<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Letter from the Director</td>
</tr>
<tr>
<td>6</td>
<td>At a Glance</td>
</tr>
<tr>
<td>8</td>
<td>Awards &amp; Achievements</td>
</tr>
<tr>
<td>10</td>
<td>Mission Statement</td>
</tr>
<tr>
<td>12</td>
<td>FY23 Highlights</td>
</tr>
<tr>
<td>14</td>
<td>Focused Research Programs</td>
</tr>
<tr>
<td>18</td>
<td>2023 Fellowships</td>
</tr>
<tr>
<td>20</td>
<td>Centers &amp; Initiatives</td>
</tr>
<tr>
<td>32</td>
<td>Marketing &amp; Communications</td>
</tr>
<tr>
<td>34</td>
<td>Awards</td>
</tr>
<tr>
<td>38</td>
<td>Looking Ahead</td>
</tr>
<tr>
<td>40</td>
<td>Leadership</td>
</tr>
<tr>
<td>48</td>
<td>Staff</td>
</tr>
<tr>
<td>53</td>
<td>Postdocs &amp; Visiting Scholars</td>
</tr>
<tr>
<td>54</td>
<td>Fellows</td>
</tr>
<tr>
<td>64</td>
<td>Hariri Institute Affiliates</td>
</tr>
<tr>
<td>74</td>
<td>Grant Highlights</td>
</tr>
<tr>
<td>76</td>
<td>Scholarly Work</td>
</tr>
<tr>
<td>80</td>
<td>Connect With Us!</td>
</tr>
</tbody>
</table>
I complete my first year as Director of the Hariri Institute for Computing and Computational Science & Engineering with deeper understanding of the complex research hub the Institute has become. I have been impressed by the many significant and impactful accomplishments of our multidisciplinary community, consisting of more than 400+ faculty affiliates and including thought leaders, problem solvers, scholars, and pioneers. They are leveraging the full power of computing, computational, and data-driven science and engineering to create new knowledge, solve hard problems, and create change on a national and international scale. Our community spans 66 departments and 13 schools and colleges. Such diversity underscores the significance of computing, and computational science and engineering in nearly every field, and highlights the Institute’s critical role in catalyzing cross-disciplinary collaborations. The Institute has been working hard toward achieving our mission of incubating and accelerating research convergence and integrated activities with social impact. I am happy to report that we have made significant progress.

Integrating the Center for Information & Systems Engineering (CISE)

The Center for Information & Systems Engineering (CISE) joined our federation of affiliated centers and initiatives and is now co-located with our new administrative offices in the new iconic Boston University Center for Computing & Data Sciences. CISE, a university-wide interdisciplinary research center, brings with it over 50 faculty and 100 doctoral student researchers, many of whom are actively engaged with Hariri Institute programs, such as the AI Research Initiative, the Center for Reliable Information Systems and Cyber Security (RISCS), and the Red Hat Collaboratory. With our complementary missions of advancing interdisciplinary research with societal impact, we look forward to deepening our collaborations for maximum impact.

Strengthening Industry Engagement

This year, we made progress in developing academic-industry partnerships to advance research, student opportunities and resources. Beginning early this year, the Robotics and Autonomous Systems Teaching and Innovation Center (RASTIC) is building its new home in a central Commonwealth Avenue location. RASTIC represents a $9-million initiative jointly funded by the Massachusetts Technology Collaborative and Boston University to support experiential learning by M.S. students in the College of Engineering’s Robotics & Autonomous Systems program. Twelve students completed external internships with industry, such as Amazon Robotics and Vicarious Surgical, in active collaboration with BU faculty. RASTIC also initiated a new partnership with Amazon Robotics that provides full tuition support, a housing allowance, and a guaranteed internship at Amazon Robotics to underrepresented minorities pursuing a master’s degree.

BU faculty and students have been interacting with industry practitioners working in open-source software communities through the Red Hat Collaboratory. Through this Hariri Institute Initiative, over $2.1 million was awarded to BU faculty and students to advance innovative research projects.

The Mass Open Cloud Alliance (MOC-A) held a two-day workshop in March that brought together its unique community of researchers, users, and industry to celebrate what has been accomplished and help define the MOC-A strategy moving forward. MOC-A is emerging as an important resource to support cloud computing and AI on demand, geared towards researchers and offering better alternatives to commercial cloud services or owning dedicated servers.

Greater Boston employers and the Boston Mayor’s Office of Women’s Advancement engaged with the Boston Women’s Workforce Council (BWWC), hosted at the Institute, and our own Software & Application Innovation Lab (SAIL) to kick off the 5th Gender and Racial Wage Gap Measurement effort. Employers are anonymously sharing payroll data with BWWC using a SAIL-developed Secure Multiparty Computation (MPC) application. This effort reflects a first-in-the-nation approach to providing a community snapshot of progress made toward closing gender and racial wage gaps in Greater Boston. The data collection program is the only effort in the nation that measures wage gaps using this innovative approach that guarantees the privacy of the data from each contributing company.

Faculty affiliates engaged with industry on a number of grant projects, including Lei Tian, Assistant Professor in Electrical
& Computer Engineering (ECE), who received a $1.3 million Samsung award for computational imaging research. David Starobinski, also a Professor in ECE and Systems Engineering, continued work with Microsoft-Affirmed Networks on data-driven optimization for 5G Mobile Edge Computing. Starobinski also received a renewal award to continue work for the Honda Research Institute in Europe on predicting product vulnerabilities.

**Focused Research Programs (FRPs) Combat Fake News**

The FRPs are the Institute’s signature mechanism to form and support large interdisciplinary teams of faculty, helping them coalesce around an important emerging topic with social impact, seek sponsored projects to support long-term research, and achieve national prominence. Two of our FY23 FRPs organized events to highlight the economic, political and behavioral implications of false narratives propagating across social media and how they continue to negatively affect society. Specifically, the Predicting and Preventing Epidemic to Pandemic Transitions FRP, funded with $1 million from the National Science Foundation (NSF), cosponsored with the Center for Emerging Infectious Diseases Policy & Research (CEID) a keynote address by the U.N. Under-Secretary-General for Global Communications Melissa Fleming. Fleming emphasized that the United Nations is combating mis- and disinformation in three areas: COVID-19, conflict, and climate change. The Data and Misinformation in an Era of Sustainability and Climate Change Crises FRP organized a full-day research symposium entitled “Taking on Climate Lies,” featuring state policy leaders, academic experts and a BU Deans’ panel that discussed these issues and potential solutions. For FY24, the Institute is investing more than $400K in four FRPs to focus on four diverse topics: modeling to aid a Mars exploration mission, algorithms for autonomous robotic systems in rehabilitation from disease and injuries, AI approaches for brain health and brain diseases, and AI modeling to support action that mitigates the health effects of climate change in urban areas that often lead to inequitable health outcomes.

**Data & Computing for Social Impact**

Hariri Institute researchers and staff continued to devote their energy to advancing research around topics of diversity, equity, and inclusion. Deaf studies scholar Naomi Caselli, Co-Director of the AI and Education Initiative and Assistant Professor at BU Wheelock College of Education & Human Development, received more than $670,000 from NIH to advance research in American Sign Language (ASL) vocabulary acquisition skills. For this project, Caselli’s team is using computer vision to take measurements of the recordings to determine how humans retrieve signs as they produce them.

Cara Stepp, a Research Fellow at the Hariri Institute and Professor in Speech, Language, and Hearing Sciences at BU College of Health & Rehabilitation Sciences: Sargent College, was awarded a new five-year, $3.5 million grant from NIH for a comprehensive, longitudinal study to ascertain the source of specific Parkinson’s-related speech problems. The groundbreaking research will provide a roadmap for future evidence-based treatment to improve speech clarity and quality of life for patients.

These are just a few examples of the transformative research happening at the Hariri Institute. I invite you to browse our website and follow up with me or any of the Hariri Institute’s Center and Initiative Directors or members of our growing community of Fellows and Faculty Affiliates.

**It Takes a Village**

All of this fascinating research and event organization would not have been possible without the fantastic support by our Institute staff. Their dedication, innovation, teamwork, and leadership are critical for core functions such as grant and project management, event organization, and publicizing faculty and student achievements through our website and social media platforms. You are welcome to contact the Hariri Institute’s administration with any questions about future research, events, or seminars.

