iCareBetter Inc

- Analyzed market for iCareBetter, a platform for providers to deliver educational medical programs.

HONORS & AWARDS

Undergraduate Research Opportunity Summer 2021 Student Research Award
College of Art and Science Dean's List: 2018

SKILLS

Python, Java, C++, C, HTML, CSS, MATLAB, bash scripts, Latex, Markdown, WinForms, Android Studio, SolidWorks, Blender, Eagle, PyMol, ImageJ, Maestro, Firebase, Django, Word, Excel, PowerPoint, Adobe Photoshop, Adobe Premiere, Soldering, PCB Design, fast prototyping, Arduino, Raspberry Pi

LEADERSHIP & ACTIVITIES

Vice President of Hack Hardware 2022 Mar 2022 - present
Member of Boston University Chinese Student Scholar Association Sep 2021 - present

Huiyi Xiong

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Education

Biomedical Engineering Major (GPA: 3.81/4.0), Boston University Expected May 2022
College of Engineering, Bachelor of Science
Core Courses: Calculus, Linear Algebra, Probability, Statistics & Data Science, Principles of Molecular Cell Biology and Biotechnology, Intro to Nanotechnology, Biomedical Measurements, Data Science in R
Dean's list (Fall 2018, Spring 2019, Fall 2019, Fall 2020, Spring 2021)

Publication

Xiong Huiyi, First Author, COVID-19 Comorbidities: How do Underlying Hypertensive and Cardiovascular Conditions Affect the Prognosis and Therapies of COVID-19? (Manuscript No.: AJBYUENMEP).

- Accepted by 2022 International Conference on Health Big Data and Intelligent Healthcare (ICHIH 2022) in Sanya, China from Jan. 20, 2022 - Jan. 22, 2022, will be published on SPIE

Skills

Computer Skills: MATLAB, JMP (from SAS), Python, R, SQL, PyMOL, Maestro, MS Office Suite
Laboratory Skills: Colony PCR, Gel Electrophoresis, Microscopy, Cell Culture and Digestion, Western Blot, Immunofluorescence Staining, Protein Blocking, Animal Experimentation and Care

Lab Experience

Biology Lab Research assistant, J. Michael Bishop Institute of Cancer Research Jul 2020 - Aug 2020

- Cultured experimental cancer cells (MBC cell line) for 21 days and digested cells every 3 days for 70% density
- Explore how centrosomes' increase in cancer cells trigger polyploid formation
- Performed immunofluorescence by staining antibodies H3, Gamma tubulin, and DAPI to investigate effect of medicines C and MK on number of centrosomes in cancer cells
- Conducted serial dilution of test medicine on cancer cell metabolic activity
- Measured effect of different anticancer drugs on cancer cell metabolic activity by using MTT assay

Projects

Statistical Data Science for Public Health and Biomedicine Online Research Seminar Jun 2021 - Aug 2021

- Learned R programming skills to grasp statistical data analysis, exploratory and summary statistics, linear regression, time series analysis, and infectious disease modeling with applications to COVID-19
- Applied stepwise logistic regression method to estimate association between 10-year CHD risk and prevalent hypertensive, cigars per day, diabetes, BMI, and age using Framingham heart disease study datasets

Senior Design Project, Boston University Sep 2021 - May 2022

- Designed novel disruptors of SARS-CoV-2 viral spike protein function by targeting chaperone protein GRP78
- Reviewed published structural data and previous ligand-based and structure-based virtual screens of GRP78 to assess potential candidate ligands and characterize two potential binding sites for virtual screening
- Selected novel ligand libraries and accomplished virtual screens of target binding sites to identify potential molecules with favorable predicted binding affinity
- Optimized most promising molecules discovered by enhancing binding affinity and physicochemical properties

