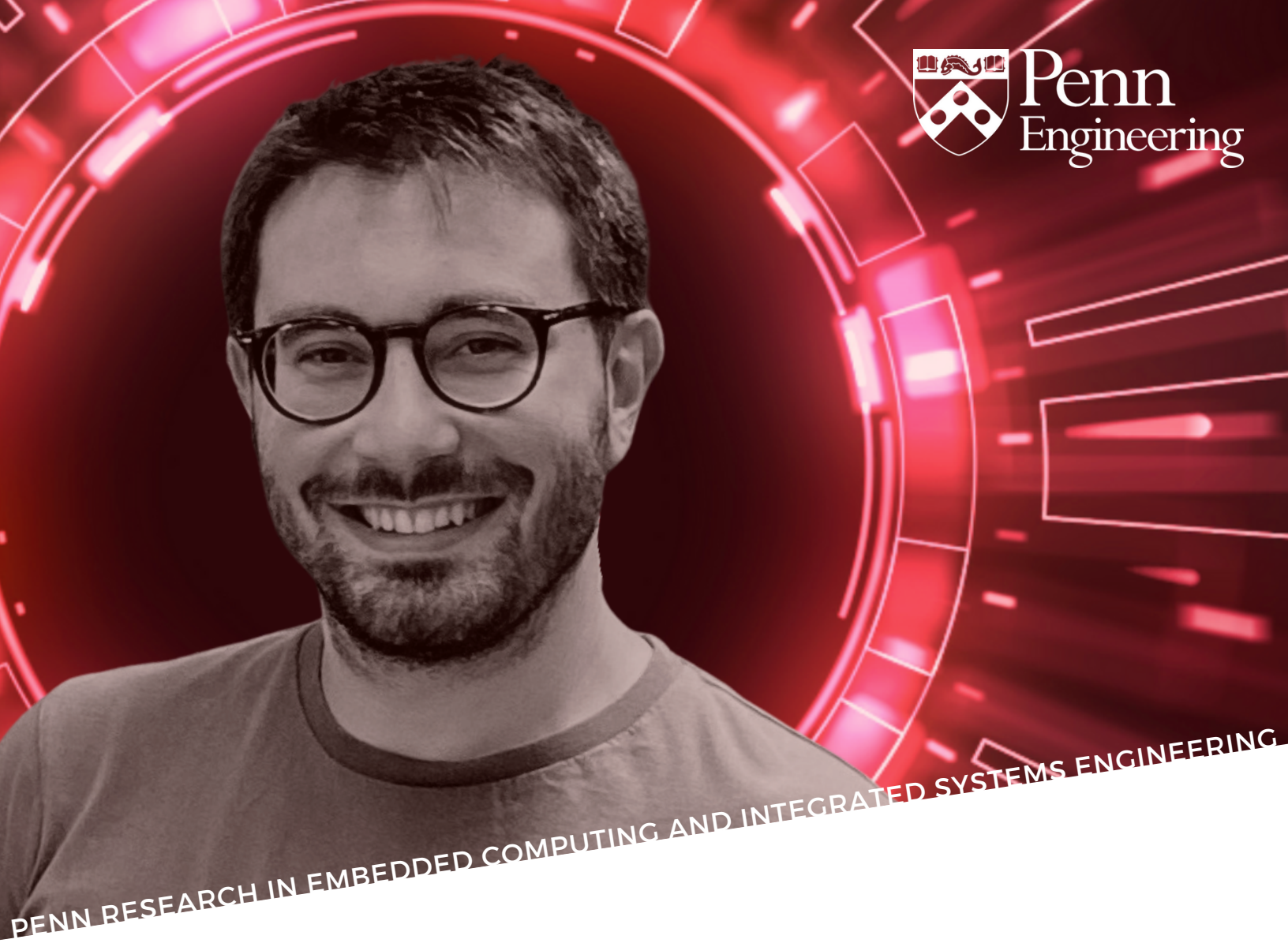


Penn Engineering

PENN RESEARCH IN EMBEDDED COMPUTING AND INTEGRATED SYSTEMS ENGINEERING

IN THE SPOTLIGHT

15 SEP 2023

MICHELE CAPRIO

A PASSION FOR THE IMPRECISE

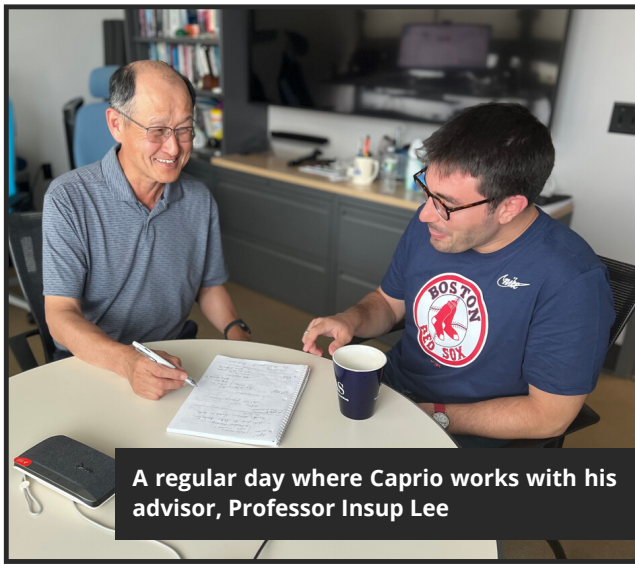
In a world where most people gravitate toward certainty and the concrete, Michele Caprio has developed a passion for the scarce, vague and conflicting.