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Ioannis (Yannis) Paschalidis

Director, Rafik B. Hariri Institute for Computing and Computational Science & Engineering

Distinguished Professor of Engineering, Department of Electrical and Computer Engineering, Division of Systems Engineering, and Department of Biomedical Engineering

Founding Professor, Faculty of Computing & Data Sciences

SAIL, developed an open-source database called ASL-LEX that has recordings of thousands of signs. Caselli’s team is using computer vision to take measurements of the recordings to determine how humans retrieve signs as they produce them.
HARIRI INSTITUTE AT A GLANCE

400+
Faculty Affiliates

66
Departments

13
Schools

2,980+
FY23 Publications

3.54k
Total Followers (+22.24%)
## FY23 Community Engagement & Promotion

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<td>Events</td>
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<td>Total Attendees</td>
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<tr>
<td>Social Media Reach</td>
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</table>
AWARDS AND ACHIEVEMENTS

$26 MILLION EXPENDITURE

HARIRI-LED GRANTS

19 NEW AWARDS

$11.4 MILLION

New FY23 Hariri-Led and Enabled Funding
Programs Funded (Hariri Institute Investments)

$465,459
Awarded to BU Faculty and Graduate Students

$60,000
Awarded to Junior Faculty Fellows

$370,459
Awarded Across Three Focused Research Programs

$35,000
Awarded to Graduate Student Fellows

Grant Highlights

PIPP Phase I: Predicting and Preventing Epidemic to Pandemic Transitions. National Science Foundation. $1 Million. Led by Yannis Paschalidis (ENG, FCDS)


Hardening Development Toolchains Against Emergent Execution Engines (HARDEN). DARPA subaward via Riverside Research Institute. Phase 1 $97,000; Contingent funding: $1 Million. Led at BU by Alley Stoughton (CAS).

Beverly Setzer (GSF 2020) won an NIH Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral Fellowship (F31) for neuroimaging research.
An incubator and convergence accelerator in a university setting, the Rafik B. Hariri Institute for Computing and Computational Science & Engineering initiates research convergence and accelerates integrated initiatives with social impact at the nexus of the computational and data sciences.

It achieves this mission by promoting discovery and innovations across a broad set of disciplines, inspired by challenges in engineering; social, health and management sciences; and the arts. Through the use of computational and data-driven approaches, diverse groups of faculty, students, and staff work together to transform research.
CONVERGE
COMPUTE
TRANSFORM
CISE Joins the Hariri Institute

CISE joined the Hariri Institute’s federation of centers and initiatives. Ayse Coskun was appointed CISE Director, taking the helm from Yannis Paschalidis who was appointed Hariri Institute Director. CISE brings with it 50+ faculty and 100+ student researchers as well as postdoctoral researchers and visiting scholars from nine different departments, divisions and academic units across Boston University.

Red Hat Collaboratory Research Incubation Awards

The Red Hat Collaboratory awarded 19 projects from BU faculty members and industry collaborators, totaling more than $2.1 million in funding. Additionally, four undergraduates received funding for open-source projects, totaling $31,000 that aim to improve the security, efficiency, and intelligence of computing systems.
Mass Open Cloud (MOC) Alliance

The MOC Alliance held a two-day workshop that featured over 70 speakers, 250 in-person attendees, and hundreds of virtual attendees, including 30 companies, 10 institutions of higher education, and multiple government agencies. Sessions covered research motivated by experience with a real cloud, the impact research has already had on upstream open source projects, and how some projects are starting to impact services that are part of the Alliance.

Software & Application Innovation Lab (SAIL)

SAIL embarked on a significant step towards enhancing their technical landscape – the implementation of advanced microservices. Microservices is a cutting-edge architectural and organizational approach to software development that makes applications easier to scale and faster to develop, fostering enhanced agility and accelerating time-to-market for new features. SAIL has developed microservices for authentication, file storage and permissioning, notification and data analytics, which have been used to empower many projects within their portfolio of work.
The Institute’s FRPs are designed to facilitate research convergence by providing ‘scaffolding’ for groups to coalesce in sustainable ways, with the goal of accelerating research for future funding and broader impact. Learn more about them:

**FY23 Focused Research Programs**

**Quantum Convergence**

The Quantum Convergence FRP is led by Andrei Ruckenstein, Professor and Chair of the Department of Physics. The goals are to launch broad conversations and collaborations across BU that reveal cross-cutting themes around quantum science and engineering, which will translate into competitive large-scale proposals and highlight and promote quantum research to the general public.

In FY23, this FRP held one workshop focusing on outreach initiatives with education leaders and industry partners. Event speakers included: Peter Love, Professor of Physics, Astronomy and Computer Science, Tufts University; Brian Swingle, Associate Professor of Physics, Brandeis University; and Alex Sushkov, Assistant Professor of Physics and Electrical and Computer Engineering, Boston University. Over 60 people attended.

Informal scientific discussions of relevant topics were also discussed at biweekly/weekly lunch meetings with Physics, Chemistry, Computer Science, and Engineering faculty. Additionally, a number of academic, training and outreach programs are under development.


**Predicting and Preventing Epidemic to Pandemic Transitions**

The Predicting and Preventing Epidemic to Pandemic Transitions FRP, funded by the National Science Foundation (NSF), is led by Yannis Paschalidis (BU ENG), Nahid Bhadelia (BU CEID), Eric Kolaczyk (McGill Math/Stats), Diane Joseph-McCarthy (BU BTEC, BME) and Jon Epstein (EcoHealth). The FRP goal is to develop a comprehensive strategy and the required science base for predicting and preventing future pandemics. This Phase I project will engage a large interdisciplinary team and a network of collaborators from EcoHealth Alliance to develop models that can identify location hot spots for pathogens that could cause an outbreak, detect disease anomalies in healthcare settings, predict patient outcomes, characterize pathogen spread, and determine best methods for response.

In collaboration with CEID, on Sept 30, the Institute hosted UN Under-Secretary-General for Global Communications Melissa Fleming for a keynote conversation focused on the evolving role of misinformation in the context of public health communications, including its role in pandemic preparedness and response.

This FRP organized a Distinguished Speaker Series entitled “Data-Driven Approaches to Prevent the Next Pandemic” that was cosponsored by School of Public Health Population Health Data Science Pro-
gram & CEID. Event speakers included Mark Lurie, Associate Professor of Epidemiology and Director of the International Health Institute, Brown University; John Drake, Regents’ Professor, Distinguished Research Professor, and Director of the Center for the Ecology of Infectious Diseases, University of Georgia; and Lauren Meyers, Cooley Centennial Professor and Director of the Center for Pandemic Decision Support, University of Texas at Austin. Over 100 people attended this speaker series.

A March 22 Distinguished Speaker Seminar was also cosponsored with the Faculty of Computing and Data Sciences featuring Andrew Stokes (SPH) and Yannis Paschalidis who presented on the topic of excess mortality as modeling methods for monitoring all-cause and cause-specific mortality during the Covid-19 pandemic.


**Data and Misinformation in an Era of Sustainability and Climate Change Crises**

The Data and Misinformation in an Era of Sustainability and Climate Change Crises FRP is led by Chris Wells (COM), Irena Vodenska (MET), and Sarah Fine (IGS Fellow). The program seeks to understand the nature, origins, spread, impacts, and possibilities of disarming disinformation about the climate issue in an effort to address the climate crisis. This FRP is jointly funded by the Hariri Institute and the Institute for Global Sustainability.

This year, this FRP organized a full-day research symposium on May 16 entitled “Taking on Climate Lies.” The event featured a keynote address by Massachusetts Deputy Climate Chief Jonathan Schrag, six BU faculty speakers from the College of Communications, College of Engineering and Metropolitan College. The event concluded with a BU Deans Panel that discussed university leadership on climate solutions through the lens of their respective areas. The hybrid event drew 174 registrants and was covered by The Brink and other media.

**Teaching Machines Human-Like Intelligence**

The goal of the Teaching Machines Human-Like Intelligence FRP is to create convergence around foundational research in artificial intelligence (AI) at BU through a year-long series of intensive discussions, working groups and seminars, with the ultimate goal of coalescing around research directions for future funding.

This FRP held one workshop entitled “Bridging AI and Disability,” which broadly explored directions for AI and user-driven frameworks for assistive and rehabilitative technologies. Event speakers included: Jose del R. Millan, Professor, The University of Texas at Austin; Patrick Carrington, Assistant Professor, Carnegie Mellon University; Sagib Shaikh, Software Engineering Manager and Project Lead for Seeing AI, Microsoft; and Maja Mataric, Distinguished Professor, University of Southern California. Over 80 people attended this workshop.
FY24 Focused Research Programs

**Novel Data Science and AI Approaches for Brain Health and Brain Disease**

Digital Health Initiative (DHI) Special Track: This FRP is led by Swathi Kiran (SAR), David Boas (ENG), Margrit Betke (CAS), and Prakash Ishwar (ENG). It brings together clinicians, neuroscientists, engineers, biostatisticians, and computer and data scientists with the objective of connecting methodologies with scientific questions related to detecting, preventing and treating brain disease. This program is cosponsored by the Hariri Institute for Computing, the School of Public Health and the Clinical & Translational Science Institute (CTSI).

**First Trip to Mars: How to Pack Light**

This FRP is led by Marianna Felici (CAS) and Paul Withers (CAS). Designed to support NASA’s plans to land humans on Mars in the 2030s, this FRP aims to produce novel software based on data from Mars orbiters and rovers to model the ionosphere, its impact on navigation systems, and engineer microbial communities capable of carbon sequestration and nutrients production.
Health Equity in the Wake of Continued Climate Change: Leveraging Big Data to Inform Action

This FRP is led by Gregory Wellenius (CAS) and Lucy Hutyra (CAS). The goal of this FRP is to provide the BU climate and health research community access to shared resources to accelerate research, innovation, and translation in this area. This program is jointly funded by the Hariri Institute for Computing and the Institute of Global Sustainability (IGS).

