BOSTON UNIVERSITY

SYSTEMS ENGINEERING

BU SE IS CELEBRATING 10 YEARS!

BOSTON UNIVERSITY COLLEGE OF ENGINEERING
DIVISION OF SYSTEMS ENGINEERING

At a Glance

SECTION 1, PAGES 1 - 5

Research

SECTION 2, PAGES 6 - 10

Academics

SECTION 3, PAGES 11 - 14

Community

SECTION 4, PAGES 15 - 22

10 YEARS OF GROWTH

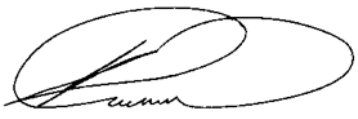
This year, SE celebrates a decade of growth and achievements.

The 2018-2019 Division of Systems Engineering Annual Report summarizes information on new research projects, PhD dissertations completed, and the scholarly output, distinctions and honors received by our faculty and graduate students.

This year, Francesco Orabona joined the Division, hired as an Assistant Professor of Electrical and Computer Engineering in 2018. He leads the Optimization and Machine Learning Lab and brings expertise in these areas. With this addition, the Division now includes 18 faculty members with home departments in Electrical and Computer Engineering and in Mechanical Engineering, along with 14 affiliated faculty members from the College of Engineering, the College of Arts and Sciences, the Questrom School of Business, and the Medical School. Our PhD student enrollment has grown to 43 students, along with 21 students in the MS and MEng programs.

There were 6 PhD degrees awarded last year, along with 15 MS degrees and 3 MEng degrees. The Division continues to provide full financial support to all admitted PhD students through fellowships, while our continuing PhD students remain funded from research grants received by participating and affiliated faculty. This year, our total sponsor commitment for active grants reached approximately $81M, including a number of new grants, some of which are highlighted in the report. We are also proud to list a number of honors and awards received by our faculty, as well as accomplishments by our students.

The Division remains committed to world-class interdisciplinary research activities in our primary concentration areas: Automation, Robotics and Control, Communications and Networking, Computational Biology, Information Sciences, and Production, Service and Energy Systems. In partnership with the Center for Information and Systems Engineering (CISE), we continue to look for exciting collaborative projects that involve faculty from different colleges and departments at BU. We are also expanding summer internship opportunities for our students with companies and research laboratories across the US. I would like to close by gratefully acknowledging the contributions of all Division faculty and students who, along with our outstanding staff, continue to pursue the Division's research and educational mission.



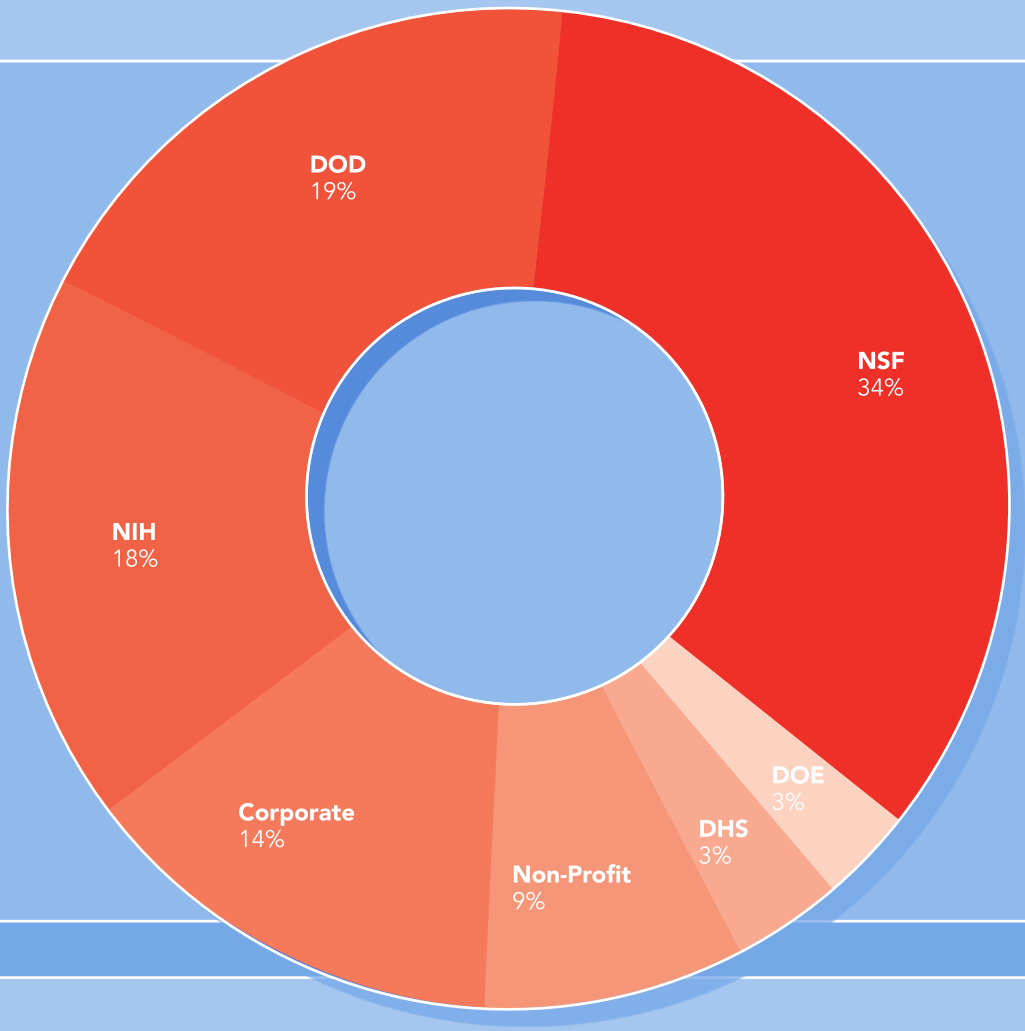
CHRISTOS CASSANDRAS

DIVISION HEAD
DISTINGUISHED PROFESSOR OF ENGINEERING

RESEARCH FUNDING

$81 Million

ACTIVE FUNDS IN 2018-2019



2018-2019 AGENCY BREAKDOWN

NSF
$27.7M

CONTINUING PROJECT

$1.8M for Synthetic Bio: Calin Belta is developing cyber-physical systems for gene circuit decision making and local communication.

DOD
$15.8M

NEW PROJECT

$.6M for Artificial Intelligence: Venkatesh Saligrama is advancing learning to recognize without training data, or *Zero-Shot Learning*.

NIH
$14.6M

CONTINUING PROJECT

$1.7M for Biochemistry: Sean Andersson is advancing single particle tracking in motion, dimension and trajectories.

CORPORATE
$11M

CONTINUING PROJECT

$.9M for Cybersecurity: Azer Bestavros is advancing privacy-preserving artificial intelligence in partnership with Honda.

NON-PROFIT
$7M

NEW PROJECT

$.2M for Health Tracking: Roberto Tron and Louis Awad (PI) are developing a tool for automatic motion assessment in frail patients.

DHS
$2.7M

CONTINUING PROJECT

$2.5M for Safety: David Castañón (PI), Clem Karl and Venkatesh Saligrama are improving emergency response to explosives.

DOE
$2.6M

NEW PROJECT

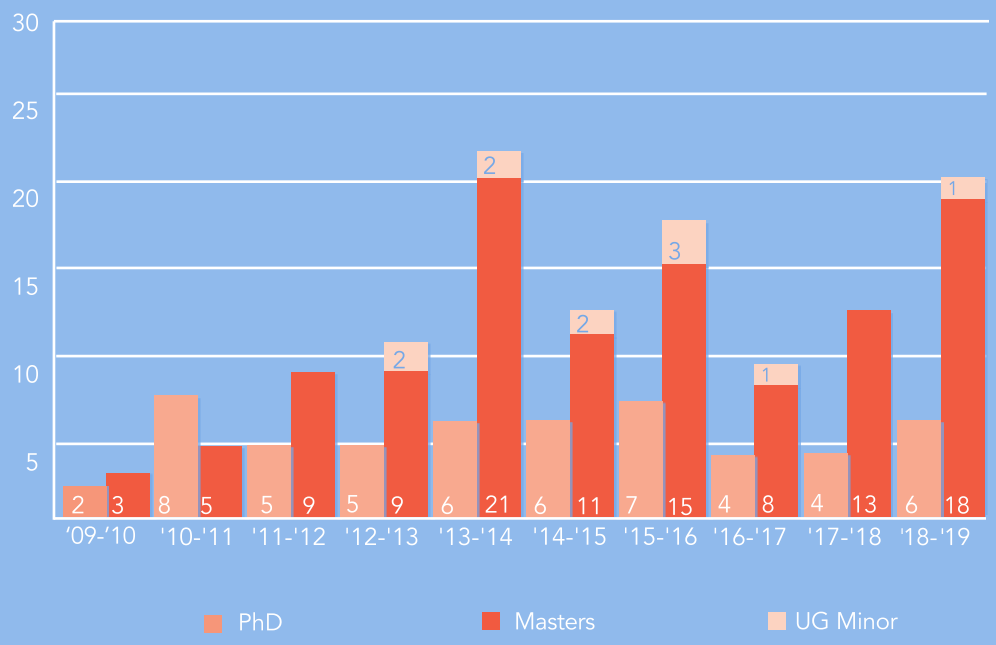
$.7M for Energy: Michael Gevelber is developing a system to determine internal and external building air leaks.