Working Experience

IQVIA Medical Consulting Intern, North Carolina Aug 2021 - Sep 2021

- Provided counseling to customers through analyzing third-party companies' information
- Assisted clinical supervisor in handling related affairs of clinical research and researchers' meetings
- Developed clinical trials for new products and monitored compliance procedure in clinical research
- Organized and prepared business communications with clearly structured and information intensive slides

Zhongkun Xue

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EDUCATION

Boston University College of Engineering | Boston, MA
Bachelor of Science in Biomedical Engineering Expected May 2022

- GPA: 3.46/4.00

Bunker Hill Community College | Boston, MA
Bachelor of Science in Biomedical Engineering Jun 2017 - Nov 2019

- Academic Excellence Award
- GPA: 3.86/4.00

RELEVANT COURSEWORK

MATLAB | Machine Learning | Signals & Control | Differential Equations | Probability & Statistics | Linear Algebra | System Physiology |

WORK AND EXPERIENCE

Nazarian Lab Laboratory Assistant | Harvard Medical School, Boston, MA Sep 2021 - May 2022

- Worked on a project aims to analyze how position of glenohumeral joint and loading on the RC tendons affect surface strain of tendons in cadaveric shoulder.
- Worked with digital image correlation and a shoulder testing system.
- Improved experiment efficiency 30% by solving bug of coding and designing a new data connection method.

VOLUNTEER EXPERIENCE

Peace Through Play | Boston, MA Sep 2016 - Dec 2016

- Teaching kids through utilization of educational games, crafts, and other learning mediums as an interactive teaching method emphasizes leadership skill-building, and self-identity awareness.

SKILLS AND CERTIFICATES

Software: C #, C++, MATLAB, LaTeX, Python, Autodesk Maya, AE Adobe
Laboratory: Data Analysis, Experimental Design, Microscopes, Genomic DNA extraction, Gel Electrophoresis, Bacterial Transformation, Transfection, Microscopy, Circuits, 3D printer
Languages: English, Mandarin

PROJECTS

Pulse Oximeter | Boston University May 2021 - July 2021

- Designed a new type of pulse oximeter with a waterproof function.
- Fabricate and assemble a prototype with SOLIDWORKS and 3D printer.

Hand-Eye Tool Jan 2019 - May 2019

- Developed a robot to calculate and recognize size and shape of front object and scale down to reproduce road conditions ahead through the Pin Art Board.
- Drafted components with Autodesk Maya.
- Efficiently organized and assigned various tasks as project leader.

Rohun Yarala

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EDUCATION

Boston University | Boston, MA — Expect to graduate in 2022 (summa cum laude)
B.S, Biomedical Engineering

- Member of MMEDIC: guaranteed acceptance to BU School of Medicine following graduation
- Relevant Coursework: Cell Biology, Biomedical Signals, Electric Circuits, Software Engineering, Data Science, Differential Equations, General & Organic Chemistry

Algonquin Regional High School | Northborough, MA — Graduated 2018

- Graduated in top 5% - National Merit Commended Scholar – National AP Scholar Award

EXPERIENCE

Human Neurobiology Lab | Boston University Medical Campus — January - July 2020
Research Assistant

- Identified and classified symptomatic behavior of atopic dermatitis in relation to neural excitation data for study looking to characterize potential relationship(s).
- Assessed movement patterns through IR scan analysis and machine learning algorithms

McLean Hospital - Neuroscience Lab | Belmont, MA — May - Aug 2019
Summer Intern

- Conducted transgenic mice research in an effort to understand hippocampal involvement in schizophrenic disease by assisting in brain tissue scanning, laser microdissection, and literature review.
- Gained experience with fundamental lab techniques such as agarose gel electrophoresis, protein and DNA extraction, PCR, and H & E staining.