Optimal Bio-Inspired Design of Holistic Rehabilitation Systems

This FRP is led by Eshed Ohn-Bar (ENG) and Alex Olshesky (ENG). It focuses on developing theory-informed principles embedded into a lightweight and adaptable system to realize efficient, safe, and intuitive wearable robots for broad mobility assistance across users, tasks, environmental conditions, and disabilities.
HARIRI INSTITUTE FELLOWS

The Institute awarded $465,459 direct funding to faculty and doctoral students doing computational research across diverse disciplines. Six Junior Faculty Fellowships (JFFs) were awarded, bringing the community to 26 members. Seven Graduate Student Fellowships (GSFs) were awarded, bringing the community to 23 members.

2023 Graduate Student Fellows

**Courtney Aul**, Psychological and Brain Sciences. Aul is leveraging a background in neuroscience, psychology, and cognitive science to advance research in Parkinson’s disease.

**Margaret (Greta) Rauch**, History. Rauch’s work combines Chinese literature, religion, and technology to research the impact of belief systems on the development of literary and intellectual history.

**Edward Ruiz**, Genetics and Genomics. Ruiz is studying tissue and cancer biology in new ways that span multiple fields.

**Jack Vincent**, Biomedical Engineering. Vincent’s work examines how high-level motor centers in the mammalian brain shape the output of low-level pattern generating circuits in the brainstem.

**Connor Wagaman**, Computer Science. Wagaman’s research includes estimating network statistics and developing new algorithms and methodology for private analysis of social network data.

**Yixin (Amy) Zhang**, Biostatistics. Zhang is combining her background in public health and statistics with computational skills to explore social causes, such as disparities in healthcare.

**Zeying Zhu**, Electrical and Computer Engineering. Zhu is designing effective software-based telemetry solutions for high-volume network traffic in software network functions and microservices.
2023 Hariri Institute Junior Faculty Fellows

**Kayhan Batmanghelich**, Assistant Professor, Electrical and Computer Engineering and AIR Affiliate. Batmanghelich’s work includes developing methods and addressing critical challenges of machine learning to develop trustworthy AI for the healthcare domain.

**Bryan Plummer**, Assistant Professor, Computer Science and a core faculty member of the Artificial Intelligence Research (AIR) Initiative. Plummer’s work focuses on visual recognition scene understanding, interpretable machine learning, and understanding the relationship between vision and language.

**Xiaozhou Ruan**, Assistant Professor, Earth and Environment. Ruan’s work includes developing novel parameterizations of small-scale ocean physics into global climate models with far-reaching implications for modeling the Earth’s climate system.

**Chris Chao Su**, Assistant Professor, Emerging Media Studies. Su’s work focuses on social media analytics and political communication, with special emphasis on these dynamics in East Asia.

**Preeti Sunderaraman**, Assistant Professor, Neurology. Sunderaraman’s research leverages cognitive and functional assessments via state-of-the-art imaging and digital technologies, and examines how technology interacts with financial decision making and financial awareness.

**Adriana Tomic**, Assistant Professor, Microbiology and Biomedical Engineering. Tomic’s research focuses on understanding protective immune responses to viral infections and vaccines, demonstrating the potential of computational perspectives in infectious diseases research.
MOC Alliance

Software & Application Innovation Lab (SAIL)

Center for Computational Science

Center for Reliable Information Systems and Cyber Security

AI Research Initiative (AIR)
The goal of the AI and Education Initiative, jointly supported by the Hariri Institute and Wheelock College of Education & Human Development, is to pursue collaborative research opportunities at the nexus of AI and education, marking the beginning of a new frontier in applications of AI research. The group expanded by almost 50%, as it now includes 38 members from 9 departments across the university.

The Initiative led a college-wide discussion of how the field of education needs to respond to the widespread availability of large language models like ChatGPT. An Op-Ed was published in BU Today entitled, “With ChatGPT’s Arrival, Should Educators Be Mourning the End of the College Essay?” Relatedly, a representative from the initiative is the Provost’s Faculty Fellow for Academic Integrity in Undergraduate Affairs and they have been working to revisit the university policy on academic integrity.

In September 2023, Boston University formed a task force to study the potential and pitfalls of generative AI (such as ChatGPT) in research and education on campus. https://www.bu.edu/articles/2023/bu-forms-ai-task-force/

This year, faculty members won grants from the National Science Foundation (NSF) and National Institutes of Health and are excited to continue to build their capacity and research agenda collaboratively.

Naomi Caselli, Director of the AI and Education Initiative, and Assistant Professor of Deaf Studies at the Wheelock College of Education and Human Development worked to release two large datasets of American Sign Language vocabulary.

Along with these datasets, Caselli published benchmarks for isolated sign recognition technology that enables a computer to recognize a sign in a video. These datasets improve state of the art sign recognition accuracy by more than three times. One of the datasets was developed in collaboration with the Software & Application Innovation Lab (SAIL).

In January 2023, Derry Wijaya with Professors Naomi Caselli and Christina Dobbs published the much-discussed opinion piece “POV: With ChatGPT’s Arrival, Should Educators Be Mourning the End of the College Essay?” in BU Today.
The AIR Initiative is a cross-disciplinary research initiative focused on machine intelligence. It brings together researchers whose work aims to create intelligent systems that reliably make decisions, reason about data, and communicate with humans. This year, AIR core faculty members included: Professors Margrit Betke, Brian Kulis, Bryan Plummer, Kate Saenko, Venkatesh Saligrama, Stan Solaroff, and Derry Wijaya. Previous core member Research Professor Sarah Bargal left for a tenure-track Assistant Professor position at Georgetown University. Newly hired Computer Science Professor of the Practice Iddo Drori joined the core team during fall 2022. AIR currently has 12 affiliate members. This year, the AIR Initiative also welcomed Najoung Kim, Assistant Professor of Linguistics, and Kayhan Batmanghelich, Assistant Professor of Electrical and Computer Engineering, as new AIR affiliates.

Margrit Betke with AIR Affiliates Prakash Ishwar and Janusz Konrad collaborated with Swathi Kiran and Archana Venkataraman to develop AI models that predict a patient’s responsiveness to aphasia rehabilitation using a complex set of brain and behavioral markers. Their work has resulted in several publications, including an upcoming presentation at an international workshop on Computer Vision for Automated Medical Diagnosis.

The AI and Emerging Media team, including students Yanru Jiang and Stan (Sha) Lai, Professors Prakash Ishwar, Derry Wijaya, Margrit Betke, and former AIR Affiliate Lei Guo won the 2022 Top Method Paper Award for “Community Detection of the Framing Element Network: Proposing and Assessing a New Computational Framing Analysis Approach” at the 105th Conference of the Association for Education in Journalism and Mass Communication in Detroit, MI.

Donghyun Kim, co-advised by Kate Saenko and Stan Solaroff, and Ben Usman, advised by Kate Saenko, defended their AI PhD theses in 2022. PhD student Afra Feyza Akyürek, advised by Derry Wijaya, published on social biases in well-regarded international AI conferences on Natural Language Processing.

Four Distinguished Speaker events were held, drawing over 240 attendees. Speakers included: Serge Belongi, Visiting Professor of Computer Science at Cornell University and Head of the Danish Pioneer Centre for Artificial Intelligence at University of Copenhagen; Holly Rushmeier, John C. Malone Professor of Computer Science at Yale University; Octavia Camps, Professor of Electrical and Computer Engineering, Northeastern University; and David Jacobs, Professor, Department of Computer Science and UMIACS, University of Maryland. Weekly AIR meetings and “coffee hours” with faculty and students were also held, providing opportunities for research presentations and the sharing of ideas.
BWWC is a public-private partnership between the Boston Mayor’s Office and Greater Boston employers dedicated to closing gender and racial wage gaps. Employers sign the 100% Talent Compact pledging to assess if their organization has wage gaps and, if so, work toward closing them with our help.

Every two years the BWWC, in partnership with the Hariri Institute, collects and analyzes payroll data anonymously from its members to show a snapshot of the progress being made to close wage gaps. In 2021, the gap was 30¢. New metrics will be available in December 2023.

In FY23, the BWWC held four quarterly briefings for its members highlighting academic experts and practitioners in the field of gender equity as it relates to pay gaps.

- Professor Frank Dobbin, Department Chair of Sociology at Harvard University, shared his findings from research with 850 different companies regarding what does and does not work in diversity training.
- Lee Pelton, President of the Boston Foundation, a long time Compact Signer, spoke about his aim to make sure equity is channeled throughout all giving by the organization.
- Sallie Krawcheck, one of the most influential women on Wall Street and the founder of Ellevest, an investment group for women, charted the ways employers can help women in their workforce stay current in their investment choices.

Our spring event was held in conjunction with the Mayor’s Office of Women’s Advancement (MOWA) and featured a panel discussion with Compact Signers. Community residents were invited to hear the conversation as well as participate in a resource fair regarding opportunities at our member’s workplaces.

11 new organizations signed the 100% Talent Compact in FY23 bringing employees covered in the Greater Boston area to approximately 200,000.