GIFTS FROM INDUSTRY

NEW PROJECT

$.3M for Traffic Control: Christos Cassandras is improving traffic mobility in highways with *Safe Swarms* of smart vehicles.

DEGREES AWARDED



TOTAL HISTORICALLY:

81 PhD Degrees
64 MS Degrees
46 MEng Degrees
4 MS with Practice Degrees
11 Undergrad Minors

2018-2019:

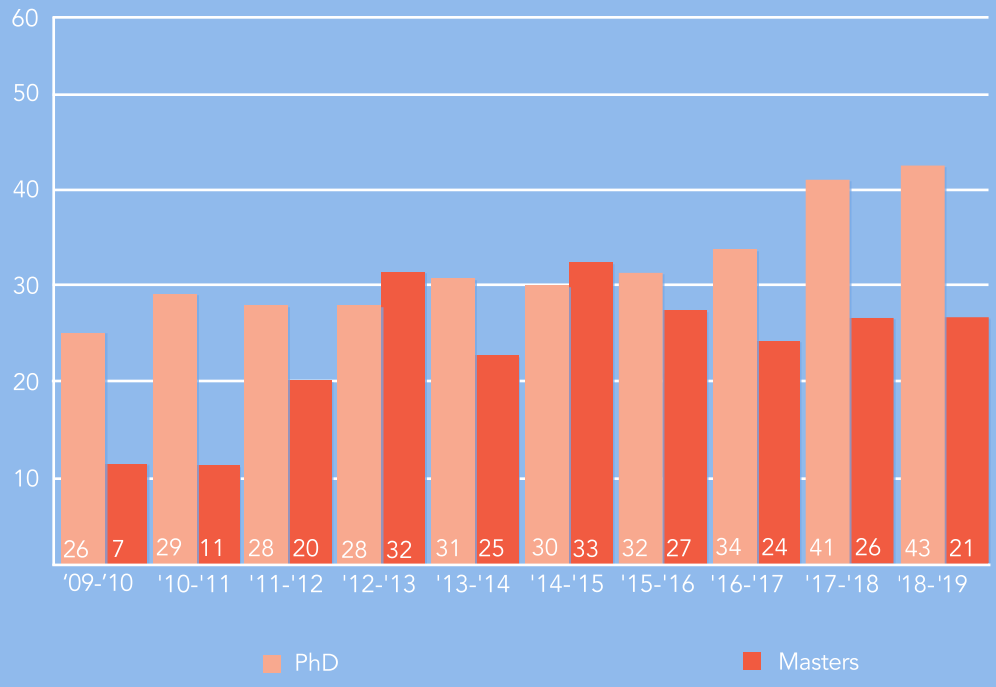
6 PhD Degrees
13 MS Degrees
2 MS Degrees with Practice
3 MEng Degrees
1 Undergrad Minor

NEW DEGREE

BU launched a MS Robotics and Autonomous Systems program.

More: bu.edu/eng/RoboProg

STUDENT POPULATION



2018-2019 ENROLLMENT:

43 PhD Students
14 MS Students
7 MEng Students

2018-2019 Scholarly Works: *4 patents, 9 plenary talks, 1 book chapter and 216 journal papers.*

NEW HIRE: Francesco Orabona was hired as an Assistant Professor of Electrical and Computer Engineering in 2018 and appointed to Systems Engineering in 2019. Orabona manages the Optimization and Machine Learning Lab.

3 NEW FELLOWSHIPS

David Castañón was elevated to IEEE Fellow. Castañón's research is focused on dynamic decision-making in uncertain environments and synthesizing information to make those decisions.

Venkatesh Saligrama was elevated to IEEE Fellow. Saligrama was recognized for contributions to detection and estimation theory for structured signals, a subfield of machine learning.

Christos Cassandras was elected Distinguished Fellow of the International Engineering and Technology Institute.

4 PATENTS

Mark Crovella, *Methods for Storing and Reading Digital Data on a Set of DNA Strands*

Thomas Little, 2 Patents | *MEMS Devices for Smart Lighting Applications* and *Visible-Light Communications Receiver*

Thomas Little, Januz Konrad, Michael Gevelber, Prakash Ishwar, Computational Occupancy Sensing System

9 PLENARY SPEAKING ENGAGEMENTS

Calin Belta, 5 Engagements | Computational Modeling in Biology Network, IFAC Conference on Analysis and Design of Hybrid Systems, Working Formal Methods Symposium, MIT LIDS Student Conference and International Workshop VaVAS

Christos Cassandras, 2 Engagements | 1st International School on Discrete Event Systems and 15th IFAC Symposium on Control in Transportation Systems

Eric Kolaczyk, 3rd Graph Signal Processing Workshop

Ioannis Paschalidis 23rd International Symposium on Mathematical Theory of Networks and Systems (semi-plenary)

3 MAJOR SOCIETAL AWARDS

Calin Belta, IEEE Control Systems Society, Distinguished Lecturer

Thomas Little, Optical Network and Systems Symposium, Best Paper Award

Ioannis Paschalidis and Alex Olshevsky, Yearbook of the International Medical Informatics Association, Best Paper Award

11 UNIVERSITY AWARDS

Sean Andersson, College of Engineering, Faculty Service Award

Mark Crovella, Hariri Institute, Data Science Faculty Fellow

Prakash Ishwar, Undergraduate Research Opportunities Program, Outstanding Mentor Award

Eric Kolaczyk, Hariri Institute, Data Science Faculty Fellow

Wenchao Li, Hariri Institute, Junior Fellow

Wenchao Li and Roberto Tron, Hariri Institute, Research Incubation Award

Abraham Matta, Department of CS, Appointed Chairperson

Bobak Nazer, Department of ECE, Outstanding Faculty Teaching Award

Francesco Orabona, Hariri Institute, Data Science Faculty Fellow

Ioannis Paschalidis, Hariri Institute, Data Science Faculty Fellow

Venkatesh Saligrama, Hariri Institute, Data Science Faculty Fellow

Research Areas

AUTOMATION, ROBOTICS AND CONTROL

Cyber-physical systems, teams of autonomous agents, networked control systems, image-guided surgery, control of material processes and nanoscale systems.

COMMUNICATIONS AND NETWORKING

Performance analysis, pricing and resource allocation, communication protocols, cyber-security, visual light communication, and optical, wireless and sensor networks.

COMPUTATIONAL BIOLOGY

Metabolic and gene networks, systems biology and protein docking.

INFORMATION SCIENCES

Signal and image processing, multi-resolution signal modeling, multidimensional detection and estimation, geometric-based modeling and estimation, image encoding/decoding and the integration of digital signal processing with signal understanding.

PRODUCTION, SERVICE AND ENERGY SYSTEMS

Energy economics and management, smart grids, production scheduling and planning, logistics, inventory control, supply chain management and financial engineering.

10 YEARS OF GROWTH

This year: $81M in active grants.
10 years ago: $29M.

Reducing Avoidable Hospital Visits

Professor Ioannis Paschalidis (PI) and research partner William G. Adams (MED) intend to decrease the number of avoidable hospital visits each year. Paschalidis was spurred to action several years ago, when he learned that in 2006, the United States spent about $30.8 billion on hospitalizations that could have been prevented through better patient care, healthier patient behavior or improved ambulatory services.

In the years since, Paschalidis and Adams received a $2 million NSF grant and put together a team of graduate students for support. They built an algorithmic model whose analysis of medical records can flag patients at increased risk for medical emergencies with greater than 80 percent accuracy.

The researchers have focused on chronic heart disease and diabetes in patients who would require hospitalization within a year. "In terms of cost," says Paschalidis, "care for these patients is a large percent of preventable hospital care."

The researchers are also at work on a similar project, aimed at reducing the number of readmission penalties, using algorithmic analysis of electronic health records from general surgery patients, to predict which patients are likely to reappear at Boston Medical Center within 30 days of their procedure.

