

# INDUSTRIAL SYSTEMS & ENGINEERING



Industrial & Systems Engineering at the University of Washington turns transformational ideas into reality. UW ISE faculty and students work toward solutions that enhance productivity, increase safety, and ensure best practices for society's overall well-being.

**The only program of its kind** in the Pacific Northwest, UW ISE is dedicated to fostering a safe, healthy and sustainable future.



## DRIVEN TO CREATE A WORLD OF GOOD

Industrial and systems engineers design, implement and improve integrated systems that account for people, materials, information flow, energy, and infrastructure. The ability to focus on the big picture makes us the most people-oriented engineering discipline.

### VIBRANT INTELLECTUAL COMMUNITY

Our faculty are passionate teachers and researchers. Our undergraduate students are some of the best and brightest, pursuing double degrees in everything from art to psychology. Our graduate students are active teaching and research partners. For us, it's all about community.

### COLLABORATIVE RESEARCH CULTURE

Using mathematical modeling, human factors, and analytical tools, ISEs find ways to unlock a system's true potential. We design, optimize and provide quality solutions that help improve cancer, reduce distracted driving, and minimize the impact of natural disasters.

### THE POWER OF FLEXIBILITY

The most distinctive aspect of industrial engineering is the flexibility it offers. An ISE degree gives graduates the opportunity to work in many different businesses and industries where they continue to draw on their technical background.

# TOP-TIER EDUCATION

## DEGREE PROGRAMS

### Bachelor of Science in Industrial Engineering (BSIE)

Provides students with the technical skills needed to serve as organizational change agents who have a systems view for solving problems.

### Master of Industrial & Systems Engineering (MISE)

A part-time degree program for working professionals that emphasizes technical leadership management and systems engineering. Classes are offered in person or online.

### Master of Science in Industrial Engineering (MSIE)

An advanced, research-oriented program for students pursuing careers in industry, government, or in preparation for a PhD.

### Doctor of Philosophy in Industrial Engineering (PhD)

A rigorous academic research program that prepares students for leadership roles in academia, industry, and top research institutions.

## ACTIVITIES AND PROFESSIONAL DEVELOPMENT

**Student organizations** provide opportunities for students to participate in student led activities, networking, industry visits and other events.

**Professional practice** features talks from ISE alumni and industry partners to prepare undergraduates for the working world.

**Certificate programs** allow working professionals to receive advanced training in Global Integrated Systems Engineering (GISE) or Engineering Leadership.

## OUR STUDENTS

- 128** Undergraduate students
- 57** Bachelor's degrees awarded
- 91** Graduate students
- 16** Master's degrees awarded
- 6** MS degrees awarded
- 6** Ph.D. degrees awarded

## ISE MENTORSHIP PROGRAM

In 2017, ISE launched its mentorship program, a collaborative effort between the ISE department, the ISE Executive Advisory Board, and the UW and Puget Sound chapters of the Institute of Industrial and Systems Engineers. Students are paired with industry mentors from a diverse set of Seattle-area companies to gain insight into professional engineering careers.

*"The ISE mentorship program gave me valuable advice to start my career and navigate the industry."*

**-Kelly Hoang '18**



### PROJECT-BASED LEARNING: STARBUCKS EMPLOYEE DEPLOYMENT TOOL

ISE students developed a dynamic algorithm that improved Starbucks staffing software and reduced customer wait time by more than a minute and increased sales by \$440 per day.

## SENIOR DESIGN PROJECTS

Our graduating seniors have a unique opportunity to partner with companies and organizations in the Pacific Northwest to work on selected company-proposed problems.

Students gain professional experience while participating organizations receive innovative student-proposed solutions, including:

**The Genie Production Line Footprint Optimization** team identified 4M: method, machine, manpower and material, areas of improvement to a Genie production line. They designed a new layout and validated changes using simulation models.

**The Clinic Resource Optimization for UW Medicine Ambulatory Care** team developed a tool that optimized space, physicians and staff to eliminate wasted time and resources.





HEALTHCARE • TRANSPORTATION • MANUFACTURING • CYBERSECURITY • ENERGY • DISASTERS

UW ISE is committed to research with impact. We are finding solutions in an increasingly diverse, dynamic, and technological world. Our faculty and students use data, statistics and mathematical models to understand and improve the interaction of humans with technology.