Four quarterly briefings with academic experts and practitioners in the field of gender equity as it relates to pay gaps.
CCS serves as a conduit for collaborations between experimental researchers who are synthesizing and collecting real-world data and computational researchers with expertise in model building, simulation, and analysis.

This year, CSS participated in diverse research and community activities. CCS hosted five research visitors in various thematic areas, including computational biophysics, quantum science, and materials science. Each researcher presented an hour-long seminar and spent several days to a week interacting with CCS faculty affiliates and their research groups. CSS also sponsored a community symposium entitled “KeyesFest 2023 - StatMech Meets Data Science,” recognizing the contributions of Chemistry Professor Emeritus Tom Keyes to science and society. The symposium included 12 invited talks from academic and industry colleagues including NC State, Boston University, St. Joseph’s University, Broad Institute - Bioinformatics, University of Kentucky, Spectral Sciences Inc., Verisk - Atmosphere and Environment Research, GlaxoSmithKline - Clinical Bioinformatics, and Electronic Transactions Consultants.

CSS faculty were strongly engaged in the Quantum Convergence FRP, participating in bi-weekly meetings with researchers from chemistry, computer science, physics, and electrical and computer engineering, to develop a roadmap for collaborations in quantum science and engineering. CCS has committed matching funds to enable this endeavor. Additionally, CSS initiated a new community engagement initiative with the Chemical Theory and Computation Journal Club. Organized by students and postdoctoral associates, this club hosts in-depth monthly presentations on research papers of current interest to the community.
CISE is a research center of the College of Engineering and part of the Hariri Institute’s federation of centers and initiatives. Its mission is to deepen and broaden interdisciplinary research in the study and design of intelligent systems with broad societal applications. From concept and algorithms to implementation in software systems and hardware, CISE researchers engage in interdisciplinary and convergent research to advance the science and societal impact of intelligent systems. CISE research has made seminal contributions and impacted a plethora of application areas, from robotics and autonomy, energy systems, computer systems, and communication networks, to medical imaging, computational medicine, video surveillance, and bioinformatics.

With 52 faculty members, across three colleges and nine departments, and over 100 graduate students, CISE welcomes new affiliates based on their outstanding contributions in their research areas. In FY23, Mechanical Engineering Professors Tommaso Ranzani and Sheila Russo were invited to join the ranks of CISE. Talented faculty researchers and students received numerous awards such as NSF CAREER or Best Paper awards, and published over 300 scholarly papers.

CISE provides full grant administration support to help faculty achieve research goals. With 38+ proposal submissions, 60+ grant awards in conjunction with CISE and over 40 awarded CISE grants, research expenditure for FY23 resulted in $16M. This includes prestigious Red Hat Collaboratory Research Incubation Awards received by CISE affiliates as well as a $9 million grant for the BU Robotics and Autonomous Systems Teaching and Innovation Center (RASTIC). This grant will fund development of a state-of-the-art robotics lab and build a community of researchers and industry partners to advance hands-on student training in robotics, autonomous systems, and artificial intelligence.

To promote collaboration with external academic and industry researchers, CISE organized 27 seminars, including two cosponsored by the Hariri Institute. CISE also hosted three visiting researchers through its Resident Scholar Program. To support student development, the Center organized industry roundtables as well as the 9th annual CISE Graduate Student Workshop (CGSW), a day-long symposium where PhD students from diverse disciplines presented their original research. This year’s event was attended by over 200 faculty, students and alumni.

CISE CGSW 9.0 Awards Ceremony.
RISCs promotes and coordinates research and education in system reliability and information security.

This year, RISCs faculty advanced the state of technology in societies across the world, and influenced public policy and national regulations that govern how we use technology. RISCs faculty and students designed and developed a differentially private release of Israel’s National Registry of Live Births, received a new DARPA grant to apply formal methods and cryptographic reasoning to protect computer systems, provided responses to U.S. federal government requests for information on regulating AI and advancing privacy-enhancing technologies, and prepared a Congressional Responsible AI Training Workshop for staffers at the U.S. Senate.

Many of these contributions have been inspired or discussed within the BU Security Seminar, the Seminar on Practical Security, and the Cyber Alliance Seminar; all of which continue to be sponsored by RISCs.

One of the main activities of RISCs was the Quantum Collaborative initiative, spearheaded together with Andrei Ruckensten and others from physics, chemistry, and engineering. The Collaborative has gained significant traction, which resulted in seed funding from Hariri Institute, and subsequent additional funding, and a hiring initiative across BU. Additional grant proposals, including a Quantum-focused NRT proposal, and research projects have merged from this initiative.

Additionally, four Charles River Crypto Day events were organized with a total attendance of over 260. Speakers included researchers from Boston University, Columbia University; Massachusetts Institute of Technology, NTT Communications, University of California, Santa Barbara; University of California, Berkeley; University of Pennsylvania; University of Texas, Austin; University of Washington; and Weizmann Institute of Science. Event cosponsors included Harvard University, Massachusetts Institute of Technology, Microsoft, and Northeastern University.

Through these seminars and other discussions, RISCs faculty have established cross-disciplinary collaborations with BU researchers in CAS, CDS, COM, ENG, LAW, MED, MET, Pardee, Wheelock, and more. Finally, we are pleased to welcome Eran Tromer as a new faculty member at BU and to the RISCs community.
DHI focuses on the essential role digital technologies play in the health and wellness of populations, and the integration of these technologies into people’s lives and health systems. DHI projects span computing and data sciences, medical informatics, health behavior change, and healthcare delivery.

This year, a number of initiatives were organized that advance DHI goals, including funding for research programs, research talks, seminars, and a new pilot project of the Clinical & Translational Science Institute (CTSI) to support the work with TriNetX and Boston Medical Center (BMC) data to develop national excess mortality models.

A special funding call for proposals was announced for the FY24 DHI Focused Research Program, which is co-sponsored by the Hariri Institute, CTSI, and the School of Public Health. In November, an event was organized for researchers to learn about the proposal call and featured presentations from clinical and faculty researchers from Boston Medical Center, College of Engineering, Sargent College, and the School of Public Health. In May, it was announced that DHI FRP was awarded to Professors Swathi Kiran, David Boas, Margrit Betke and Prakash Ishwar who will lead research in novel data science and AI approaches for brain health and brain disease. Digital Health was also a theme in two other awarded FY24 FRPs focused on health equity and climate change, and bio-inspired design of holistic rehabilitation systems.

The new Machine Learning in Medicine (MLX) Seminar Series was also launched, and featured 21 research talks, including three hosted at BU as Director Esteemed Seminars. Speakers included: Fei Wang of Cornell University, Dani Basset of University of Pennsylvania, and Emre Kiciman of Microsoft Research. This hybrid seminar series year is coorganized with University of Pittsburgh, University of Pittsburgh Medical Center, and University of Toronto.

In June, the Institute cosponsored the Health Data Science Distinguished Speaker event featuring Rafael Irizarry, Professor and Chair of the Department of Data Science at the Dana-Farber Cancer Institute and Professor of Biostatistics at the Harvard T.H. Chan School of Public Health. This event was held on the Boston University Medical Campus and was cosponsored with the School of Public Health Population Health Data Science Program and Department of Biostatistics.

Yannis Paschalidis also hosted a Research on Tap event entitled “Artificial Intelligence for Biomedicine and Healthcare” event, which featured talks by Institute affiliates Margrit Betke, Mark Kramer, Kayhan Batmanghelich, Vijaya B. Kolachalama, Adriana Tomic, Daniel Segrè, Jixin Chen, Emma Lejeune, and Lei Tian.

Additionally, a number of papers were published funded by DHI, including a paper in Frontiers in Digital Health.

This research story was picked up by six outlets, including NSF News with quote from NSF Deputy Division Director for the Division of Information and Intelligent Systems (IIS) Wendy Nilsen.
The Mass Open Cloud (MOC), launched in 2013, has transformed into the MOC Alliance – a partnership between higher education, government, and industry to create an open production cloud which will provide domain researchers with predictable low-cost services while enabling innovation by a broad community of academic researchers and industry collaborators. The MOC Alliance supports and coordinates a set of interrelated projects, including production cloud services supported institutionally by BU and Harvard University, a national testbed for cloud researchers, the $20M Red Hat Collaboratory at BU, and a planned national center on cloud and datacenter-scale computing.

In March, the MOC Alliance organized its first in-person opportunity for the community to gather since the start of Covid. The two-day hybrid event featured over 70 speakers, 250 in-person attendees, hundreds of virtual attendees, including 30 companies, 10 institutions of higher education, and multiple government agencies.

Over the past year the MOC Alliance has continued to focus on enabling BU and Harvard University Research IT to offer production cloud services through the NERC (New England Research Cloud). Currently the NERC production services are used by the core MOC institutions, BU, Harvard, Northeastern, MIT and UMASS as well as Bentley, WPI, and URI. With an additional $1.34M of funding from the Massachusetts Technology Collaborative, a Donation from AMD, and a $3M hardware donation from Wayfair, we plan to expand the usage by other institutions and small businesses throughout the Commonwealth.

