



BOSTON UNIVERSITY College of Engineering
Department of Electrical and Computer Engineering

RISING TO THE TOP

**INCREASING RANK, FACULTY,
FUNDING & FACILITIES**

BU ECE
IMPACT REPORT
2016/2017

FUELING RAPID GROWTH

ECE CHAIR PROFESSOR W. CLEM KARL

The Department of Electrical and Computer Engineering at Boston University has completed another dynamic year of growth and advancement. We continue to launch state-of-the-art facilities and centers while hiring top-notch faculty. In 2017, we welcome exceptional faculty leaders Ji-Xin Cheng and David Boas to BU. These pioneers in bioimaging complement the five most recent junior faculty members to join ECE, whose combined expertise ranges from Bioelectronics to Data Science and Software Systems security. Our new Rajen Kilachand Center for Integrated Life Sciences and Engineering also opened this year, providing new space for transformative interdisciplinary engineering research. Our academic program continued its expansion, with the creation of a new undergraduate curriculum reflecting new topics, such as the growing role of data science in society. This academic year was record breaking for two reasons: ECE awarded the largest number of graduate degrees ever, and admitted the largest incoming Doctoral class.

“BU ECE’S COMMITMENT TO GROWTH AND EXCELLENCE CONTINUES UNABATED AND BUILDS ON OUR STRONG FOUNDATION TO CREATE AN EVEN BRIGHTER FUTURE.”



GRADUATE PROGRAM RANK IMPROVEMENT

ELECTRICAL ENGINEERING

#15 PROGRAM RANK*

↑12 RANK UP 12 SPOTS IN 5 YEARS

%10 IN TOP 10% OF ABET-ACCREDITED PROGRAMS

COMPUTER ENGINEERING

#16 PROGRAM RANK*

↑11 RANK UP 11 SPOTS IN 5 YEARS

%13 IN TOP 13% OF ABET-ACCREDITED PROGRAMS

Source: USNWR
*Private institutions

NEW FACILITIES

RAJEN KILACHAND CENTER FOR INTEGRATED LIFE SCIENCES & ENGINEERING

A brand new \$150 million, nine-story, state-of-the-art research center will bring together life scientists, engineers and physicians. A **\$115 million gift by BU Alum Rajen Kilachand, the largest gift in BU history**, will endow the

ground breaking research and move the boundaries of human knowledge with breakthroughs unthinkable just a few years ago. The center will be home to the *Living Computing Project* funded by a \$10 million NSF grant to ECE Professor Douglas Densmore.



RECORD-BREAKING GROWTH

FACULTY



Professor Cheng



Asst. Professor Kinsy



Asst. Professor Li



Asst. Professor Olshevsky



Asst. Professor Popović



Asst. Professor Tian



Assoc. Professor Yang

7 FACULTY HIRED IN 2 YEARS

STUDENT ENROLLMENT

↑16%

AVERAGE ANNUAL GROWTH RATE OVER 6 YEARS

GRANT FUNDING

↑16%

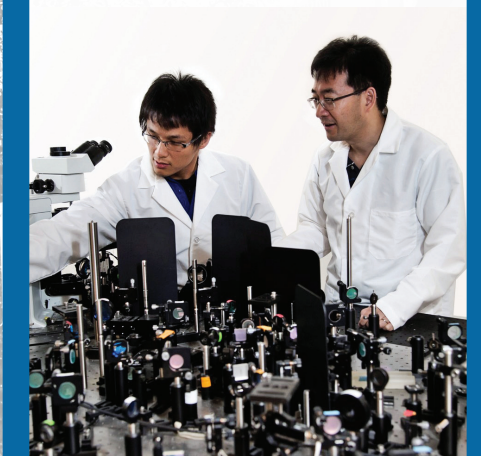
AVERAGE ANNUAL GROWTH RATE OVER 10 YEARS