Aphasia Research Lab | Boston University — Summer 2016 and 2017, Sep - May 2019
Research Intern

- Reprogrammed treatment delivery system in python with bilingual neuroimaging study team.
- Analyzed Aphasia patient scans to validate effectiveness of various imaging technologies
- Volunteered in Teens Teaching Technology to help patients learn to use basic devices such as tablets and smartphones in a comfortable one-on-one environment

ACADEMIC AND TECHNICAL PROJECTS

Senior Design Project | Synthera Health and Boston University — September - May 2022
Research Affiliate

- Collaborated with 3 other students to develop confidential point-of-care diagnostic technology
- Developed multi-analyte chemical detection technique through biochemical experiments
- Utilized MATLAB/Python to develop image analysis algorithm and smartphone app software

Other Academic Projects | Boston University Department of Engineering — January 2020 - May 2021

- Lead class project to create electromechanical, user-optimized liquid drug dispenser
- Lead group project to create user-specific, low-cost, heat therapy glove for arthritic patients using Arduino IDE software to communicate with heating and pressure elements

SKILLS

- MATLAB, Python, C, C++, Arduino, Image processing, and Microsoft Excel/Office proficiency.

Qin (Jackson) Ye

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314.755.6803 | qinye@bu.edu

Education

Boston University College of Engineering, Boston, MA
Expected May 2022
Bachelor of Science: Major in Biomedical Engineering
Cumulative GPA: 3.79/4.0
Honors/Awards: Magna Cum Laude (top 10% of class), Tau Beta Pi member (College of Engineering top 12.5%), Alpha Eta Mu Beta member (Biomedical Engineering Major top 5%), Bausch + Lomb Honorary Science Award, National Honor Society, BU College of Engineering Dean's List (Fall 2018, Fall 2019, Spring 2020, Fall 2020, Spring 2021)
Relevant Classes: Tissue Engineering, Computational Biology, Biomedical Measurement I&II, Device Diagnostics and Design, Programming for Engineers (MATLAB, C), Cellular Biology & Biotech, Fundamental Biomaterials, Systems Physiology, Transport Phenomena in Living Systems, Solid Biomechanics, Engineering Mechanics, Electric Circuits, Signals & Controls, Thermodynamics & Statistical Mechanics, Microfluidics, Engineering Design

Experiences & Projects

Digital Biopsy for Glomerular Ultrastructural Measurement, Boston, MA. **Sep 2021 – May 2022**
Researcher/Designer

- Develop a U-Net segmentation algorithm to automatic annotate glomerular membrane in TEM images and test its accuracy of predicted annotation by comparing with expert's annotation.
- Lead in designing an image processing algorithm to automate measuring foot process width and slit-diaphragm density along surmised glomerular membrane.
- Deploy algorithm as a web-based tool for researchers to expedite renal experimental analysis.

Glomerular Renal Disease Prediction Algorithm, Boston, MA **Sep 2021 – Dec 2021**
Researcher/Designer

- Developed an Expectation-Maximization Algorithm to model parameters of normal foot process cell's width and effaced cell's width.
- Created a classifier to distinguish normal and effaced cells using predicted parameters.
- Implemented reinforced learning to anticipate host's state (healthy or diseased) using the ratio between normal and effaced cells.

Emergency Narcan Dispenser System, Boston, MA **Sep 2021 – Dec 2021**
Designer

- Proposed a Naloxone dispenser system for users encounter overdosed victims in public area and communicates emergency service to victim's location.
- Constructed a working dispenser with temperature control, safety, and communication systems.

Dong Qiu Lab at Chinese Academy of Science, Beijing, China **Jun 2019 – Aug 2019**
Intern

- Cultivated biocompatible conductive hydrogel with various lab-specific polymers to produce a hydrogel capable of optimal cell recovery and elasticity.
- Assessed and approved lab products using a tensile strength tester resulting in reliable strength and conductivity of hydrogel.