Orran Kriger was a 2023 recipient of the Excellence in Technology Transfer Award from Federal Laboratory Consortium for Technology Transfer for development of Keylime, an open-source software enabling organizations to secure sensitive cloud data that has been implemented as a core security component in the Mass Open Cloud (MOC) alliance.
Through BU and Red Hat’s $20 million expanded partnership, announced in 2021, the Red Hat Collaboratory seeks to create more trustworthy, reliable, scalable, self-operating, distributed, heterogeneous compute platforms that stretch from edge devices to cloud datacenters.

The Red Hat Collaboratory also enables innovative partnerships between academic researchers and open source communities. Collaboration in systems research at this scale can have a profound impact on society. Projects funded through the Red Hat Collaboratory Research Incubation Award are open source and focus on problems of distributed, operating, security, or network systems whose solutions show promise for advancing their fields and impacting the tech industry. This year, the Red Hat Collaboratory awarded 19 projects to BU faculty members and industry collaborators, totaling more than $2.1 million in funding.

The Red Hat Collaboratory funded Student Research Projects geared towards providing BU students with research and experiential learning opportunities that advance open source projects in cloud computing, systems engineering infrastructure, and security. Four undergraduates received funding for open-source projects, totaling $31 thousand, that aim to improve the security, efficiency, and intelligence of computing systems.

This year, project recipients of the Red Hat Collaboratory 2022 and 2023 Research Incubation Awards were recognized for excellence at preeminent research conferences, including “SREP: out-of-band sync of transaction pools for large-scale blockchains,” which received the Best Paper Award at the 2023 IEEE International Conference on Blockchain and Cryptocurrency (ICBC), and “CaT: coaching a teachable student,” which was selected as a Highlight Paper at the 2023 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR).

In December, colleagues moved to Collaboratory space in the new Center for Computing and Data Sciences Building. A unique aspect of the space is the CoDes research lab which provides the infrastructure and engineering foundation needed to support co-design-based specialized hardware research in areas such as Automation, Scalability, Tunability and Configurability, Features, Portability and Uniformity.

BU Professor and Red Hat Collaboratory Co-Director Orran Krieger on the cover of the May issue of Red Hat Research Quarterly with Paul Cormier, Chairman of Red Hat.
SAIL is the premier professional research, software engineering, and consulting lab within the Hariri Institute. SAIL acts as both a driver and a collaborative partner in the creation of cutting-edge solutions for the data-driven, computational, and software engineering aspects of research across the university and beyond. SAIL’s range of services includes full-stack web and mobile application development, code base refactoring and maintenance, software best-practice consulting, project and product management guidance, and assistance with proposal and grant writing to secure extramural funding for research projects.

This year, the SAIL team welcomed nine new staff members, including seven software engineers, one technical project manager, and Associate Director of Engineering Greg Frasco, a former SAIL software engineer (2016-2018). This new SAIL team launched over a dozen new projects with faculty members such as Hank Fien, Preeti Sunderaraman, Andrey Fradkin, Tesary Lin, Nathan Jones, Ting Fang Alvin Ang, Michael Dietze, Brian Cleary and more, while providing meaningful contributions to the research of their long-term faculty collaborators, including Naomi Caselli, Mayank Varia, David Boas, and Magrit Betke.

A major area of expansion for SAIL was in the biomedical space. SAIL was instrumental in developing the COVID testing lab at BU. Now that testing has subsided, SAIL is working with Doug Densmore and the DAMP Lab staff to provide innovative software that will help address vital synthetic biology-related research challenges. Under the guidance of Greg Frasco, SAIL initiated implementation of microservices. SAIL also collaborated with the Boston Women’s Workforce Council (BWWC) to launch the 5th Gender and Racial Wage Gap Measurement effort with the SAIL team’s web-based deployment of Secure Multiparty Computation (MPC), enabling employers in Greater Boston to share aggregated payroll data anonymously with the BWWC to track progress.

SAIL was awarded a Shipley Center for Digital Learning and Innovation award to pilot the SAIL Microservices And Software Tools (MAST) program for BU students interested in developing microservices and software tools for university research. In collaboration with BU SPARK!, SAIL will provide project-based learning, enabling students to gain experience testing and deploying software, which they could leverage in coursework, senior capstones, undergraduate research, and future professional careers.

SAIL conducted technical, hands-on API development and Machine Learning workshops for 10 high school students served by BU’s Upward Bound Math Science program.
Best of The Brink 2022: BU’s Most-Read Science and Research Stories

Five of The Brink’s Top 10 most-read science and research stories of 2022 featured work or commentary from the Hariri Institute community.

Red Hat Collaboratory Featured in Red Hat Research Quarterly

The May 2023 issue of Red Hat Research Quarterly featured a cover story on how Red Hat Chairman Paul Cormier and Orran Krieger (ECE) helped spearhead a collaborative partnership between the two institutions.

NSF News Publishes Institute Research Story

National Science Foundation published a feature article (Aug 2022) originating from the Institute-authored article, “Could a computer diagnose Alzheimer’s disease and dementia?”

30 Science Stories
25 Bylined by the Hariri Institute
As the research hub within BU’s universe of computing and data science programs and initiatives, the Institute organized a diverse array of events designed to facilitate connection, collaboration, and the sharing of ideas across our dynamic multidisciplinary community. Over 100 events drawing well over 5,000 attendees were organized or cosponsored.

With CISE, the Institute hosted a Director Esteemed Seminar featuring Elad Hazan, Professor of Computer Science, Princeton University who presented an emerging paradigm in differentiable reinforcement learning called “online nonstochastic control.” CISE and Hariri Institute also coorganized a seminar led by Michael Milford of Queensland University of Technology spoke on Machine and Natural Learning of Spatial Intelligence in Robots and Animals.

In collaboration with the Faculty of Computing and Data Sciences, the Institute cosponsored a Tech Together Hackathon with BU Spark! on Oct 29-Oct 30.

Yannis Paschalidis organized a Research on Tap entitled "Robotics and Autonomous Systems" on Feb. 8th.

Speakers included faculty researchers from the College of Engineering and the College of Health and Rehabilitation Sciences: Sargent College, including Christos Cassandras (ECE, SE), Calin Belta (ME, ECE, SE), Roberto Tron (ME, SE), Wenchao Li (ECE, SE), Alyssa Pierson (ME, SE), Douglas Holmes (ME, MSE), Lou Award (PT), Eshed Ohn-Bar (ECE), Andrew Sabelhaus (ME), Tom Ranzani (ME, MSE, BME), Sean Anderson (ME, SE).

Graduate Student Fellows organized a Did You Know Series on April 16 with featured speaker Wayne Gilmore, Director of Research Computing Information Services & Technology, who shared how BU’s Research Computing Services can assist faculty and student researchers with computational needs.

The Institute also supported Data Science Mentoring Circles events including: Assessing a Company’s Financial Health (Feb 23), Salary Negotiation Workshop (March 2), and Speed Dating with Mentors (Oct 22). The Institute also led a student tour on May 10th for affiliated faculty of Wheelock College.
2023 HARIRI INSTITUTE COMMUNITY RECOGNITION AWARDS

This year, we initiated Community Recognition Awards to recognize Hariri Institute personnel whose contributions have been instrumental in helping to bring success to their team and to our organization. This program also aims to raise awareness of the important work that transpires, at all levels, within the Institute and broaden understanding of how personnel efforts help advance the Institute's mission. Award recipients were selected through voting by the community. The 2023 winners include:
Distinguished Service Award

Recipient: Stephen Brown, Director, Finance & Administration, Hariri Institute

Finalists: Emily Johnson, Assistant Director, Grants Management, Hariri Institute, and William Tomlinson, Director, Software & Application Innovation Lab (SAIL)

Student Excellence Award

Chris Cho, Senior, Computer Science; Software Engineer Intern, Software & Application Innovation Lab (SAIL)

Julie Ha, PhD Student, Computer Science; Graduate Research Assistant, Faculty Advisor: Mayank Varia

Excellence in Service Award

Tara Moran, Senior Administrative Coordinator, Mass Open Cloud – Alliance

Christina Polyzos, Associate Director, Center for Information and Systems Engineering

Innovation Award

Collin Bolles, Software Engineer, SAIL

Mayank Varia, Associate Professor, Faculty of Computing and Data Sciences

Diversity, Equity and Inclusion (DEI) Award

Katherine D'Angelo, Assistant Director, Programs and Events, Hariri Institute

Team Player Award

Daniela Demaestri, Financial Manager, Hariri Institute
Faculty Promotions

Professor
Jennifer Balakrishnan, CAS, Mathematics & Statistics
Taylor Boas, CAS, Political Science
Tereasa Brainerd, CAS, Astronomy
Theresa Ellis, Sargent, Physical Therapy
Jennifer Greif Green, Wheelock, Teaching & Learning, Special Education
Kate Saenko, CAS, Computer Science
Konstantinos Spiliopoulos, CAS, Mathematics & Statistics
Paul Withers, CAS, Astronomy

Associate Professor
Louis Awad, Sargent, Physical Therapy
Andrew Bell, CAS, Earth & Environment
Jacob Bor, SPH, Global Health
Anushya Chandran, CAS, Physics
Elaine Nsoesie, SPH, Global Health
Noora Lori, Pardee, International Relations
Gianluca Stringhini, ENG, Electrical & Computer Engineering
Roberto Tron, ENG, Mechanical Engineering

Honors & Appointments
Ayse Coskun was named Interim Associate Dean for Research and Faculty Development (ENG).
Juliet Floyd was named the Gordon Parker Bowne Professor of Philosophy, and appointed incoming Director of the Center for the Humanities (CAS).
Tesary Lin was selected the Isabel Anderson Career Development Professor (Questrom School of Business).