NEW ENDOWED PROFESSORSHIP

PROFESSOR JI-XIN CHENG

A world leader in molecular spectroscopic imaging, Professor Cheng holds the endowed title of Theodore Moustakas Professor of Optoelectronics and Photonics. Prof. Cheng pushed the speed of Raman spectral techniques to microsecond acquisition times, allowing the use of Raman spectroscopy in living cells with high throughput. He is an AIMBE Fellow and received the Craver Award from Coblentz in 2015. The National Institute of Health recently awarded Prof. Cheng a total of \$2.3M to benefit his research on metabolic signatures of cell subpopulations. **PROF. CHENG’S ADVANCEMENTS WILL AID IN THE DEVELOPMENT OF DISEASE-SPECIFIC TREATMENT STRATEGIES.**



PEOPLE POWER

SPOTLIGHTS

NEXT-GENERATION VEHICLE TECHNOLOGY

\$4.4M GRANT FROM THE DOE TO CONTINUE ADVANCING PROF. CHRISTOS CASSANDRAS' INTERNET OF CARS RESEARCH UNDER THE NEXTCAR PROGRAM.

With the grant, Prof. Cassandra will lead the way in developing smart vehicle technology to reduce energy consumption and make roads more efficient.



THE ERA'S MOST INFLUENTIAL

TOP EXPERTS FROM AROUND THE WORLD traveled to BU ECE for a symposium honoring Professor Theodore Moustakas. Prof. Moustakas is renowned for groundbreaking work and a patent on blue light emitting diodes (LEDs) commonly used today in smartphones, tablets, laptops and lighting products.



Left to right: Prof. Moustakas, Dr. Liao (CIO, RayVio) and Nobel Prize winner Prof. Nakamura (U. of California Santa Barbara).

ECE'S DEEP CROSS-DISCIPLINARY TEAM

PROFESSOR DAVID BOAS is best known for his use of near-infrared spectroscopy to determine the metabolic origins of the ubiquitous fMRI BOLD signal. He has also made fundamental contributions in laser speckle imaging, combined-modality methods for medical imaging, and metabolic imaging using two-photon microscopy. Prof. Boas is an AIMBE Fellow and received the Britton Chance Biomedical Optics Award. He is an affiliated ECE faculty member.



FACULTY ACHIEVEMENT

TOP HONORS

29

AVERAGE H-INDEX

4.5K

AVERAGE NUMBER OF CITATIONS

1

NATIONAL ACADEMY MEMBER

3

CURRENT/ FORMER IEEE SOCIETY PRESIDENTS

27

SOCIETY FELLOWS

23

NSF PECASE AND CAREER, DOE AND DOD YOUNG INVESTIGATOR AWARDS

DESIGN AUTOMATION CONFERENCE RECOGNIZES TOP 5 INNOVATORS UNDER 40, and names Prof. Douglas Densmore as an emerging young leader in the field of electronic design automation (EDA). Prof. Densmore is one of only two academic researchers to receive the honor.



FACULTY ON THE RISE

31

FULL PROFS.

10%

PRIMARY TENURE & TENURE TRACK FACULTY ARE URM_s

10

ASSOCIATE PROFS.

10%

PRIMARY TENURE & TENURE TRACK FACULTY ARE FEMALE

YOUNG LEADERS

PROF. SAHAR SHARIFZADEH RECEIVES DOE AWARD
Prof. Sharifzadeh earned a highly-competitive Early Career Award from the Department of Energy for her ground-breaking work in nanoelectronics, which combines methods from Physics, Materials Science and ECE. The award funds a five-year research project focused on understanding how light interacts with the atoms and electrons in materials such as graphene to determine its function in a device.



RESEARCH THAT CHANGES THE WORLD

STATE-OF-THE-ART CENTERS & FACILITIES

NEW RAJEN KILACHAND CENTER FOR INTEGRATED LIFE SCIENCES & ENGINEERING

A new, nine-story facility will feature cutting-edge technology for synthetic biology, neuroscience, cognitive neuroimaging and tissue engineering. A record gift from BU Alum Rajen Kilachand will contribute \$15 million to support center's construction and \$100 million to establish an endowment. Photo on page 9 & 10.

NEW BIOLOGICAL DESIGN CENTER

The center develops a principles-based understanding of systems ranging from molecular signal transduction and genetic circuits to multicellular tissues to microbial ecosystems. It is harnessing this knowledge for research and therapeutic applications.