Identifying Risk for Heart Disease & Diabetes

Paschalidis (PI) teamed up with Systems Engineering Division Head Professor Christos Cassandras and Professor Rebecca Mishuris (MED) on another big data project. Fueled by a $900,000 NSF grant, the researchers are developing a pilot health informatics system to identify patients who are at risk of heart disease or diabetes, which alone costs the United States about $5.8 billion for hospitalizations that could be prevented.

Spotting those patients sooner would enable early intervention and personalized treatment plans.

The project will use algorithms that incorporate data from electronic health records with data from real-time sources (like wearables, implants and at-home diagnostic devices).

"Eventually, we hope to move from predictions to prescriptions," says Paschalidis. "We have some initial results for diabetes and hypertension. The goal is to make recommendations available in electronic health records as guidance for the care provider."

Source: Art Jahnke for *BU Today*

Pictured above | Members of Cassandras' team at University of Michigan's M-city testing facility. Researchers from the University of Delaware, University of Michigan, Oak Ridge National Laboratory, and corporate partners like Bosch and Honda collaborate on the plug-in hybrid vehicle pictured here.

Talking Cars

Honda and Professor Christos Cassandras' (PI) interdisciplinary team of researchers will be exploring and quantifying the benefits of using smart vehicles to improve highway traffic flow through *safe swarms*.

Technologies that offer safety and energy-efficiency will be tested on Highway US-33 Smart Corridor in Ohio. Derived from ARPA-E's NEXTCAR research, this project supplements Cassandras' ongoing effort to advance connected autonomous vehicles.

The project aims to develop control and optimization technologies for plug-in hybrid vehicles enabling them to communicate with nearby cars and transportation system infrastructure, thus, enabling vehicles to act on the information exchanged. For example, it will allow a car to efficiently calculate the best possible route to a destination and accelerate or decelerate as needed to optimize the powertrain's operation.

$7.5 MURI Grant for Neuro-Inspired Vehicles

Professor Ioannis Paschalidis (PI) is leading a project that aims to develop a novel category of neuro-inspired autonomous robots for land, sea and air. The initiative will explore human processes, like learning and forming memories, for autonomation. Investigators have termed this area of exploration "neuro-autonomous."

"[The team is] inspired by the fusion of multiple sensor modalities, spatial awareness and spatial memory inherent in biological organisms," said Paschalidis. "These systems will have unprecedented capabilities for self-learning and on-the-fly adaptation to environmental novelty."

"This is fascinating science," adds Paschalidis. "We will develop the ability to make behavioral observations of animals and humans, correlate behavior with activity in the brain, and use the data to design control policies that will guide autonomous systems. This truly is the next frontier in advancing the field of robotics and autonomous vehicles."

Ioannis Paschalidis is bringing together an interdiciplinary group of researchers from Boston University, Massachusetts Institute of Technology and abroad. The team includes preeminent experts in neuroscience (with interest in localization, mapping, and navigation functions) and robotics scientists (with interests in computer vision, control systems and algorithms). BU SE collaborators include Professors John Baillieul and Roberto Tron.

Source: Maureen Stanton for CISE

Media Analytics 2.0

Analytic Tools to Examine the Digital Communication Landscape

Boston University researchers are developing tools that will allow social scientists to examine public communications around the world. SE Professor Prakash Ishwar is the sole engineer on the project that unites PI Margrit Betke (CS), Lei Guo (COM) and Derry Wijaya (CS).

Research Rewarded | The team's largest grant to date is a four-year $1 million NSF award. The project will unfold in three phases: First comes the data gathering—collecting thousands of news stories, lead photos, video clips, comments, tweets, and more; then, tapping into crowd sourcing workforces like Amazon's Mechanical Turk, as well as analysis efforts from communication researchers, they will begin manually analyzing the relatively small selection of the media in their library. They will start with basic questions—What is this article about? Who is in it? Where did it take place?—and move on to trickier judgments, like whether the item is largely positive or negative; finally, using machine learning, they will begin "training" the computer to make human-like judgments about the media in their library.

Other big-data studies have used artificial intelligence to pick out the who-what-where from news stories. This study explores something subtler: the story's point of view, or frame.

"To analyze a mass shooting, for example, there are a lot of perspectives to talk about it," says Guo. The same event could become a human-interest story, a policy op-ed or an economic impact report. "Framing analysis in our field is always done using student coders or researchers to manually go through the article," says Guo.

The researchers will also look at how stories are told differently around the world. "We're expecting that the frames that people use outside the US are different from the ones in the US," says Betke.

To prepare the data to be analyzed, media in 100 different languages will be consolidated. Simply delivering the dataset for this project will be a first-of-its-kind achievement. "Having a dataset actually is very important to move further in research, to push the boundaries of what's possible," says Wijaya.

According to Ishwar, "machine learning provides mathematically-principled frameworks and algorithms to better understand human-labeled data."

"These tools will be used at large and small scale. For example, it could be used to decipher the sentiment of a tweet or to flag a national agenda item before it trends."

Source: Kate Becker for *BU Today*

The team is creating a tool that measures the relationship between digital content and viewers' reaction.

From left to right: Lei Guo, Derry Wijaya, Margrit Betke and Prakash Ishwar.

ANDERSSON LABORATORY
Sean Andersson
bu.edu/anderssonlab
The lab explores the dynamics in nanometer-scale systems with fundamental theory, applied mathematics, and physical experiments. The work applies to nanobioscience, nanotechnology, and robotics.

ADVANCED PROCESS CONTROL LABORATORY
Michael Gevelber
bu.edu/pcl
The lab applies a controls-based approach to integrate process modeling, sensor development, system and control design and experimentation.

CONTROL OF DISCRETE EVENT SYSTEMS LABORATORY (CODES)
Christos Cassandras
https://christosgcassandras.org/codes
The lab conducts research on modeling, design, analysis, performance evaluation, control and optimization of a variety of discrete events and hybrid systems.

DATA SCIENCE & MACHINE LEARNING LABORATORY
Venkatesh Saligrama
https://sites.bu.edu/data/
Projects related to vision and learning, decision and control machine learning and structured signal processing.

DEPENDABLE COMPUTING LABORATORY
Wenchao Li
sites.bu.edu/depend/
The research spans dependable computing, particularly the development of computational proof methods and machine learning techniques to aid the construction of safe, reliable and secure systems.

HYBRID AND NETWORKED SYSTEMS LABORATORY
Calin Belta
sites.bu.edu/hyness
The lab is focused on integrating algorithms and machine learning to make robots smarter and more autonomous.

INFORMATION & DATA SCIENCES LABORATORY
C. Cassandras, D.Castañón, W. Karl, B. Kulis, T. LIttle, P. Ishwar, B. Nazer, A. Olshevsky, I. Paschalidis, V. Saligrama, D. Starobinski, A. Trachtenberg, W. Li
bu.edu/iss
The lab designs and synthesizes secure networked systems for optimum decision-making and control.

INTELLIGENT MECHATRONICS LABORATORY
J. Baillieul, S. Andersson, H. Wang
bu.edu/iml
Projects explore limited-bandwidth control problems, cooperative systems and control, symbolic control and animal-inspired agile flight control.

LABORATORY OF NETWORKING & INFORMATION SYSTEMS
D. Starobinski, A.Trachtenberg
nislab.bu.edu
The lab offers a perspective on modern networking with emphasis on scalability, heterogeneity and performance.

MULTI-DIMENSIONAL SIGNAL PROCESSING LABORATORY
W. Clem Karl
mdsp.bu.edu
The lab applies computational imaging to develop statistical models to extract information from diverse and vulnerable data sources.

MULTIMEDIA COMMUNICATIONS LABORATORY
Thomas Little
hulk.bu.edu
Projects focus on ubiquitous distributed computing, specifically in the area of distributed multimedia information systems emphasizing time-dependent and continuous media data.

NETWORKS RESEARCH GROUP
A. Bestavros, M. Crovella, A. Matta
bu.edu/cs/nrg/
Research encompasses network measurement, architectures and protocols. Projects span from the design and implementation to the analysis of networked applications and systems.

OPTIMIZATION AND MACHINE LEARNING LABORATORY
Francesco Orabona
sites.google.com/view/optimal-lab/
The lab explores the research topic at the intersection between machine learning and optimization, with emphasis on adaptive and parameter-free methods.

PASCHALIDIS NETWORK OPTIMIZATION & CONTROL LABORATORY
Ioannis Paschalidis
sites.bu.edu/paschalidis/
Research deals with optimal network design and operation, performance regulation with control algorithms, data science and industrial applications.

RELIABLE COMPUTING LABORATORY
Lev Levitin
bu.edu/reliable
Projects span from the design of computer chips to efficiency testing in hardware, software, signal processing and networks.