Faculty Awards
Debbie Cheng was elected a Fellow of the American Statistical Association (ASA).
Lou Chitkushev was awarded a Fulbright Specialist Foreign Scholarship.
Alice Cronin-Golom received the Society of Neuroscience Bernice Grafstein Award for Outstanding Accomplishments in Promotion and Mentoring of Women in Neuroscience.
Chunanfei Dong received a Department of Energy (DOE) Early Career Research Award.
Mary Dunlop was elected a Fellow of American Institute for Medical and Biological Engineering (AIMBE).
Juliet Floyd was awarded the Fall 2022 Lecture in Criticism, October 27, 2022.
Stephen Grossberg won the 2022 PROSE Book Award in Neuroscience of the Association of American Publishers for his Magnum Opus: CONSCIOUS MIND, RESONANT BRAIN: HOW EACH BRAIN MAKES A MIND.
Orran Kriger was a 2023 recipient of the Excellence in Technology Transfer Award from Federal Lab-
Dan Li received the Timothy Oke Award from the International Association for Urban Climate for Original Research in the Field of Urban Climatology.

Renato Mancuso received a National Science Foundation (NSF) CAREER Award.

Hadi Nia received a National Science Foundation (NSF) CAREER Award.

Yannis Paschalidis was elected a Fellow of the International Federation of Automatic Control (IFAC).

Yannis Paschalidis received the 2023 College of Engineering Faculty Service Award.

Alyssa Pierson received a National Science Foundation (NSF) CAREER Award.

Alyssa Pierson received the MassRobotics Rising Star Award.

Katya Ravid was elected a Fellow of the American Heart Association (FAHA).

Lei Tian was selected a Fellow of the Scialog: Advancing Biomedical Imaging (ABI).

Courtney Aul (GSF 2023), advised by Alice Cronin-Golomb, was awarded a Sigma Xi Grant in Aid of Research (GIAR) to support the project “Visual Sustained Attention Fluctuations in Parkinson’s Disease”.

Beverly Setzer (GSF 2020), advised by Laura Lewis, received the Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral Fellowship (F31) from the National Institute of Health for her proposal titled “Advanced neuroimaging of arousal state transition network dynamics in the human brain.”

Hasini Weerathunge (GSF 2020), advised by Cara Stepp, received The American Speech-Language-Hearing Foundation (ASHFoundation) New Century Scholars Doctoral Scholarship. Weerathunge also received the 2022 Biomedical Engineering Department’s Best First-Author Paper Award by a graduate student for her work published in PLOS Computational Biology.

Rashmi Agrawal, advised by Ajay Joshi, received Second Place at the Workshop for Women in Hardware and Systems Security (WISE) 2022 for “Affordable and Practical Acceleration of CKKS-based Fully Homomorphic Encryption”.

Angela Castronuovo, advised by Gianluca Stringhini, received ECE’s best MS Project award for “Tracking the Evolution of Android Malware.”

Sadullah Canakci, advised by Ajay Joshi and Manuel Egele, received the Best Paper Award at IEEE International Symposium on Hardware Oriented Security and Trust (HOST) for PhD work and paper “ProcessorFuzz: Processor Fuzzing with Control and Status Registers Guidance.”

Max Cohen, advised by Calin Belta, received the 2023 ME Outstanding PhD Dissertation Award for his work “Online Learning-based Control of Safety-Critical Systems.”

William Krska, advised by Vivek Goyal, received the 2023 ECE Undergraduate Outstanding Research award for his IEEE ICCP paper Double Your Corners, Double Your Fun: The Doorway Camera. doi: 10.1109/ICCP54855.2022.9887738.

Sheila Seidel, advised by Vivek Goyal, received an inaugural ECE Doctoral Achievement Award 2023 for her mentorship and dissertation work “Edge-Resolved Non-line-of-sight Imaging”.

Shahabeddin Sotudian, advised by Yannis Paschalidis, received the 2023 SE Outstanding Dissertation Award for his work, “Robust Learning to Rank Models and their Biomedical Applications”.

Zihao Yuan, advised by Ayse Coskun, received the 2023 ECE Outstanding PhD Dissertation Award for work “Modeling and Optimization of Emerging On-Chip Cooling Technologies via Machine Learning.”
In 2023, the Institute made important progress on advancing research convergence and integrated initiatives. The Institute will continue to advance its goal of elevating Boston University’s data science and computing research to national prominence, and strengthening its position as the research hub within BU’s universe of programs and initiatives that intersect with computing and computational science and engineering.

Our strategic priorities are:

1. Retain and Robustify Institute Focused Research Programs

We will seek to expand the circle of experts and research leaders from whom we obtain feedback regarding proposed programs. Working with BU in DC, we want to make FRPs more predictive than reactive, identifying areas where there are strengths at BU, emerging research leaders, and good prospects for future sponsored projects. For the first time, and as we are forming and growing an industry advisory board, we will seek input from our board on areas we should be investing.

2. Establish an Industry Advisory Board

Building on our current industry engagement through MOC-A and the Red Hat Collaboratory, we will expand our industry engagement by establishing an Industry Advisory Board. The board will identify opportunities for collaboration, provide internship and employment opportunities for our students, and guide initiation of research engagements with faculty and their research teams. Board members will also serve as ambassadors of the Institute, expanding its visibility beyond the confines of academia.

3. Strengthen and Expand Hariri Institute Services

The Institute promotes research advances and collaborations through its service function. From SAIL support to PIs, to funding and incubation support to FRPs, grant financial management, and the programs to support Junior Faculty Fellows and Graduate Student Fellows, the Institute is focused on providing goal-oriented services, programs and resources to our community. We will continue to maintain and improve the services that we provide. An area of focus is providing SAIL engineering support to junior faculty and faculty from non-STEM fields who lack resources to achieve their research goals.
The Hariri Institute for Computing is a federation of centers, labs, and initiatives. Our leadership team consists of the Directors or Co-Directors of each federated area, plus the Institute’s Director. Each of these leaders serves on the Institute’s Steering Committee in an ex-officio capacity.

IOANNIS PASchalidis

Director, Hariri Institute for Computing and Computational Science & Engineering
KATE SAENKO
Co-Director, Artificial Intelligence Research (AIR) Initiative

MARGRIT BETKE
Co-Director, Artificial Intelligence Research (AIR) Initiative

HUGH BROCK
Co-Director, Red Hat Collaboratory

ORRAN KRIEGER
Co-Director, Red Hat Collaboratory
Director, MOC Alliance
WILLIAM TOMLINSON
Director, Software & Application Innovation Lab (SAIL)
Co-Director, Center for Reliable Information Systems & Cyber Security (RISCS)

KIM BORMAN
Executive Director, Boston Women’s Workforce Council (BWWC)

RAN CANETTI
Co-Director, Center for Reliable Information Systems & Cyber Security (RISCS)

MAYANK VARIA
Co-Director, Center for Reliable Information Systems & Cyber Security (RISCS)
Members of the Institute’s Steering Committee are appointed by the Office of Research to assist the Director with overall strategic planning and management of the Institute’s operations. Members assist in reviewing ongoing activities, identifying and evaluating opportunities for investment of resources, developing proposals for new programs or initiatives, communicating the Institute’s vision, and promoting its goals to the constituents they represent.
Hugh Brock  
Co-Director, Red Hat Collaboratory

Ran Canetti  
Professor, Computer Science, CAS, Faculty of Computing & Data Sciences

Naomi Caselli  
Assistant Professor, Wheelock, Deaf Studies

David Coker  
Professor, Chemistry, CAS, Faculty of Computing & Data Sciences

Ayse Coskun  
Professor, ECE, SE, ENG, Director, CISE

Ziba Cranmer  
Director, BU SPARK!