CENTER FOR INFORMATION & SYSTEMS ENGINEERING

The center advances the study and design of intelligent systems. It is a conglomerate of cross-disciplinary researchers, comprised of 41 affiliated faculty members and more than 100 graduate students.

RAFIK B. HARIRI INSTITUTE FOR COMPUTING AND COMPUTATIONAL SCIENCE & ENGINEERING

An incubator in a university setting, the institute initiates, catalyzes, and propels transformative computational and data-driven research and training initiatives across the landscape of academic disciplines for a better society.

LIGHTING ENABLED SYSTEMS & APPLICATIONS NSF ENGINEERING RESEARCH CENTER

With a mission to develop new technologies and applications, the center is changing the way society uses lighting. Smart lighting systems will optically sense the environment to provide energy-efficient, comfortable illumination while simultaneously providing high-speed data access.

MATERIALS SCIENCE AND ENGINEERING RESEARCH FACILITY

The facility houses state-of-the-art equipment, from X-ray diffraction, scanning electron and transmission electron to atomic force and X-ray microscopes, for the study of electronic, photonic, and other material systems. It allows ECE faculty to move the boundaries of human knowledge with breakthroughs that would have been unimaginable only a few years ago.

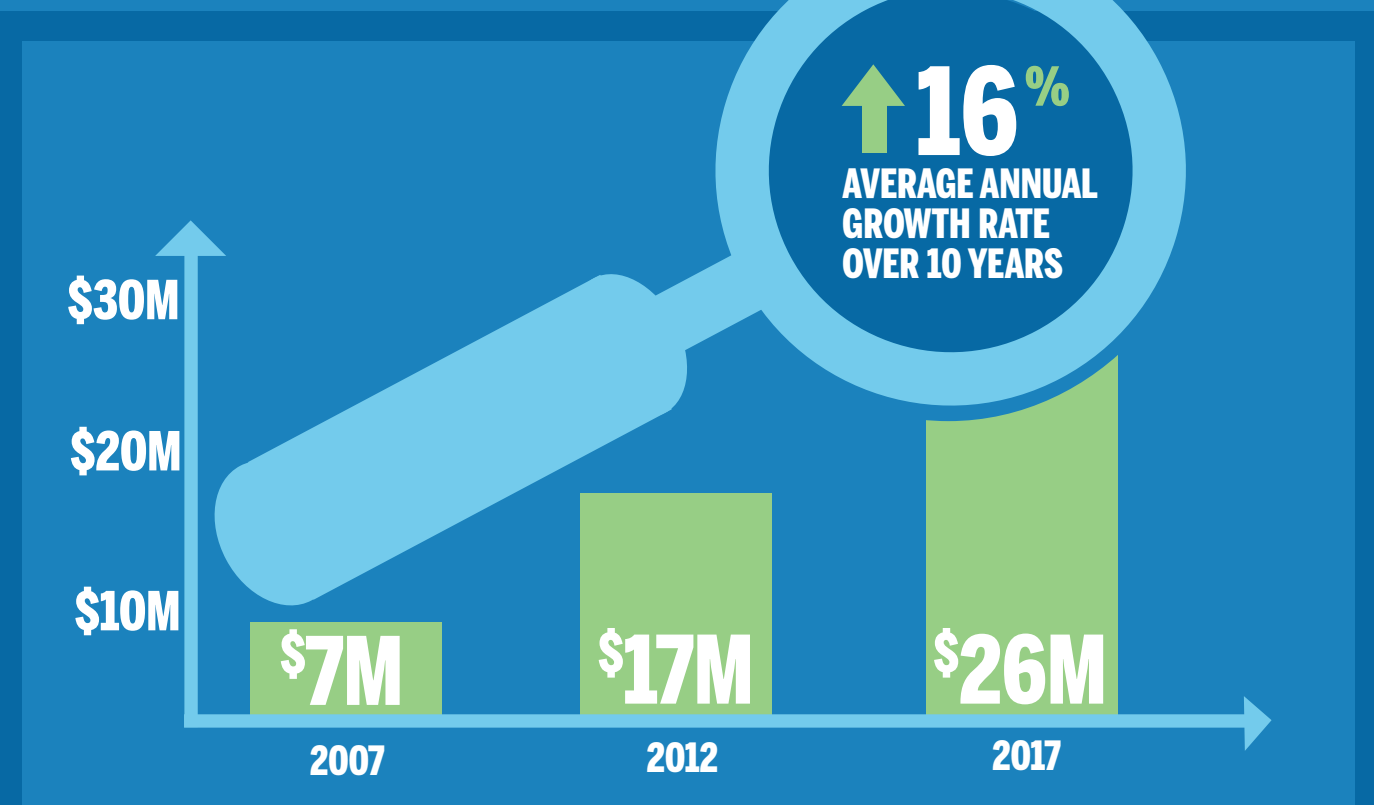
PHOTONICS CENTER