Skills

Medical Imaging Skills: Image segmentation, spectroscopy, image processing, image filtering, spatial frequency domain analysis, noise cancelling, image data clustering and classifying
Wet Lab Skills: Cell culture preparation & exchange, cell counting, hydrogel production
Programming Skills: MATLAB, Python, C, SQL
Languages: Chinese (Native), English

Jasper Zeng

jaspzeng@bu.edu | (603) 443-3732 | Boston, MA

Education:

Boston University, College of Engineering - Boston, MA Expected 05/22
Degree- B.S. Biomedical Engineering

Coursework - Differential Equations, Matlab, Electronic Circuits, Physics, Engineering Mechanics, Engineering Design, Probability and Statistics, Organic Chemistry, Fundamentals and Principles of Tissue Engineering, Thermodynamics, Biomaterials

Skills:

- Computer: Matlab (intermediate), C++ (beginner), Excel (intermediate)
- Lab Experience: qPCR, DNA/RNA Extraction, Flow Cytometry, Western Blotting, pipetting, TLC Analysis, Recrystallization, NMR, Cell Culture

Projects:

Design an App | Programming for Engineers

- Collaborated with two other students to create an app using matlab's app designer
- App tracks and graphs a person's calorie intake over course of a day compared to amount needed per day
- Utilized database and excel to get data

Basilar Membrane Probe | Senior Design

- Collaborated with two other students and a professor to improve and design a probe to measure the basilar membrane stiffness of different species
- Programmed probe's horizontal and vertical motion with C++ and Matlab
- Utilized COMSOL and CAD to model and simulate probe motion
- Measured stiffness of gerbil basilar membranes with completed probe
- Performed statistical analysis on measurements to determine efficacy of constructed probe
- Aided teammates with tasks when able

Experience:

Covid Clinical Testing Lab - Boston, MA 10/21 - Present
Lab Technician

- Prepared samples and reagents using pipettes and other measurement tools
- Operate robots for Aliquoting, qPCR, and DNA/RNA extraction
- Cooperated with fourteen graduate students to process thousands of samples a day

Engineering Mechanics Grader - Boston, MA 01/20 - 12/20
Grader

- Graded homework and quizzes for 60+ students
- Coordinated with one other student and professor

Peking Tokyo - Lebanon, NH 12/14 - 01/18
Host

- Managed service and orders at front desk for hundreds of customers a day
- Placed in charge of training of two new employees at front desk

Jiaming (Ben) Zhang

318 Summit Ave, Brighton, MA, 02135 | (617-990-4975) |jiamingz@bu.edu

Education

Boston University College of Engineering — Boston, MA

Bachelor of Science — Expected May 2022

Biomedical Engineering Major Applied Statistics Minor

GPA: 3.41/4.0 Major GPA: 3.73

Skills

Lab skills: Gas chromatography, ultraviolet spectrometer, fluorescent microscope, gel electrophoresis, cell culture, extraction, PCR, TLC, pH and Conductivity Value Determination, Moisture content Determination Titration, UV/VIS

Coding skills: MATLAB, C++, python

Projects

Computational Model of Mechanical Homeostasis of Focal Adhesions (final year design) — Bos, MA

Researcher and reporter — Sep 2021 - present

- Constructing first automatic computational and quantitative mathematical model
- Employ Monte Carlo statistical model to simulate fluctuations of traction forces.
- Strategic planning Monte Carlo model to simulate experimental data obtained in focal adhesion level.
- Presenting focal adhesion simulations to predict tensional homeostasis at FA

Shenzhen Institutes of Advanced Technology Chinese Academy of Science — Shenzhen, CHN

Biology lab assistant — Jun - Aug 2020

- Directed postdoctoral teammates resolving technique problem within imaging machines
- Collaborated in training pre-testing drugs for mice central brain reactions
- Collected data for Cerebral embolism experiment, specifically for black mice group testing for behavior testing and huge mice behavior conclusion, correctness is around 95%
- Devised gel and pre-lab materials for Western Plot experiment to analyze condition of components in cerebral under imaging machine for 1000 cutting image machine

Static Trust Project — Boston, MA

Organizer and reporter — Jan - Apr 2019

- Designed, constructed, and tested a Truss bridge model according to specified dimensions. Developed designs and predicted points of failure using Win Truss computer application and MATLAB coding with other two teammates and did reporting in front of class.