Michael Dietze  
Professor, Earth and Environment, CAS

Cathie Jo Martin  
Professor, Political Science, CAS

Swathi Kiran  
Professor, Speech, Language, and Hearing Sciences, SAR, Faculty of Computing & Data Sciences
Orran Krieger  
Professor, Electrical & Computer Engineering, ENG

Loretta Lees  
Professor, CAS, Sociology; Director of the Initiative on Cities

Elaine Nsoesie  
Associate Professor, Global Health, SPH

Ioannis Paschalidis  
Distinguished Professor, ENG, ECE, BME, SE, Faculty of Computing & Data Sciences

Emily Ryan  
Associate Professor, ME, MSE, ENG, Faculty of Computing & Data Sciences

Kate Saenke  
Professor, Computer Science, CAS, Faculty of Computing & Data Sciences Science, CAS

Tracy Schroeder  
Vice President, Information Services & Technology

Benjamin Sovacool  
Professor, Earth & Environment, CAS; Director, IGS

Cara Stepp  
Professor, SLHS, Sargent College; Director, Sensorimotor Rehabilitation Engineering Lab
William Tomlinson
Director, SAIL

Mayank Varia
Associate Professor, Faculty of Computing & Data Sciences

Laura White
Professor, Biostatistics, SPH

Derry Wijaya
Assistant Professor, Computer Science, CAS

Wesley Wildman
Professor, Philosophy, Theology, and Ethics, STH, Faculty of Computing & Data Sciences
ADMINISTRATIVE TEAMS

The Hariri Institute has assembled a team of talented and dedicated professionals to help researchers make connections, identify additional support resources, and lift the burden of administrative support, so that more research is accomplished with far fewer barriers.

The Institute’s administrative staff provide program and project management, grant administration, event planning, communications support, and more.

Katherine D’Angelo
Assistant Director, Programs & Events, Hariri Institute

Daniela Demaestri
Financial Manager, Hariri Institute

Emily Johnson
Associate Director, Research Administration, Hariri Institute

Jennifer McDonough
Senior Administrative Coordinator, Hariri Institute

Maureen Stanton
Assistant Director, Marketing & Communications, Hariri Institute

Kenneth Rudolph
Marketing Communications Specialist, Hariri Institute

Stephen Brown
Executive Director, Hariri Institute
Christina Polyzos
Associate Director, CISE

Amy Hayward
Grants Administrator, CISE

Lea Sabra
Marketing Communications Specialist, CISE

MOC Alliance

Nancy Clinton
Managing Director, MOC Alliance

Tara Moran
Senior Administrative Coordinator, MOC Alliance

BWWC

Lauren Noonan
Marketing and Events Manager, Boston Women’s Workforce Council
SAIL consists of a small team of professional software architects and developers who are assigned to work directly with faculty members (and their research teams) on specific software and application development projects. Additionally, these professional software engineers supervise a team of BU student interns through the SAIL Internship Program. Professional SAIL staff act as the clearing house for software developed by students, thus allowing the research community to leverage the untapped software development capacity of undergraduate and graduate students at BU, while ensuring project continuity.

SAIL ENGINEERS

William Tomlinson
Director, SAIL

Jeff Simeon
 Associate Director, Programs & Product Management, SAIL

Greg Frasco
 Associate Director of Engineering, SAIL

Collin Bolles
Software Engineer, SAIL

Justin Chen
Professor

Hazim Ab Halim
Software Engineer, SAIL
Manny Akosah  
Software Engineer, SAIL

Zoe Chitty  
Software Engineer, SAIL

Karina Hickman  
Technical Project Associate, SAIL

Harunobu Ishii  
Software Engineer, SAIL

Shashank Karthikeyan  
Software Engineer, SAIL

Asad Malik  
Software Engineer, SAIL

Arezoo Sadeghi  
Senior Software Engineer, SAIL

Wenhan Wang  
Software Engineer, SAIL
MOC ALLIANCE TEAM

Michael Daitzman
Director of Engineering and Product

Joachim Weyl
Technical Project Manager

Naved Ansari
Senior Software Engineer

Lars Kellogg-Stedman
Senior Principal Software Developer

Kristi Nikolla
Senior Software Engineer

Hakan Saplakoglu
Software Engineer
Postdoctoral Research Associates have recently earned a PhD from Boston University or other institutions. They are currently collaborating with faculty researchers and other PhD students on projects at the Hariri Institute.

Visiting Scholars are scholars from other institutions spending time at the Hariri Institute in collaborative research endeavors.

Venkitesh Ayyar, Postdoc, Center for Computational Science
Han Dong, Postdoc, Hariri Institute
Cody Freitag, Postdoc, RISCS
Alexander Hino, Postdoc, Center for Computational Science
Marcel Neunhoeffer, Postdoc, RISCS

Maryam Aliakarpour, Visiting Researcher, Hariri Institute
Seyedmohammadhadi Daneshmand, Visiting Researcher, Hariri Institute
Heidi Dempsey, Visiting Researcher, MOC Alliance
Peter Desnoyers, Visiting Researcher, MOC Alliance
Abishek Pratap, Visiting Researcher, Hariri Institute
Larry Woodman, Visiting Researcher, MOC Alliance
Larry Rudolph, Visiting Researcher, MOC Alliance
Our Junior Faculty Fellows program aims to both recognize outstanding early-career computing and data-driven researchers at Boston University and support their continued development by connecting them with one another and with the Institute community at large through various mechanisms and activities. Junior Faculty Fellows are early-career faculty researchers who are selected for a three-year appointment.

**Junior Faculty Fellows**

- **Gerdus Benade**, Assistant Professor, Information Systems, QST, 2020
- **Andrey Fradkin**, Dean’s Research Scholar, Assistant Professor, Marketing, QST, 2020
- **Jonathan Huggins**, Assistant Professor, Mathematics & Statistics, CAS, 2020
- **Emma Lejeune**, Assistant Professor, Mechanical Engineering, ENG, 2020
- **Elaine Nsoesie**, Assistant Professor, Global Health, SPH, 2020
- **Chris Wells**, Associate Professor, Journalism, COM, 2020
- **Ana Fiszbein**, Assistant Professor, Biology, CAS, 2021
- **Scott Hirst**, Associate Professor, Law, LAW, 2021
- **Jihye Jeon**, Assistant Professor Economics, CAS, 2021
- **Garrett Johnson**, Assistant Professor, Marketing, QST, 2021
- **Laura Lewis**, Assistant Professor, Biomedical Engineering, ENG, 2021
- **Eshed Ohn-Bar**, Assistant Professor, Electrical & Computer Engineering, ENG, 2021
- **Prasad Patil**, Assistant Professor, Biostatistics, SPH, 2021
- **Jonathan Jay**, Assistant Professor, Community Health Science, SPH, 2022
- **Tesary Lin**, Assistant Professor, Marketing, QST, 2022
- **Yuhei Miyauchi**, Assistant Professor, Economics, CAS, 2022
- **Shariq Mohammed**, Assistant Professor, Biostatistics, SPH, 2022
- **Max Reppen**, Assistant Professor, Finance, QST, 2022
- **Jinglong Zhao**, Assistant Professor, Operations & Technology Mgt, QST, 2022
- **Kayhan Batmanghelich**, Assistant Professor, Electrical & Computer Engineering, ENG, 2023
- **Bryan Plummer**, Assistant Professor, Computer Science, CAS, 2023
- **Xiaozhou Ruan**, Assistant Professor, Earth & Environment, CAS, 2023
- **Chris Chao Su**, Assistant Professor, Emerging Media Studies, COM, 2023
- **Preeti Sunderaraman**, Assistant Professor, Neurology, CAMED, 2023
- **Adriana Tomic**, Assistant Professor, Biomedical Engineering and Virology, Immunology & Microbiology, ENG, 2023
Our Graduate Student Fellows program recognizes outstanding PhD students who are pursuing computing and data-driven research at Boston University. These fellows have a three-year appointment.

**GRADUATE STUDENT FELLOWS**

Sheng Huang, PhD Student, Astronomy, CAS, 2020

Anil Kag, PhD Student, Electrical & Computer Engineering, ENG, 2020

Yunzhe Li, PhD Student, Electrical & Computer Engineering, ENG, 2020

Beverly Setzer, PhD Student, Computational Neuroscience, CAS, 2020

Liang Wang, PhD Student, Earth and Environment, CAS, 2020

Hasini Weerathunge, PhD Student, Biomedical Engineering, ENG, 2020

Si Wu, PhD Student, Political Science, CAS, 2020

Afra Feyza Akyurek, PhD Student, Computer Science, CAS, 2021

Munib Hasnain, PhD Student, Biomedical Engineering, ENG, 2021

Chen Ling, PhD Student, Computer Engineering, ENG, 2021

Devlin Moyer, PhD Student, Interdisciplinary Programs, Bioinformatics, 2021

Adam Samuels, PhD Student, Astronomy, CAS, 2021

Adrianna Spindle-Jackson, PhD Student, Social Work, SSW, 2021

Hao Wang, PhD Student, Electrical & Computer Engineering, ENG, 2021

Jianing Wang, PhD Student, Interdisciplinary Programs, Biostatistics, 2021

Daria Dragicevic, PhD Student, Speech, Language & Hearing Sciences, Sargent, 2022

Anqi Guo, PhD Student, Electronic & Computer Engineering, ENG, 2022

Hiba Kobeissi, PhD Student, Mechanical Engineering, ENG, 2022

Chika Onubogu, PhD Student, Astronomy, CAS, 2022

Michael Silverstein, PhD Student, Interdisciplinary Programs, Bioinformatics, 2022

Olivia Wyatt, PhD Student, Counseling Psychology & Applied Human Development, Wheelock, 2022

Lingyi Xu, PhD Student, Computing & Data Sciences, CDS, 2022

Courtney Aul, PhD Student, Psychological and Brain Sciences, CAS, 2023

Margaret (Greta) Rauch, PhD Student, History, CAS, 2023

Edward Ruiz, PhD Student, Medicine, Hematology/Oncology, MED, 2023

Jack Vincent, PhD Student, Biomedical Engineering, ENG, 2023

Connor Wagaman, PhD Student, Computer Science, CAS, 2023

Yixin (Amy) Zhang, PhD Student, Biostatistics, CAS, 2023

Zeying Zhu, PhD Student, Electrical & Computer Engineering, ENG, 2023
RESEARCH FELLOWS

Faculty who are part of project teams awarded support by the Hariri Institute through one of our funding mechanisms.