Dedicated to the study and engineering of light, the center is a unique national resource for the development of advanced photonic device prototypes for commercial, military, and healthcare applications.

For a more complete list and in-depth descriptions of our research facilities, go to BU.EDU/ENG/ECERESEARCHCENTERS

RESEARCH SNAPSHOT

RESEARCH FUNDING GROWTH



BU ECE AREAS OF RESEARCH

- ELECTRICAL & COMPUTER BIOENGINEERING
- INTELLIGENT COMPUTATION & DATA SCIENCE
- PHOTONICS, ELECTRONICS & NANOTECHNOLOGY
- MOBILE/CLOUD COMPUTING WITH SECURITY
- IMAGING & OPTICAL SCIENCE

COMBINING FORCES

RED HAT & BU UNITE TO ADVANCE CLOUD COMPUTING

ECE Prof. Orran Krieger is the founding director of Massachusetts Open Cloud (MOC) and is the University's lead on a \$5M partnership with Red Hat, the *Red Hat Collaboratory at Boston University*. Red Hat is the world's leading provider of open source

enterprise software. The Collaboratory aims to advance research projects focused on emerging technologies, including open source operating systems, cloud computing technologies and services, machine learning and automation and big data platforms.



Professor Krieger

CREATING THE SOCIETAL ENGINEER®

SOCIETAL ENGINEERS ARE PROBLEM SOLVERS WITH THE SKILLS NECESSARY TO MAKE A LIFE-LONG IMPACT AND MOVE SOCIETY FORWARD.

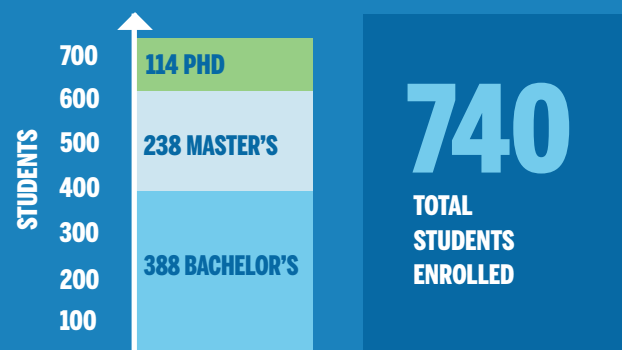
MAJOR ENROLLMENT GROWTH

TRENDING UP



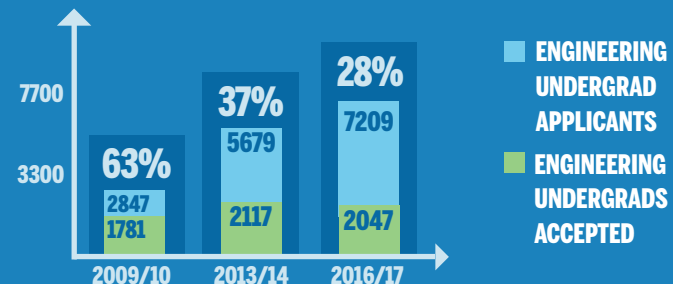
AVERAGE ANNUAL ENROLLMENT GROWTH OVER 6 YEARS