## FACULTY

- 14** Tenure-track faculty
- 1** Teaching faculty
- 8** Affiliate faculty

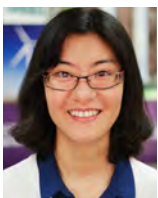
## FACULTY EXCELLENCE

- 3** NSF Early Career Awards
- 3** Fellows - INFORMS, IEEE, IISE
- 2** Excellence in Teaching, IISE
- 4** Outstanding Professor Awards

## NOTABLE INDUSTRY PARTNERS

- Accenture
- Amazon
- Apple
- AT&T
- Boeing
- Genie
- Intel
- Microsoft
- PACCAR
- Physio Control
- Seattle Cancer Care Alliance
- Seattle Children's Hospital
- Toyota
- UPS
- UW Medical Center

## FACULTY SPOTLIGHT



**Shan Liu** researches healthcare interventions to improve patients' health and enable cost-effective care delivery. She received a UW Population Health initiative grant to improve access to trauma care.



**Prashanth Rajivan** examines how human behavior affects cyber security in order to develop effective interventions that prevent attacks, promote safe behaviors and help people to take protective actions.

## TOP RESEARCH FUNDERS

- National Science Foundation
- National Institutes of Health
- U.S. Department of Transportation
- U.S. Navy
- Seattle Children's Hospital
- Toyota

## RESEARCH AREAS

- **Operations research** seeks solutions for decision-making problems, applying optimization and stochastic models to improve design and product flow.
- **Applied statistics and production systems** improves the quality of products and services through data monitoring and analysis of complex systems.
- **Human factors and ergonomics** designs technological systems that improve the safety and efficiency of healthcare, transportation and manufacturing.

## RESEARCH LABS

- **The Disaster Data Science Laboratory** uses data to help others before, during, and after disasters, and provides evidence-based remedies to assist in recovery efforts and build community resilience.
- **The Human and Systems (HAS) Laboratory** investigates the fields of human performance modeling, neuroergonomics, and cognitive engineering to ensure that work systems can better accommodate individual differences.
- **The Human Factors and Statistical Modeling Lab** studies people's behavior and uses a wide range of analytical approaches to solve problems related to human factors and transportation systems.
- **The Scale-independent Multimodal Automated Real Time Systems (SMARTS) Lab** develops automated decision-making methods for cyber-physical systems to achieve optimal and robust performances.



# TRAILBLAZERS

## Ashis Banerjee (Assistant Professor)

directs the Scale-independent Multimodal Automated Real Time Systems Lab. He develops decision-making methods for cyber physical systems at widely varying scales ranging from optically actuated micro-bio systems to large manufacturing enterprises.



**Archis Ghate (Professor)** focuses on sequential decision problems under uncertainty. He has pioneered mathematical optimization models to better adapt cancer radiotherapy to each patient's biological response.



**Chiwei Yan (Assistant Professor)** explores transportation and logistics systems, with a particular focus on optimization, data analytics, stochastic modeling and emerging problems under sharing economy such as Uber's rider surge pricing algorithm.



**Chaoyue Zhao (Assistant Professor)** developed innovative data-driven approaches to enable effective decision-making under uncertainty for power system scheduling problems such as optimal power flow and unit commitment.



**Tolu Abe (Ph.D. '17)** is a senior manager at Amazon. As a Ph.D. student, she developed mathematical models to improve patient outcomes and credits the department's diverse cultures and perspectives with providing a unique collaborative learning environment that enhanced her academic experience.



**Kali Bader (B.S. '96)** is a vice president at Rembold Companies, a real estate company focused on acquisition, financing and development management. She is an adjunct professor at Portland State University and mentors young professionals in real estate.



**Daniel Chen (B.S. '02)** is board director and president of HNA Group Co., Ltd., a global conglomerate encompassing core divisions in aviation, financial services, real estate, tourism and logistics. He holds leadership positions in real estate and aviation-related companies.



**Susie Lu (B.S. '10)** is a data visualization engineer at Netflix where she makes custom data visualization applications to help the business effectively look at the data they collect. "Working collaboratively was a huge part of what I learned from UW ISE."



## YOUNG ALUMNI SPOTLIGHT



**Thanika Painruttanasukho '19** is a UW graduate student studying computer science. While at ISE, she improved transportation logistics in developing countries and evaluated a Seattle homeless assistance program's call center to help them better utilize resources.



**Abby Synder '20** is an industrial engineer at Boeing. At ISE, she received a UW Population Health award for developing an optimization tool that uses route visualization to efficiently distribute vaccines to health centers in rural Mozambique.

"UW ISE is known for a supportive atmosphere, the accessibility of our faculty, and the inclusiveness of our community. Our students take courses from internationally renowned faculty and participate in cutting-edge research to foster a safe and sustainable future. We invite you to join us in creating a world of good."

- Linda Ng Boyle, Professor and Chair



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