ROBOTICS LABORATORY
C. Belta & S. Andersson, J. Baillieul, C. Cassandras, R. Tron
sites.bu.edu/robotics
Research spans several areas of robotics, including motion planning, control, machine learning and computer vision.

SPIRA-LENBURG LABORATORY
Avrum Spira
bumc.bu.edu/compbiomed/labs/spira-lenburg
The lab utilizes post-genomic technologies and computational tools to improve the diagnosis, treatment and prevention of lung disease.

VAJDA LABORATORY
Sandor Vajda
vajdalab.org
The lab focuses on the recognition of proteins and small molecules by protein receptors. The work applies to metabolic control, signal transduction, gene regulation, rational drug and vaccine design.

VISUAL INFORMATION PROCESSING LABORATORY
Prakash Ishwar
vip.bu.edu/
Projects relate to technology transfer in the broad areas of image, video and multimedia processing. This visual information processing research applies to visual surveillance, 3D video and human-computer interfaces.

The Program

THE MISSION

Rather than focus on specific application areas, the SE curriculum offers a holistic view of the field: a fundamental science-based education applicable to all aspects of modeling, analysis, simulation, control, optimization and management of complex systems. The Division cuts across numerous departments at BU to provide a well-rounded perspective of the environment in which a system is housed. An education in systems engineering touches on skill sets based in areas like electronics, mechanics, chemistry, biology, business management, logistics and more. Graduates are equipped with unique skills to adapt to a variety of domains.

GLOBAL DUAL DEGREE

SE partners with Tsinghua University in Beijing for a dual engineering degree program. Students are selected from the Department of Automation at Tsinghua University to enroll in BU's courses for two semesters. Afterwards, they return to Tsinghua University to complete the program. US News & World Report ranks partner Tsinghua University as one of the top global engineering programs.

STUDENT FUNDING

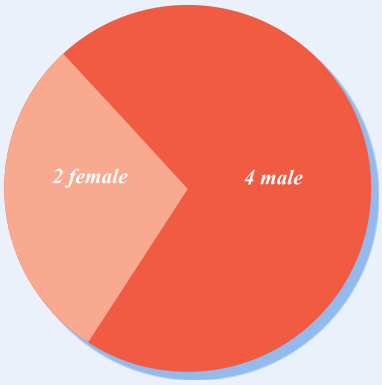
Students are guaranteed funding for five years conditioned on satisfactory academic performance. Currently, 43 PhD students and one MS student are receiving fellowship funding: 35 PhD Doctoral Research Fellows, 4 PhD Systems Fellows, 4 PhD Dean's Fellows, 1 MS Tuition Scholarship.

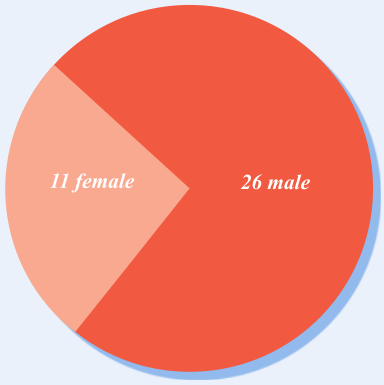
10 YEARS OF GROWTH

This year: 24 degrees awarded.
10 years ago: 5 degrees.

DEMOGRAPHICS

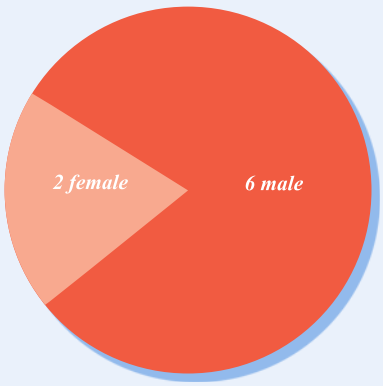
6 DOMESTIC
PHD STUDENTS

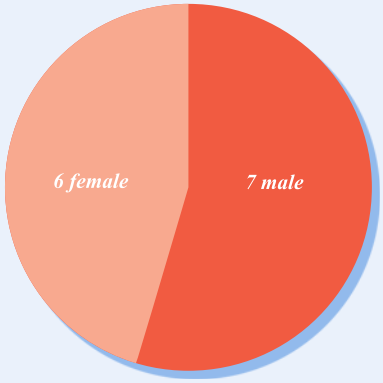




36 INTERNATIONAL
PHD STUDENTS

8 DOMESTIC
MASTERS STUDENTS





13 INTERNATIONAL
MASTERS STUDENTS

PHD DEGREES AWARDED IN 2018-2019

NAN ZHOU, Advised by C. Cassandras, Cooperative Control for Multi-Agent Persistent Monitoring Problems

LIANGXIAO XIN, Advised by D. Starobinski, Cascading Attacks in Wi-Fi Networks: Demonstration and Counter-Measures

FENG NAN, Advised by V. Saligrama, Learning to Predict Under a Budget

IMAN HAGHIGHI, Advised by C. Belta, Spatio-Temporal Logics for Verification and Control of Networked Systems

YUFAN LUO, Advised by S. Andersson, Image Processing Techniques for High-Speed Atomic Force Microscopy

SHUAI WANG, Advised by J. Baillieul, Paradigm and Paradox in Power Networks

INTERNSHIPS

EMILY CHANG Commonwealth Edison

ARMAN KARIMIAN Philips Research

XIAOYU LI Nokia Bell Labs

NOUSHIN MEHDIPOUR Dell Technologies

REBECCA SWASZEK Massachusetts Department of Transportation

TAIYAO WANG Philips Research

INTERNSHIPS CONTINUED

XIAO WANG Mitsubishi Electric Research Laboratories

SALOMÓN WOLLENSTEIN-BETECH IBM Research

FATMA YANIKARA Commonwealth Edison Smart Grid Engineering

TINGTING XU Adobe

HENGHUI ZHU Amazon

Robots Solving Global Challenges

Systems engineers are skillfully suiting robots and computers to fulfill situational needs. Enrolled in one of the top seven robotics programs as recognized by Analytics Insight, BU SE students are "pushing the boundaries of robotic systems to the next level."

GUANG YANG (PHD '20) | Yang works on a surveillance drone project in the Robotics Lab. Yang is responsible for flagging safety concerns and correcting the behavior. He spends his time optimizing algorithms and running tests, getting closer and closer to producing consumer-ready technology.

"You have to constantly check back to the real world application to see [if the calculations] on paper actually make sense in the real world," says Yang. When the drone project is finished, it will have multiple industry applications such as search-and-rescue and crop monitoring.

NOUSHIN MEHDIPOUR (PHD '20) | Mehdipour works at the BU Robotics Lab and takes a theoretical approach to robotics. Her research is a combination of applied machine learning, optimization, data analysis and control theory.

As a third year PhD student, Mehdipour is emerging as a top researcher. She appreciates working in an interdisciplinary environment with scientists from different backgrounds and engineering disciplines.

ARIAN HOUSHMAND (PHD '20) | On the fourth floor of the BU Photonics Center, Houshmand works in the CODES Lab on a self-driving car project, ARPA-E NEXTCAR. His goal is to reduce the amount of energy these cars consume. Traffic increases energy consumption, so Houshmand's team is programing the cars to avoid and also reduce traffic. Houshmand designs algorithms that deploy a communication system between the cars. The system enables cars to share information about traffic patterns and react accordingly.

Houshmand appreciates working on this project for a few reasons. He feels personal satisfation knowing he is helping the environment and appreciates the real-world career experience.

Students studying robotics and autonomous systems at Boston Univeristy get hands-on experience. Houshman tests self-driving cars at M-City in Ann Arbor, Michigan, and conducts local tests in the CODES lab. Earlier this year, Houshmand and his lab mates designed a scaled-down model of M-City to mimic real-life test simulations.

The project is highly collaborative, with contributors based at the University of Delaware, University of Michigan, Oak Ridge National Lab and Bosch.

Guang Yang

Noushin Mehdipour

Arian Houshmand

Video interviews on Instagram and Facebook

Interviews will be published on WeChat when the account launches in Spring 2020.

MAHROO BAHREINIAN
Advisor: R. Tron
Oral Presentation: 2019 Grace Hopper Celebration, USA. "Computational Theory of Robust Localization Verifiability in the Presence of Outlier Measurements."