CURRENT STUDENT POPULATION



STRONG COLLEGE BACKING

INCREASING UNDERGRADUATE SELECTIVITY

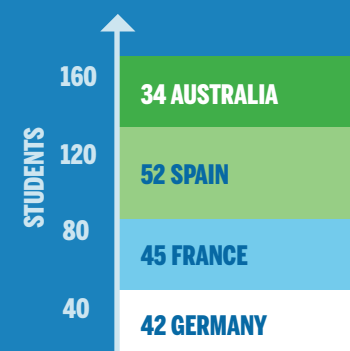


GLOBAL CAMPUS

ENGINEERING STUDY ABROAD PROGRAM:

173

PARTICIPANTS STUDIED ABROAD IN 2016 & 2017



MORE BU WOMEN EARN ECE BACHELOR'S DEGREES THAN THE NATIONAL AVERAGE

23%

OF BACHELOR'S DEGREES IN ECE WERE AWARDED TO FEMALES IN 2016/17



14%

NATIONAL AVERAGE OF BACHELOR'S DEGREES IN ECE THAT WERE AWARDED TO FEMALES IN 2015 (most recent data from ASEE).

INFLUENTIAL ALUMNI

↑\$9k

HIGHER AVERAGE STARTING SALARY

ECE graduates receive a higher starting salary than the national average by \$9K (salary.com).

8TH

IN MID-CAREER SALARY

Average mid-career salary of ENG graduates is ranked 8th among ENG graduates nationally (Payscale).

11TH

IN EMPLOYABILITY

BU graduates rank #11 in employability worldwide (USNWR).

SOCIETAL ENGINEERS AT WORK

Yitao Liao (ECE PhD '11) continues to break new ground with RayVio, a health and hygiene company that delivers clean water and environments. Liao launched the company in 2012. RayVio

harnesses the power of UV LED technology to create devices that can kill germs and disinfect environments with the touch of a button. RayVio has raised \$26M in Series B funding. Liao worked with Prof. Moustakas as a graduate student at ECE.

ECE SENIOR DESIGN PROJECTS IMPROVE THE WORLD

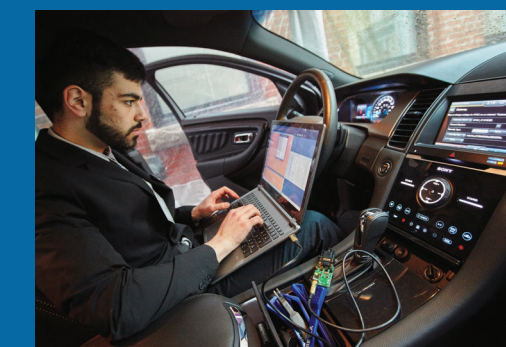
THE LARGEST SENIOR CLASS IN ECE HISTORY DEVELOPED NEW TECHNOLOGY TO BENEFIT SOCIETY



One team developed *Groove Gloves* to allow deaf and hearing-impaired people to experience music through vibrations on their fingertips.



ECE engineers worked for William E. Carter School to develop a *Door Opening Robotics Intelligence* system to help students with severe disabilities and health complications.



Omar Janoudi and his teammates developed a product called *AutoPen* that tests vulnerability of vehicle software with the intention of improving car security.



**INTERDISCIPLINARY RESEARCH OF ECE FACULTY WILL
BE HOUSED IN THE NEW RAJEN KILACHAND CENTER FOR
INTEGRATED LIFE SCIENCES & ENGINEERING**



**SUBSCRIBE TO BI-ANNUAL ECE NEWSLETTERS AT
BU.EDU/ENG/ECESUBSCRIBE**

FACULTY WHO ENHANCE THE WORLD

MICHELLE SANDER

**PROF. SANDER RECEIVES YOUNG INVESTIGATOR RESEARCH
AWARD & NAMED OPTICAL SOCIETY OF AMERICA AMBASSADOR**

Prof. Sander is one of nine ambassadors to be named across the country. Additionally, she received the prestigious Young Investigator Research Award from the Air Force Office of Scientific Research (AFOSR). Sander's research is concentrated on ultrafast optics and spectroscopy. Her most recent discoveries were