Experience

Chongqing Zhifei Biological Products Co., Ltd — Chongqing, CHN

Process Transformation/ QA Engineer — May - Jul 2021

- Tested and fixed 18 different types of machine value for biochemical solutions used Tableau in 3 weeks and conducted 5 different sheets of excel including 2000 sets of data sets
- Improved industrial process within chemical solution production based on former laboratory documents and increased precision for 5%, letting precision increased to 90%

Juncheng Zhang

andyzjc@bu.edu | Boston, MA

EDUCATION

Boston University College of Engineering May 2022

Bachelor of Science In Biomedical Engineering

- Richard D. Cohen Scholarship
- 3.76 / 4.00 GPA

RESEARCH EXPERIENCE

BU Bio Optical & Acoustic Spectroscopy Lab Sep 2021 - Present

- Developed a MATLAB GUI for processing workflow of multi-photon images.
- Optimized algorithms for segmentation of capillaries and targeting red blood cell stalling events.
- Validated the stalling events and conducted algorithm accuracy analysis.

BU Growth Factor Mechanobiology Lab Sep 2019 - Jul 2021

- Explored Raman spectroscopy for diagnosing early-stage musculoskeletal degeneration.
- Developed enzymatic and mechanical models for early-stage osteoarthritis in animal species.
- Performed histological sectioning and H&E staining for cartilage specimens to cross-validate OA models with spectral data.

SELECTED PUBLICATIONS

- Kimberly Kroupa*, Man I Wu*, **Juncheng Zhang***, Magnus Jensen, Wei Wong, Brian D. Snyder, Mads S. Bergholt, Michael B. Albro. “Raman needle arthroscopy for in vivo molecular assessment of cartilage.” *Journal of Orthopaedic Research*. 2021

SELECTED CONFERENCE PRESENTATIONS

- **Juncheng Zhang**, Magnus Jensen, Mark W. Grinstaff, Thomas Schaer, Brian D. Snyder, Mads S. Bergholt, Michael B. Albro. “Raman Needle Arthroscopy for In Vivo Diagnostics of Musculoskeletal Connective Tissues.” *Annual Meeting of Orthopaedic Research Society.* 2021

- **Juncheng Zhang,** Magnus Jensen, Sedat Dogru, Hector Grande-Arriola, Mark W. Grinstaff, Brian D. Snyder, Mads S. Bergholt, Michael B. Albro. “Raman Plate Reader for Quantitative Molecular Monitoring of Live Cartilage Explants.” *Annual Meeting of Orthopaedic Research Society.* 2021

- **Juncheng Zhang**, Tianbai Wang, Magnus Jensen, Mark W. Grinstaff, Brian D. Snyder, Mads S. Bergholt, Michael B. Albro. “Raman Needle Arthroscopy Towards In Vivo Monitoring of Engineered Cartilage Growth.” *Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C).* 2021

SELECTED HONORS & AWARDS

- 2nd Place on SB3C BS-level Student Paper Competition 2021
- Distinguished Summer Research Fellowship 2020

SKILLS

Software: MATLAB, Python, C++, ImageJ, Pymol, Solidworks, GitHub, Figma, Latex, Arduino

Optics: Raman Spectroscopy, Confocal Microscopy, Multi-photon Microscopy, Near-infrared Spectroscopy, Magnetic Resonance Imaging, Computed Tomography

Laboratory: Bacterial/Cell/Tissue Culture, Paraffin Sectioning, H&E Staining, ELISA, qPCR, Plasmid/DNA Extraction, Strain/Stress Analysis, Gel-electrophoresis

Boston University College of Engineering
Department of Biomedical Engineering