RUIDI CHEN
Advisor: I. Paschalidis
Journal Publication: Ruidi Chen, Ioannis Ch. Paschalidis, Hiroto Hatabu, Vladimir I. Valtchinov, Jennifer Siegelman. "Detection of unwarranted CT radiation exposure from patient and imaging protocol meta-data using regularized regression." European Journal of Radiology Open, 2019.
Journal Publication: Ruidi Chen, Ioannis Ch. Paschalidis, Michael C. Caramanis, Panagiotis Andrianesis. "Learning from past bids to participate strategically in day-ahead electricity markets." IEEE Transactions on Smart Grid, 2019.
Journal Publication: Ruidi Chen, Ioannis Ch. Paschalidis. "Learning optima personalized treatment rules using robust regression informed K-NN." Nips Machine Learning for Health workshop, 2018.
Journal Publication: Ruidi Chen, Ioannis Ch. Paschalidis. "A robust learning approach for regression models based on distributionally robust optimization." The Journal of Machine Learning Research, 2018.
Conference Publication: 2018 IEEE CDC, USA. "A distributionally robust optimization approach for outlier detection."
Oral Presentation: 2018 IEEE CDC, USA. "A distributionally robust optimization approach for outlier detection."
Award: 2019 Brilliant Bud Award at the 4th annual BU Data Science Day.

IMAN HAGHIGHI
Advisor: C. Belta
Journal Publication: Demarcus Briers, Ashley R. G. Libby, Iman Haghighi, David A. Joy, Bruce R. Conklin, Calin Belta, Todd C. McDevitt. "Self-organized pluripotent stem cell patterning by automated design." SSRN Electronic Journal, 2019.
Conference Publication: 2018 IEEE CDC, USA. "Spatial-temporal pattern synthesis in a network of locally interacting cells."
Award: 2019 Superlative Award for Most Attentive Student at CISE Graduate Student Workshop.

MAJID HEIDARIFAR
Advisor: M. Caramanis
Conference Publication: 2019 IEEE Power and Energy General Meeting, Atlanta, USA. "Efficient load flow techniques based on holomorphic embedding for distribution networks."
Oral Presentation: 2019 IEEE Power and Energy General Meeting, USA. "Efficient load flow techniques based on holomorphic embedding for distribution networks."

ARIAN HOUSHMAND
Advisor: C. Cassandras
Journal Publication: Xiangyu Meng, Arian Houshmand, Christos G. Cassandras. "Hybrid system modeling of multi-agent coverage problems with energy depletion and repletion." IFAC-PapersOnLine, 2018.
Conference Publication: 2018 IEEE ITSC, USA. "Eco-routing of plug-in hybrid electric vehicles in transportation networks."
Conference Publication: 2018 IEEE CDC, USA. "Multi-agent coverage control with energy depletion and repletion."
Conference Publication: 2019 IEEE ITSC, New Zealand. "The penetration rate effect of connected and automated vehicles in mixed traffic routing."
Conference Publication: 2019 ITSC, New Zealand. "Optimal routing and energy management strategies for plug-in hybrid electric vehicles."
Oral Presentation: 2018 IEEE ITSC, USA. "Eco-routing of plug-in hybrid electric vehicles in transportation networks."
Oral Presentation: 2019 ARPA-E Summit, USA. "ARPA-E NEXTCAR."
Award: 2019 Best presentation Award at CISE Graduate Student Workshop.

XIAOYU LI
Advisor: F. Orabona
Conference Publication: 2019 AISTATS, Japan. "On the convergence of stochastic gradient descent with adaptive stepsizes."

YE LIN
Advisor: S. Andersson
Journal Publication: Ye Lin, Sean Andersson. "Investigation of Single Particle Tracking Performance by Different Particle Filter and Smoother Algorithms." Biophysical Journal, 2019.
Conference Publication: 2019 ASCC, Japan. "A 2-step algorithm for the estimation of time-varying single particle tracking models using Maximum Likelihood."

NOUSHIN MEHDIPOUR
Advisor: C. Belta
Conference Publication: 2018 IEEE CDC, USA. "Spatial-temporal pattern synthesis in a network of locally interacting cells."

FRANCISCO PENEDO ALVAREZ
Advisor: C. Belta
Conference Publication: 2018 IEEE CDC, USA. "Control Synthesis for Partial Differential Equations from Spatio-Temporal Specifications."
Oral Presentation: 2018 IEEE CDC, USA. "Control Synthesis for Partial Differential Equations from Spatio-Temporal Specifications."

ATHAR ROSHANDELPOOR
Advisor: P. Vakili
Journal Publication: Emily Ryan, Zoe A. Pollard, Quang-Thinh Ha, Athar Roshandelpoor. "Designing heterogenous hierarchical material systems: a holistic approach to structural and materials design." MRS Communications, 2019.
Student Travel Award: 2019 International Conference on Machine Learning, Diversity & Inclusion Travel Grant.
Award: 2019 Third prize for best presentation at CISE Graduate Student Workshop.

MEHRNOOSH SARMASHGHI
Advisor: U. Eden
Conference Publication: 2019 Science and Nonduality, USA. "Efficient spline regression for neural spiking data."
Conference Publication: 2019 Neuroscience, Chicago, USA. "Integrated statistical and machine learning approach to identify spatial receptive field structure in rat hippocampal and prefrontal cortex populations."

ADAM SONNENBERG
Advisor: B. Suki
Journal Publication: Jarred R. Mondoñedo, Susumu Sato, Tsuyoshi Oguma, Shigeo Muro, Adam H. Sonnenberg, Dean Zeldich, Harikrishnan Parameswaran, Toyohiro Hirai, Béla Suki. "CT Imaging-Based Low-Attenuation Super Clusters in Three Dimensions and the Progression of Emphysema." American College of Chest Physicians/CHEST Journal, 2018.
Conference Publication: 2019 American Thoracic Society, USA. "Markov Chain Simulation of Particle Deposition in the Lung."

REBECCA SWASZEK
Advisor: C. Cassandras
Journal Publication: Rebecca M. A. Swaszek, Christos G. Cassandras. "Receding horizon control for station inventory management in a bike sharing system." IEEE Transactions on Automation Science and Engineering, 2019.
Conference Publication: 2019 IEEE ITSC, New Zealand. "Load balancing in mobility-on-demand systems: reallocation via parametric control using concurrent estimation."
Oral Presentation: 2019 BARI, USA. "Bike sharing system inventory management: Somerville case study."

TAIYAO WANG
Advisor: I. Paschalidis
Journal Publication: Theodora S. Brisimi, Tingting Xu, Taiyao Wang. "Predicting diabetes-related hospitalizations based on electronic health records." Statistical Methods in Medical Research, 2018.
Journal Publication: Meghan Thommes, Taiyao Wang, Qi Zhao, Ioannis C. Paschalidis, Daniel Segrè. "Designing metabolic division of labor in microbial communities." mSystems, 2019.
Oral Presentation: 2019 IEEE ECC, Italy. "Perspective cluster-dependent support vector machines with an application to reducing hospital readmissions."

***Award**: Member of 2019 winning team at WiDS Cambridge Datathon Workshop by Microsoft, Harvard IACS and MIT IDSS.*

***Award**: 2019 Silver Medal for Kaggle*

SALOMON WOLLENSTEIN-BETECH
Advisor: C. Cassandras, I. Paschalidis
Conference Publication: 2019 IEEE ITSC, New Zealand. "The penetration rate effect of connected and automated vehicles in mixed traffic routing."
Oral Presentation: 2019 BARI, USA. "Congestion Maps: A visual interactive data-driven platform tracking annual traffic conditions in the Eastern Massachusetts area."
Student Travel Award: 2019 IEEE ITSS Young-Professionals Traveling Fellow, 2019.

WEI XIAO
Advisor: C. Cassandras, C. Belta
Conference Publication: 2019 ACM/IEEE ICCPS, Canada. "Decentralized meeting control in traffic networks: A control barrier function approach."
Conference Publication: 2019 ACC, USA. "Decentralized optimal merging control for connected and automated vehicles."
Conference Publication: 2019 IEEE ITSC, New Zealand. "Decentralized merging control in traffic networks with noisy vehicle dynamics: A joint optimal control and barrier function approach."

TINGTING XU
Advisor: I. Paschalidis
Journal Publication: Theodora S. Brisimi, Tingting Xu, Taiyao Wang. "Predicting diabetes-related hospitalizations based on electronic health records." Statistical Methods in Medical Research, 2018.
Conference Publication: 2019 ECC, Italy. "Learning models for writing better doctor prescriptions."
Conference Publication: 2019 ACC, USA. "Learning parameterized prescription policies and disease progression dynamic using Markov decision processes."

***Award**: Member of 2019 grand prize winning team at the MIT Policy Hackathon.*

***Award**: 2019 Second place in the Cancer Track of MIT Grand Hack.*

***Award**: Member of 2019 winning team at WiDS Cambridge Datathon Workshop by Microsoft, Harvard IACS and MIT IDSS.*

GUANG YANG
Advisor: C. Belta
Conference Publication: 2019 ACC, USA. "Self-triggered control for safety critical systems using control barrier functions."
Oral Presentation: 2019 ACC, USA. "Self-triggered control for safety critical systems using control barrier functions."