A postdoctoral researcher at the PRECISE Center in Penn Engineering's Department of Computer and Information Science, Caprio's research focuses on imprecise probabilities (IPs), which allow scholars to do statistical research in situations that involve ambiguity. He is particularly interested in how IPs can be applied to the fields of machine learning and artificial intelligence.

"I think IP techniques have the potential to broaden the topics studied by scholars in any statistics and computer science department," Caprio said. "They could also foster new inter-university collaborations."

Caprio, who earned his Ph.D. in statistics at Duke University and bachelor's and master's degrees in economic and social science at Bocconi University in Italy, has published 10 papers in prominent journals and conferences such as IEEE Access, the International Journal of Approximate Reasoning and UAI (Uncertainty in Artificial Intelligence) 2023.

In a forthcoming paper, Caprio and his collaborators, including fellow Penn Engineering postdoctoral researchers, Research Professor Oleg Sokolsky, and PRECISE Center Director and Cecilia Fitler Moore Professor Insup Lee, developed a deep learning technique – Imprecise Bayesian Neural Networks (IBNN) – that allows researchers to better distinguish between different types of uncertainties and to quantify them.



A regular day where Caprio works with his advisor, Professor Insup Lee

"We applied IBNNs to two case studies," Caprio said. "One, to model blood glucose and insulin dynamics for artificial pancreas control and two, for motion prediction in autonomous driving scenarios. We showed that IBNNs perform better," when compared to standard techniques.

Caprio was the recipient of the IMS Hannan Graduate Student Award and Duke University's Aleane Webb Dissertation Research Fellowship, and was also a finalist for the New England Statistical Society Student Research Award in 2022. He is also an At-Large Member of the Executive Committee of the Society for Imprecise Probabilities: Theories and Applications. Two months ago, he was named IJAR Young Researcher at ISIPTA 2023.

Throughout his career, Caprio has proven to be an excellent mentor for the students he instructed as a teaching assistant and the Ph.D. students he advised as a postdoc. He is also appreciated by his colleagues.

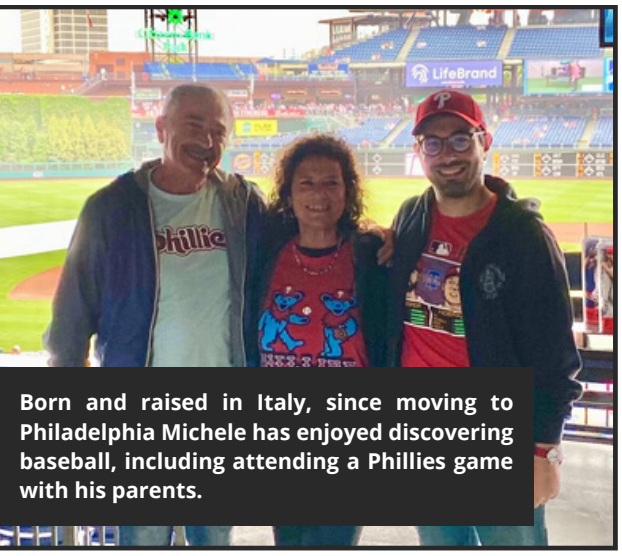
He was a teaching assistant for three courses at Duke, including an intro to statistics course that attracted undergraduate students from several different majors.

"I always tried to make lectures and labs as engaging as possible, with real-life examples and discussions on diversity and equality, both in the field of statistics and in academia more generally," Caprio said.

He also assisted a master-level course where students having backgrounds in statistics, computer science and engineering were asked to apply machine learning techniques to real-life situations. "Teaching the course was an absolute pleasure," Caprio said. "I was always available to the students, even outside of the assigned office hours, and many of them asked me for advice regarding their future career, especially on the million-dollar question of whether or not to enroll in a Ph.D. program."

As a postdoc at Penn, he has helped and supervised Ramneet Kaur and Pengyuan Eric Lu with their Ph.D. dissertations, providing guidance on the theoretical parts of their manuscripts and on contextualizing their research within the broader literature.

"I was happy to see the students become more independent and to see how they have grown as scholars overall," Caprio said.



Born and raised in Italy, since moving to Philadelphia Michele has enjoyed discovering baseball, including attending a Phillies game with his parents.

In addition to his research and teaching goals, Caprio also aspires to make a difference in his field by lessening the adversity that members of minority groups, including women, the LGBTQ+ community, and people of color, face in academia and in the job market more broadly.

"I will structure my lectures, examples, labs and office hours to be as inclusive as possible," Caprio said. "I also think that trying to solve the problem at the college level is too late. I would like to start (or be part of) an organization that holds events for middle school students to expose all pupils – especially those who come from underprivileged backgrounds – to the job of scientist, and the bright, fun, interesting and rewarding future that is possible through college education and, potentially, academia."

Michele will be on the academic market beginning September 2023. If anyone is interested in interviewing Michele, please email precise@seas.upenn.edu to get the most recent version of Michele's CV and to set up a meeting.