Boston University College of Engineering

Charles DeLisi Distinguished Scholar Award & Lecture

Professor Yannis Paschalidis

(ECE, BME, SE)

2020 Recipient

Yannis Paschalidis is a Professor and Data Science Fellow in Electrical & Computer Engineering, Systems Engineering, Biomedical Engineering, and Computing & Data Sciences at Boston University. He is the director of the Center for Information and Systems Engineering (CISE). He received his bachelor's degree in 1991 from the National Technical University of Athens, Greece, a master's in 1993 and a doctoral degree in 1996 from the Massachusetts Institute of Technology, all in electrical and computer engineering.

He joined the faculty at Boston University in 1996. His current research interests lie in the fields of systems and control, networks, optimization, operations research, computational biology, and medical informatics. He is the author of more than 200 peer-reviewed publications on these topics and has given more than 120 invited lectures.

Paschalidis' work has been recognized with a Faculty Early Career Development Program (CAREER) award from the National Science Foundation; the second prize in the 1997 George E. Nicholson paper competition by INFORMS; and the best student paper award at the WiOpt 2011, the 9th International Symposium of Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks, won by one of his doctoral students for a joint paper; an IBM/Institute of Electrical and Electronics Engineers (IEEE) Smarter Planet Challenge Award; and a finalist best paper award at the IEEE International Conference on Robotics and Automation.

His collaborative work on protein docking has been recognized for best performance in modeling selected protein-protein complexes against 64 other predictor groups at the 2009 Protein Interaction Evaluation Meeting. His recent work on health informatics won an IEEE Computer Society Crowd Sourcing Prize and a best paper award by the International Medical Informatics Associations. He was an invited participant at the Frontiers of Engineering Symposium organized by the National Academy of Engineering, and at the 2014 National Academies Keck Futures Initiative Conference. Paschalidis is a fellow of the IEEE and the founding editor-in-chief of the IEEE Transactions on Control of Network Systems.

Boston University College of Engineering

cordially invites you to a lecture on

Data Science and Optimization Adventures in Computational Biology and Medicine

by

Professor Yannis Paschalidis

Department of Electrical and Computer Engineering
Division of Systems Engineering
Department of Biomedical Engineering
Director, Center for Information and Systems Engineering

ABSTRACT

Optimization methods, and, more broadly, quantitative data-driven reasoning, have been the backbone of engineering systems for a long time. Recently, and at an accelerating pace, researchers are finding applications of these methods in biology and medicine due to a confluence of factors, including our increased understanding of system-level interactions and availability of data.

In this lecture Paschalidis will present several seemingly disparate areas of his work in computational biology and medicine connected through the use of data science and optimization methods. Topics range from the molecular to the whole organism/disease level, and models progress from predictive to prescriptive. Topics will include:

1. Protein docking: Paschalidis will outline a set of algorithms based on optimization and learning methods to predict how proteins associate with other proteins to enable a variety of processes within living cells, characterizing the three-dimensional structure of protein complexes and how they are formed.

2. Metabolic networks: Learning from data collected from bacterial cells, he will describe a method to predict a cell's evolving metabolic objective and characterize cross-feeding synergies in bacterial communities.

3. Predictive health analytics: Motivated by medical applications, he will consider a setting where data, such as electronic health records, may be contaminated with outliers. He and his team have developed a new distributionally robust optimization framework for learning predictive models from data. He will discuss example applications in predicting hospitalizations for chronic disease patients and predicting hospital re-admissions.

4. Data-driven decisions: Beyond predictions, he will discuss methods that can leverage the robust predictive models to make decisions and offer specific personalized prescriptions and recommendations to improve future outcomes. Applications include making treatment recommendations for hypertension and diabetes. Paschalidis will also consider the problem of learning how to make decisions dynamically over time. In this setting, he and his team have developed a method for learning a dynamic control policy by observing actions of an expert. A fascinating application is to infer navigation policies for autonomous vehicles using data from animals navigating complex terrains.

MANUEL EGELE, 2020 EARLY CAREER EXCELLENCE AWARD

Assistant Professor Manuel Egele (ECE) is the College of Engineering's 2020 Early Career Excellence Award winner. Egele's research spans all areas of systems and software security – in particular mobile and embedded systems security, web security, malicious code analysis, embedded systems firmware, and new computer architectural features.

Egele's research has been recognized with two best paper awards and a distinguished paper award at recent computer security conferences, and the Junior Principal Investigator Award of the Austrian Scientists in Northern America network in 2019.

LEI TIAN, 2021 EARLY CAREER EXCELLENCE AWARD

Assistant Professor Lei Tian (ECE, BME) directs the Computational Imaging Systems Lab, where he is developing next-generation imaging systems that synergistically combine optics and computations to achieve novel capabilities, with particular applications in biomedical microscopy and neuroscience. He is a recipient of the NSF CAREER Award, the Hariri Institute Research Incubation Award, and the College of Engineering's Dean's Catalyst Award. Tian is associate editor of *Optics Letters, Biomedical Imaging*, and *IEEE Transactions of Computational Imaging*.

KEITH BROWN, 2021 EARLY CAREER EXCELLENCE AWARD

Assistant Professor Keith Brown (ME, MSE, Physics) studies polymers and smart fluids to determine how useful properties emerge from hierarchical structure. A considerable focus is developing approaches that increase the throughput of materials research using scanning probe lithography, autonomous experimentation, additive manufacturing, and combinatorial chemistry. Brown is recipient of the Minerals Metals and Materials Society's Frontiers of Materials Award, and the Moorman-Simon Interdisciplinary Career Development Professorship. He is a two-time winner of the College of Engineering's Dean's Catalyst Award.

Charles DeLisi

Widely considered the father of the Human Genome Project, Charles DeLisi was an early pioneer in computational molecular biology, and made seminal contributions to theoretical and mathematical immunology. He currently serves as Metcalf Professor of Science and Engineering, and continues to direct the Biomolecular Systems Laboratory, where more than 100 undergraduate, graduate and post-doctoral students have trained.

As Dean of the College of Engineering from 1990 to 2000, he recruited leading researchers in biomedical, manufacturing, aerospace and mechanical engineering, photonics and other engineering fields, establishing a research infrastructure that ultimately propelled the College into the top ranks of engineering graduate programs. In 1999 he founded—and then chaired for more than a decade—BU's Bioinformatics Program, the first such program in the nation.

CHARLES DELISI DISTINGUISHED SCHOLAR AWARD

The Charles DeLisi Distinguished Scholar Award annually honors a single senior faculty member who has helped move his or her field and society forward through outstanding, high-impact research, and provides the recipient with a public forum to discuss his or her work before the Boston University academic community.

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Xin Zhang
Joyce Y. Wong
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