FATMA YANIKARA
Advisor: M. Caramanis
Conference Publication: 2018 IEEE CDC, USA. "Strategic Behavior of Distributed Energy Resources in Energy and Reserves Co-Optimizing Markets."
Oral Presentation: 2018 INFORMS Annual Meeting, USA.
Oral Presentation: 2018 IEEE CDC), USA.

Interdisciplinary Faculty

The SE community is built on a broad-based group of field experts.

COLLEGE OF ARTS AND SCIENCES

Bioinformatics Program
Department of Computer Science
Department of Mathematics and Statistics

COLLEGE OF ENGINEERING

Department of Biomedical Engineering
Department of Electrical and Computer Engineering
Department of Mechanical Engineering
Division of Materials Science and Engineering

QUESTROM SCHOOL OF BUSINESS

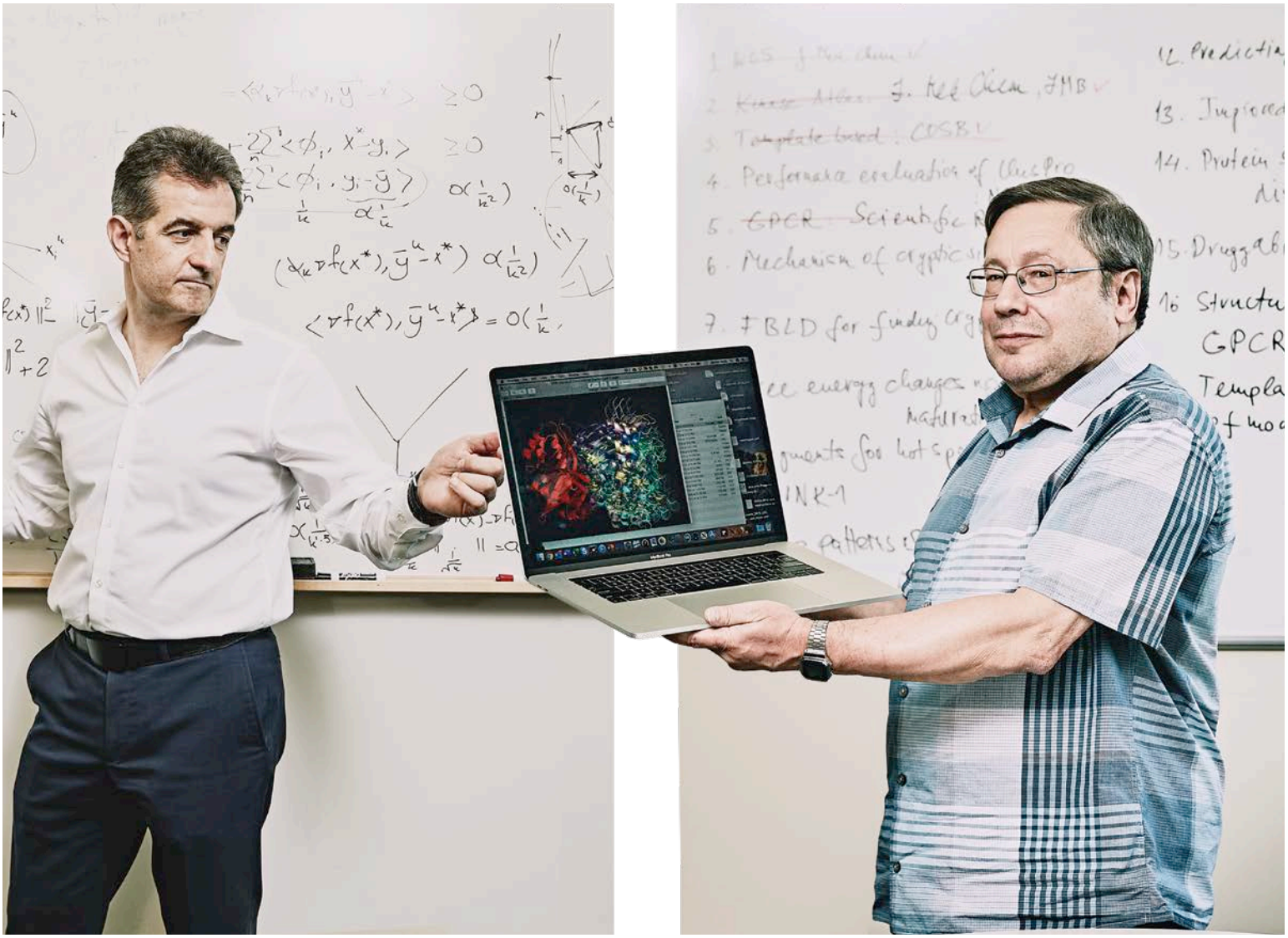
Operations and Technology Management

SCHOOL OF MEDICINE

Division of Computational Biomedicine

10 YEARS OF GROWTH

This year: 32 faculty.
10 years ago: 27 faculty.



Support Through Funding and Students

ESTABLISHING NEW COLLABORATIONS AND STRENGTHENING OLD

Professors Sandor Vajda (PI) and Ioannis Paschalidis have been working together for more than a decade and continue to benefit from the collaborative space created by the Division of Systems Engineering.

Their project involves building an automated server to predict how one protein might bind, or dock, to another one. Experimentally, this is an extremely difficult problem to solve in a biological lab, but by using computational methods, they have developed methodologies for predicting protein structures.

Vajda believes that although this work has direct implications in the biomedical space, the work requires a strong background in mathematics and computational methods—a skill set commonly found in systems engineering graduate students.

Professor Ioannis Paschalidis (left) and Professor Sandor Vajda (right) built an open-source tool that helps researchers across the globe predict protein-protein interactions.

Source: By Liz Sheeley for *ENGineer*

SEAN ANDERSSON
Associate Professor of ME & SE
Robotics, control theory, scanning probe microscopy, single molecule tracking
PhD, University of Maryland, 2003
NSF CAREER Award, 2009

JOHN BAILLIEUL
Distinguished Professor of ME, ECE & SE
Robotics, control of mechanical systems, mathematical system theory, information-based control theory
PhD, Harvard University, 1975
IEEE, IFAC & SIAM Fellow
40th President of the IEEE Control Systems Society, 2006

CALIN BELTA
Professor of ME, ECE, Bioinformatics & SE
Director of Robotics Laboratory
Verification and control of dynamical systems, hybrid systems, symbolic control, robot motion planning and control, gene and metabolic networks
PhD, University of Pennsylvania, 2003
IEEE Fellow, 2017
AFOSR Young Investigator Award, 2008
NSF CAREER Award, 2005

MICHAEL CARAMANIS
Professor of ME & SE
Mathematical programming, control and stochastic systems
PhD, Harvard University, 1976

CHRISTOS CASSANDRAS
Distinguished Professor of ECE and SE
Head of Division of Systems Engineering
Discrete event and hybrid systems, stochastic optimization, simulation, manufacturing systems, communication and sensor networks, multi-agent systems
PhD, Harvard University, 1982
IEEE & IFAC Fellow
IEEE Control Systems Society President, 2012
IBM/IEEE Smarter Planet Challenge prize, 2011 & 2014

DAVID CASTAÑÓN
Professor of ECE & SE
Stochastic control, estimation optimization, image understanding and parallel computation.
PhD, Massachusetts Institute of Technology, 1976
IEEE Fellow, 2019
IEEE Control Systems Society Past President, 2008

PRAKASH ISHWAR
Professor of ECE & SE
Statistical signal processing, machine learning, information theory, secure multi-party computation, visual information processing and analysis
PhD, University of Illinois Urbana, Champaign, 2002
IEEE Transactions on Signal Processing Associate Editor, 2012-2014
NSF CAREER Award, 2005

REBECCA KHURSHID
Assistant Professor of ME & SE
Robotics
PhD, University of Pennsylvania, 2015

BRIAN KULIS
Associate Professor of ECE & SE
Machine learning, statistics, large-scale data analysis
PhD, University of Texas at Austin, 2008
NSF CAREER Award, 2015

ALEX OLSHEVSKY
Assistant Professor of ECE & SE
Control and algorithms for multi-agent systems, sensor networks, distributed optimization, control of large-scale systems
PhD, Massachusetts Institute of Technology, 2010
AFOSR Young Investigator Award, 2015
NSF CAREER Award, 2014

FRANCESCO ORABONA
Assistant Professor of ECE & SE
Machine learning and optimization
PhD, University of Genoa, 2007

IOANNIS PASCHALIDIS
Professor of ECE, BME & SE
Director of CISE
Systems and control, networking, applied probability, optimization, operations research, computational biology, medical informatics, and bioinformatics.
PhD, Massachusetts Institute of Technology, 1996
IEEE Fellow
IEEE Transactions on Control of Network Systems Inaugural Editor-in-Chief
IBM/IEEE Smarter Planet Challenge prize, 2014