Teaching Machines
Human-Like Intelligence

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Predicting and Preventing Epidemic to Pandemic Transitions

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Data and Misinformation in an Era of Sustainability and Climate Change Crises

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Health Equity in the Wake of Continued Climate Change

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First trip to Mars: How to Pack Light

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Novel data science and AI approaches for Brain Health and Brain Disease

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Andrew Sellars, Associate Professor of Law; Founding Director, Technology Law Clinic, BU

Joshua Semeter, Professor, ENG (ECE, BU

Kamal Sen, Associate Professor, ENG (BME), BU
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Yuting Zhang, Assistant Professor, MET (CS); Director of Cybersecurity, BU
Jinglong Zhao, Assistant Professor, QST (OTM), BU
Lawrence Ziegler, Professor, CAS (CHEM), BU
SELECTED GRANT HIGHLIGHTS

BU Robotics & Autonomous Systems Teaching & Innovation Center. $4.4 million from Massachusetts Technology Collaborative and $4.4 million in matching funds from Boston University. Led by Yannis Paschalidis. (ENG, FCDS)

Comprehensive Assessment of Speech Physiology and Acoustics in Parkinson’s Disease Progression. National Institute of Health. New MultiPI award. $3.5 Million (FY23 $667,000). Led at BU by Cara Stepp (SAR).


Optimized Relations Auditing for Compliance with Laws and Ethical Statements (ORACLES). Increment Award. Department of Defense DARPA. Cooperative. Increment Award $1,445,838. Led by Mayank Varia (RISCS, FCDS)


Red Hat Collaboratory Awards

Improving Cybersecurity Operations Using Knowledge Graphs. David Starobinski (BU), David Sastre Medina (Red Hat), Zhenpen Shi (BU), Şevval Şimşek (BU) aim to improve the workflow and performance of security operations centers, including automating several of its tasks, by leveraging the vast amount of structured and unstructured real-world data available on threats, attacks, and mitigation.

Relational Memory Controller. Manos Athanassoulis (BU), Renato Mancuso (BU), Ulrich Drepper (Red Hat), Ahmed Sanaullah (Red Hat) aim to enable the integration of the Relational Memory Engine (RME), an FPGA-based, hardware-based data transformation engine, with a memory controller.

Toward On-The-Fly Reorganization of High-Order Data Objects. Renato Mancuso (BU), Manos Athanassoulis (BU), Ulrich Drepper (Red Hat), Ahmed Sanaullah (Red Hat) will investigate the design and development of on-the-fly data reorganization engines to make the benefits of RME available to a wider set of applications, such as image manipulation, machine learning, and tensor analysis.

HySe:Hypervisor Security Through Component-Wise Fuzzing. Manuel Egele (BU), Muzammil Hussain (BU), and Bandan Das (BU) will design, implement, and evaluate program analysis capabilities that allow the preemptive identification of bugs and vulnerabilities in hypervisor components that use interfaces identified as exposed to potential attackers.

Prototyping a Distributed, Asynchronous Workflow for Iterative Near-Term Ecological Forecasting. Michael Dietze (BU), Christopher Tate (Red Hat), Yan-
nis Paschalidis (BU), Atefeh Hosseini (BU) will prototype an accessible community infrastructure to generate ecological forecasts at scale, focusing on the development of a cloud-native workflow that can handle an asynchronous, event-driven, distributed approach to execution.

Co-Ops: Collaborative OpenShift-Based Training of Large Open-Source AI Models at Scale. Eshed Ohn-Bar (BU), Adam Smith (BU), Erik Erlandson (Red Hat), Michael Clifford (Red Hat), Lance Galletti (Red Hat), Sanjay Arora (Red Hat), Ruizhao Zhu (BU), Jimuyang Zhang (BU), Yuanming (John) Chai (BU) will develop a set of open source, Red Hat-integrated tools for efficiently and flexibility facilitating diverse and modular collaboration when training AI models for autonomous driving at scale, emphasizing privacy-preserving knowledge sharing.

Minimal Mobile Systems via Cloud-Based Adaptive Task Processing. Eshed Ohn-Bar (BU), Hee Jae Kim (BU), Lei Lai (BU), Sanjay Arora (Red Hat), Bassel Mabsout (BU) will work to build an efficient cloud-robot distributed computing platform for automatic offloading of computationally intensive tasks to the cloud, improving performance and making low-cost, cloud-enabled robots accessible for a significantly larger set of users.

Privacy-Preserving, Automated Operational Data Sharing Telemetry Framework. Alan Liu (BU) will develop an open source automated tracing system to collect, process, and anonymize operational data, focusing on identifying and testing privacy preservation models.

Open Source Infrastructure for Secure Educational Data Management to Optimize Treatment and Identification of Students with Learning Disabilities. Hank Fien (BU), Eshed Ohn-Bar (BU), Ola Ozernov-Palchik (BU), Kasey Tenggren (BU) will develop a distributed infrastructure to process, store, analyze, and redistribute educational data that addresses privacy and security requirements for research on literacy-based disabilities.

DISL: A Dynamic Infrastructure Services Layer for Reconfigurable Hardware, Martin Herbordt (BU), Uli Drepper (Red Hat), Ahmed Sanaullah (Red Hat)

Practical Programming of FPGAs with Open Source Tools, Martin Herbordt (BU), Uli Drepper (Red Hat), Ahmed Sanaullah (Red Hat)

Towards High Performance and Energy Efficiency in Open-Source Stream Processing, Vasia Kalavri (BU), Jonathan Appavoo (BU), Sanjay Arora (Red Hat)

Creating a Global Secure Open-Source Research Platform to Better Understand Social Sustainability Using Data From a Real-Life Smart Village, Christos Cassandras (BU), Alexandra Machado (Red Hat), Jim Craig (Red Hat), Christopher Tate (Red Hat)

FHELib: Fully Homomorphic Encryption Hardware Library for Privacy-preserving Computing, Ajay Joshi (BU), Shaun Ghosh (BU)

Learned Cost-Models for Robust Tuning, Manos Athanassoulis (BU), Evimaria Terzi (BU)

Serverless Streaming Graph Analytics, Vasia Kalavri (BU)

Enabling Intelligent In-Network Computing for Cloud Systems, Alan Liu (BU)

Symbiotes: A New Step in Linux’s Evolution, Jonathan Appavoo (BU)

Foundation in Open Source Education, Jonathan Appavoo (BU)
**SELECTED SCHOLARLY WORKS**

**Books**


**Papers**


Jennifer Beane-Ebel (MED, Computational Biomedicine) and collaborators published findings related to their lung cancer research in Proceedings of the American Association for Cancer Research Annual Meeting 2023: 5433, 5632, 4651.

Emelia J. Benjamin (MED, SPH, Epidemiology) with collaborators has published a number of recent papers on cardiovascular health including in Nature Reviews Cardiology, Neurobiology of Aging, and Current Problems in Cardiology.


Anushya Chandran (CAS, PHY) with collaborators published a paper in Annual Review of Condensed Matter Physics in which they discuss the phenomenon of quantum many-body scars and quasiparticles in the energy spectrum.

Faisal, Muhammad; Zhang, Jerry; Liagouris, John; Vasiliki, Kalavri; Varia, Mayank.


Juliet Floyd, “Surveyability” in Hilbert, Wittgenstein and Turing, Philosophies 2023, 8(1), 6; https://doi.org/10.3390/philosophies8010006


SELECTED SCHOLARLY WORKS


Conference Presentations and Invited Talks


Shariq Mohammed (SPH, Biostatistics) presented “Tumor Radiogenomics with Bayesian Layered Variable Selection” at the Royal Statistical Society International Conference, Sept 13, 2022.

Coaching a Teachable Student. Jimuyang Zhang, Zanming Huang, Eshed Ohn-Bar; Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023, pp. 7805-7815


Yannis Paschalidis published papers at ICASSP 2023, ICLR 2023, NeurIPS 2022, ICML 2022, which are among the top AI/ML conferences.

Yannis Paschalidis gave an Invited Talk, COVID Information Commons, Columbia University, April 24, 2023 where he presented his research on Predictive Models of COVID-19 Severity and Patient Outcomes, a project was funded by NSF Predictive Intelligence for Pandemic Prevention Phase 1.


Jessica Stern (Pardee) delivered the 2023 Cyril Foster Lecture on ‘Nuclear Terrorism: What is the Threat?’, Oxford University’s annual distinguished lecture in the field of International Relations, May 16, 2023.

If interested in joining any of our collaborative initiatives please visit our website for more information at https://www.bu.edu/hic/