JAMES PERKINS
Associate Professor of ME & SE
Real-time scheduling and control of manufacturing systems, supply chain management, resource pricing and congestion control in communications networks
PhD, University of Illinois, Urbana-Champaign, 1993

VENKATESH SALIGRAMA
Professor of ECE & SE
Machine learning, computer vision, information theory, and statistical signal processing
PhD, Massachusetts Institute of Technology, 1997
IEEE Fellow, 2019
NSF CAREER Award, 2005
Presidential Early Career Award, 2003
ONR Young Investigator Award, 2002

DAVID STAROBINSKI
Professor of ECE & SE
Wireless and vehicular networks; QOS and traffic engineering; network economics; cyber security
PhD, Technion, Israel Institute of Technology, 1999
DOE Early Career Award, 2004
NSF CAREER Award, 2002

ROBERTO TRON
Assistant Professor of ME & SE
Intersection of automatic control, robotics and computer vision, with a particular emphasis on applications of Riemannian geometry and on distributed problems involving teams of multiple agents
PhD, Johns Hopkins University, 2012

PIROOZ VAKILI
Associate Professor of ME & SE
Monte Carlo simulation, optimization, computational biology, computational finance
PhD, Harvard University, 1989

HUA WANG
Associate Professor of ME & SE
Associate Head of Division of Systems Engineering
Control of nonlinear phenomena, intelligent systems and control, complex networks, cooperative control, robotics, and applications in biological, energy and aerospace systems
PhD, University of Maryland at College Park, 1993

AZER BESTAVROS
Professor of CS
Director of Hariri Institute
Scalable Internet protocols and systems, application of game theory to the design of systems and networks, resource colocation and management for cloud computing, virtualization and programming support for cyber systems, compositional analysis and verification of complex systems
PhD, Harvard University, 1992

MARK CROVELLA
Professor of CS
Performance evaluation, focused on parallel and networked computer systems, detecting and understanding anomalies in IP networks, efficient network monitoring, network security
PhD, University of Rochester, 1994

MICHAEL GEVELBER
Associate Professor of ME & MSE
Development of control and sensing systems for electrospinning of nanofibers, plasma spray, ebeam deposition, crystal growth, CVD, and intelligent building HVAC systems
PhD, Massachusetts Institute of Technology, 1988

W. CLEM KARL
Professor of ECE & BME
Chairperson of ECE
Computational imaging, detection and estimation, inverse problems, biomedical signal and image processing
PhD, Massachusetts Institute of Technology, 1991

ERIC KOLACZYK
Professor of Mathematics and Statistics
Statistical modeling of instrumental data in temporal, spatial, and network-indexed contexts
PhD, Stanford University, 1994

LEV LEVITIN
Distinguished Professor of ECE
Information theory, physics of communication and computing, complex and organized systems, quantum theory of measurement, reliable communication and computing, bioinformatics
PhD, Gorky University, 1969

WENCHAO LI
Assistant Professor of ECE
A.I. Safety, human cyber physical systems, formal methods, design automation
PhD, University of California, Berkeley, 2013

THOMAS LITTLE
Professor of ECE
Associate Dean of COE Educational Initiatives
Associate Director NSF Smart Lighting ERC
Computer networking, mobile computing, distributed systems, multimedia streaming and storage, visible light communications
PhD, Syracuse University, 1991

ABRAHAM MATTA
Professor of CS
Chairperson of CS
Management and economics of virtualized distributed systems, transport and routing protocols for the Internet and wireless networks, feedback-based control design and analysis, architectures for protocol design and large-scale traffic management, modeling and performance evaluation
PhD, University of Maryland at College Park, 1995

BOBAK NAZER
Associate Professor of ECE
Information theory, communications, signal processing, and neuroscience
PhD, University of California, Berkeley, 2009

EROL PEKÖZ
Professor of Operations and Technology Management
Applied probability and statistics, rare events, Stein's method queuing theory and statistical methods for health care data
PhD, University of California Berkeley, 1995

AVRUM SPIRA
Alexander Graham Bell Professor of Healthcare Entrepreneurship,
Chief of the Division of Computational Biomedicine,
Director of Translational Bioinformatics Program
Lung cancer and COPD genomics, smoking and airway gene expression, bioinformatics
MD, McGill University, 1996

ARI TRACHTENBERG
Professor of ECE
Cyber security, algorithms, error-correcting codes
PhD, University of Illinois, 2000

SANDOR VAJDA
Professor of BME & Chemistry
Director of BMERC
Scientific computing, primarily optimization, computational chemistry and biology, including protein and peptide structure determination, protein engineering, and drug design
PhD, Hungarian Academy of Science, 1983

ADMINISTRATION:

CHRISTOS G. CASSANDRAS
Division Head

HUA WANG
Associate Head

RUTH MASON
Division Director

ELIZABETH FLAGG, ED.M.
Graduate Programs Manager

GABRIELLA MCNEVIN, MS
Communications Manager

VISITING COMMITTEE:

TAMER BASAR
Director, Center for Advanced Study; Swanlund Endowed Chair, Department of Electrical and Computer Engineering; CAS Professor of Electrical and Computer Engineering, Center for Advanced Study; Research Professor, Coordinated Science Laboratory; Research Professor, Information Trust Institute, University of Illinois at Urbana-Champaign

DIMITRIS BERTSIMAS
Boeing Professor of Operations Research and Co-Director, Operations Research Center, Massachusetts Institute of Technology

YU-CHI (LARRY) HO
Professor Emeritus, Harvard University;
Chief Scientist and Chair Professor, Center for Intelligent and Networked Systems, Tsinghua University, Beijing, China

KIRK E. JORDAN
IBM Distinguished Engineer, Data Centric Systems, IBM T.J. Watson Research; Chief Science Officer, IBM Research UK; Member, IBM Academy of Technology

P. R. KUMAR
University Distinguished Professor and College of Engineering Chair in Computer Engineering, Texas A&M University

MARK T. MAYBURY
Vice President and Chief Technology Officer, The MITRE Corporation

STEFAN MIESBACH
Vice President and Director, Unify Inc., Service Practice Circuit

ROBERT R. TENNEY
Former Vice President, BAE Systems Advanced Information Technology

PRAVIN VARAIYA
Professor of Electrical Engineering and Computer Sciences, University of California, Berkeley

POST-DOCS:

PANAGIOTIS ANDRIANESIS
Power systems economics, optimization, distributed algorithms
PhD, University of Thessaly, Greece, 2016

YAO MA
Machine learning, reinforcement learning, online learning
PhD, Tokyo Institute of Technology, 2015

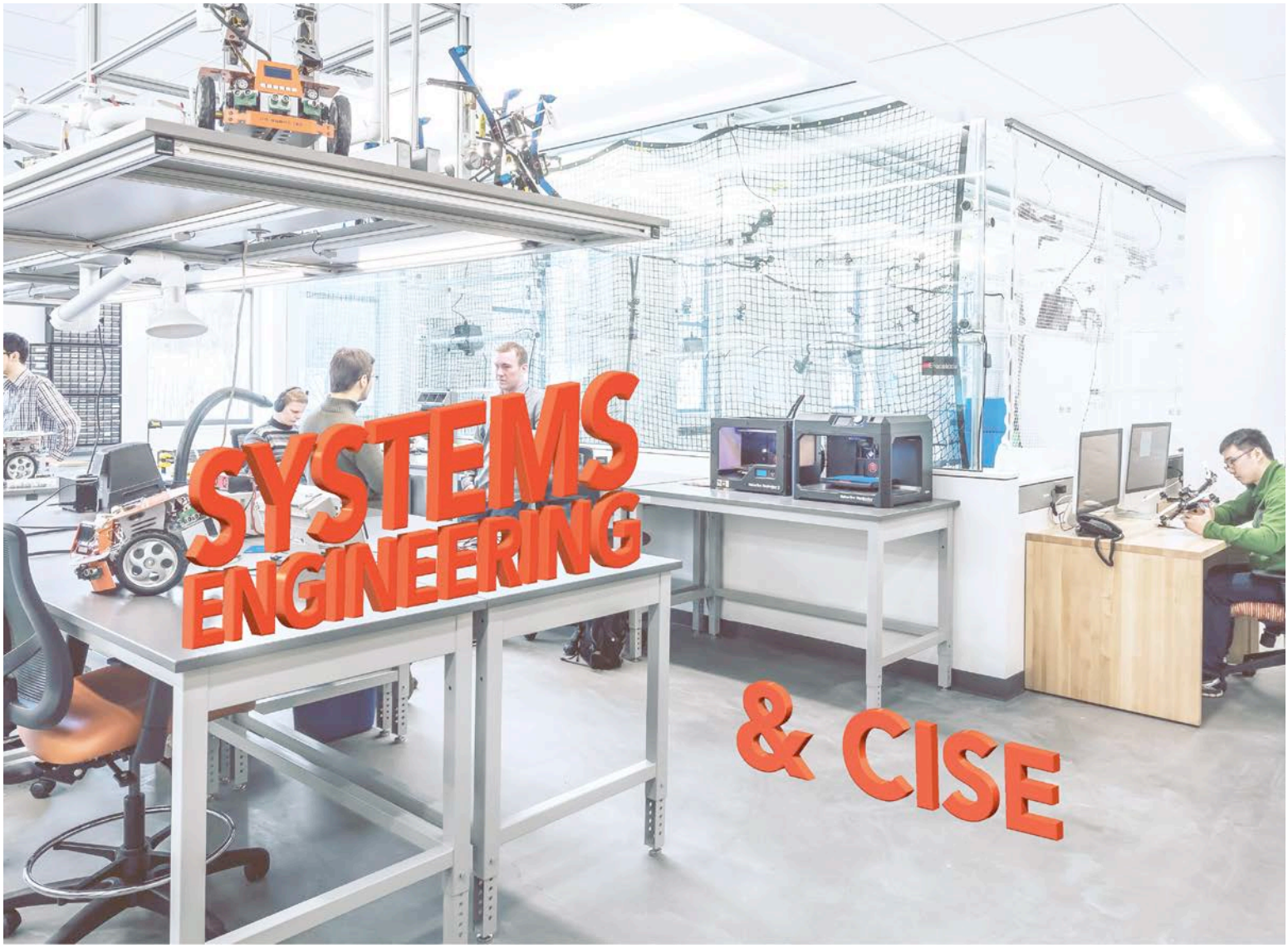
XIANGYU MENG
*Smart city control, distributed algori*thms,
PhD, University of Alberta, Canada, 2014

SHI PU
Distributed optimization, network science, machine learning
PhD, University of Virginia, 2016

CHUANGCHUANG SUN
Optimization algorithms and reinforcement
PhD, The Ohio State University, 2018

GRADUATE COMMITTEE:

Hua Wang, Chair
Sean Andersson
Calin Belta
Alex Olshevsky
Rebecca Khurshid
Elizabeth Flagg



The SE & CISE Partnership

30 professors are assoiated with both SE and CISE.

2 SE professors received CISE seed grants.

12 students were jointly sponsored to attend the Grace Hopper Celebration and Scientista.

29 events were organized by CISE for the joint community this year.

CENTER FOR INFORMATION & SYSTEMS ENGINEERING | CISE is an interdepartmental research center focused on deepening and broadening interdisciplinary research in the study and design of intelligent systems. With 44 faculty affiliates across 3 colleges and 9 departments, CISE researchers advance information and data science to solve complex problems in fields such as autonomous systems, robotics, healthcare, information systems, communications, transportation, energy, and national security. Key research areas include automation, robotics and control; computational biology and medicine; cyber-physical systems; data analytics; energy systems; information sciences; networks and smart cities.

CISE manages a resident scholar program, organizes student events and hosts conferences with government agencies and engineering societies. The center strengthens relationships between faculty and their corporate partners by running weekly seminars, lectures and round table events. In addition, CISE offers grant management services and seed funding.

CISE 2018-2019 FUNDING | Annual expenditures were $7.5 million.

CISE PEOPLE | 6 fellows, 3 IEEE society presidents (past and present), 17 NSF career award recipients, 4 editors-in-chief of a scientific journal (past and present), 6 early career award recipients.

Ioannis Paschalidis, Director
Christina Polyzos, Associate Director
Maureen Stanton, Center Administrator

DR. JULIEN HENDRICKX
Ecole Polytechnique de Louvain
Open Multi-Agent Systems: Arrivals and Departures

DR. MARCIN BALICKI
Philips Research Cambridge
Medical Robotics @ Philips Research

DR. PLAMEN CH. IVANOV
Boston University
The New Field of Network Physiology: Mapping the Human Physiolome

DR. ARIEL ORDA
Technion, Israel Institute of Technology
Network Science - A Network of Sciences

DR. ARIEL ORDA
Technion, Israel Institute of Technology
Some Recent Advances on the Application of Game Theory to Networking

DR. ALEXANDER WYGLINSKI
Worcester Polytechnic Institute
Bumblebees and Vehicular Networking: Intelligent Connectivity on the Road

DR. LEANDROS TASSIULAS
Yale University
Collaborative Information Caching at the Network Edge

DR. JAMES TEE
University of Canterbury, New Zealand
Is Information in the Brain Represented in Continuous or Discrete Form?

DR. LUCA SCHENATO
University of Padova, Italy
Multi-Agent Map-Building: Kalman Filtering Meets Gaussian Processes

DR. JENNIFER DY
Northeastern University
Learning from Complex Medical Data, Clustering and Interpretable

DR. ANDREW GORDON WILSON
Cornell University
Loss Valleys and Generalization in Deep Learning

DR. DANIELA TUNINETTI
University of Illinois at Chicago
Distributed Data Shuffling

DR. ABBAS EL GAMAL
Stanford University
On Exact Distributed Randomness Generation

DR. RAIMUND OBER
Texas A&M University
Quantitative Aspects of the Analysis of Single Molecule Experiments

DR. PRIYA NAGPURKAR
IBM T.J. Watson Research Center
Next Generation Secure Multi-cloud Platform

DR. YARON RACHLIN
MIT Lincoln Labs
Wide Field of View Imaging Using Optical Multiplexing

DR. JULIEN HENDRICKX
UCLouvain, Belgium & Boston University
Automatic Computation of Exact Worst-Case Performance for First-Order Methods

DR. FLAVIO CALMON
Harvard University
Representations, Fairness, and Privacy: Information-Theoretic Tools for Machine Learning

DR. URBASHI MITRA
University of Southern California
Estimation and Communication: Observation Driven Sensor Scheduling

DR. BOB BARMISH
Boston University
On Use of the Expected Logarithmic Growth Criterion: From Gambling to Stock Trading

DR. JACOB ABERNETHY
Georgia Tech
Building Algorithms by Playing Games

DR. ANDY SUN
Georgia Institute of Technology
New Advances in Network Constrained Nonconvex Optimization: Distributed Computation, Matrix Minors, and Dynamic Programming

DR. ALESSANDRO PINTO
United Technologies Research Center, Inc.
Planning via Constrained Markov Decision Processes

DR. SUNGHOON IVAN LEE
UMass Amherst
The Use of Wearable Sensors and Systems in Physical Medicine and Rehabilitations

DR. ASHOK CUTKOSKY
Google
Preconditioned Online Learning without Preconditioning

DR. MENGDI WANG
Princeton University
State Compression and Primal-Dual Reinforcement Learning

DR. EDWARD A. LEE
University of California at Berkeley
A Personal View of Real-Time Computing

DR. JIM KAPINSKI
Toyota Research Institute, North America
Training, Verification, and Bug Finding for AI-Enabled Cyber-Physical Systems

Events listed in order of occurrence.

ROBOTICS & AUTONOMOUS SYSTEMS

$2.4M
Calin Belta directs teams of robots to survey areas with collapsed buildings and debris.

$1M
Roberto Tron is developing disaster relief technology for aerial vehicle search-and-rescue.

HEALTHCARE

$6.6M
Avrum Spira is creating an atlas to characterize pre-cancerous lesions of the airway and lung.

$1.6M
Ioannis Paschalidis develops a system to predict the risk of heart disease and diabetes. More on page 7

ENERGY

$1M
Janusz Konrad (PI), Prakash Ishwar, Thomas Little and Michael Gevelber are developing next-generation people-counting sensors for HVAC systems.

$.3M
Michael Caramanis is working to reform the power market for retail customer participation and distribution network marginal pricing.

SMART CITIES & TRANSPORTATION

$4.4M
Christos Cassandras is advancing the internet-of-cars.

$.5M
Christos Cassandras (PI) and Ioannis Paschalidis are optimizing vehicle routing to ease traffic congestion. More on page 8

INFORMATION SYSTEMS

$8M
Azer Bestavros and Orran Krieger (PI) are developing an open cloud resource in Massachusetts with a user-friendly format.

$.8M
Ari Trachtenberg (PI) and David Starobinski are improving the synchronization of technology.

PhD Student Athar Roshandelpoor works on material development. You can follow her projects on social media.

SE WeChat launching in Spring 2020!

BU DIVISION OF SYSTEMS ENGINEERING
15 Saint Mary's Street, Room 117
Brookline, MA 02446

bu.edu/se
2018-2019 Annual Report