2017 Impact Report

2,489
Students Enrolled

56
Faculty

18
IEEE Fellows

$13.5
Million in Research Expenditures

IOWA STATE UNIVERSITY
Department of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering at Iowa State University is steadily on the rise. In 2017, we hired seven new faculty members to join our exceptional team. Our enrollment of undergraduate and graduate students is at an all-time high, with an increase in underrepresented minorities. We have enhanced our ability to support these minority students through our $2 million RIDE grant from the National Science Foundation (NSF), which supports transforming our curriculum and broadening the participation of underrepresented students; as well as our $4 million S-STEM NSF grant, which improves diversity and creates a more inclusive environment. Our students are impacting the world around them, investigating technologies to early-diagnose diseases using nanotechnology, developing enabling technologies for precision agriculture, helping to solve the world's energy problems through the design of a secure smart grid, training the nation on cybersecurity and traveling to Australia to race a first-ever all student-built solar utility vehicle across the continent. Through the years, our influential alumni return to campus to visit us and meet with students, giving back to the program that gave them so much. We are proud of the ways ISU ECpE is changing the world and making it a smarter and better place to live.

Ashfaq

Palmer Department Chair
Electrical and Computer Engineering
Iowa State University

Iowa State University: Ames, Iowa

Biggest university in the state: 36,660 enrolled
College of Engineering record enrollment: 9,669
Electrical and Computer Engineering Department: Established 1909

- 12,625 alumni living around the world
- More than $740,000 in scholarships awarded to students
- Top 25 graduate programs among public programs nationwide
  (U.S. News & World Report 2016)
- Notable alumni inventions: The first electronic digital computer, first portable phone, first handheld scientific calculator and first in-line controller for Apple earbuds

Faculty

21 NSF CAREER Awards

18 IEEE Fellows

16 Endowed Professors

1 American Institute of Ultrasound in Medicine Fellow

2 American Society for Engineering Education Fellows

3 American Association for the Advancement of Science Fellows

1 Institute of Electrical Engineers Fellow

1 Royal Academy of Engineering Fellow

1 Accreditation Board for Engineering Technology Fellow

3 American Physical Society Fellows

56 total faculty

49 Tenured/Tenure Track

4 Non-Tenure Track
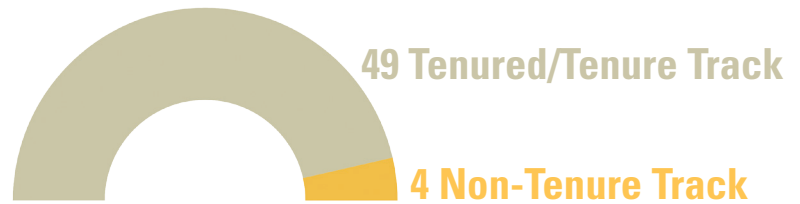
Our faculty are researching...

Bioengineering

The department aims to be a leader in **bioengineering** research, by combining biology, physics, mathematics and engineering concepts to make advancements at the intersection of these disciplines.

Cyber Infrastructure

Through projects in information assurance, cyber-physical security and high performance computing, ECpE is a national leader in **cyber infrastructure** research, education and industry/ educational outreach.

Data, Decisions, Networks, Autonomy

With the ever-expanding capabilities of cyber-physical systems, ECpE recognizes that **data, decisions, networks and autonomy** play fundamental roles in designing complex engineering systems.

Energy Infrastructure

Through decades of experience in power grid design, renewables and numerous other projects, ECpE is internationally known for excellence in **energy infrastructure** research.
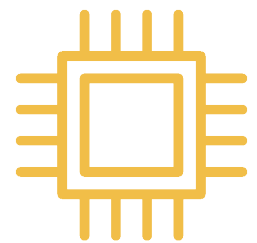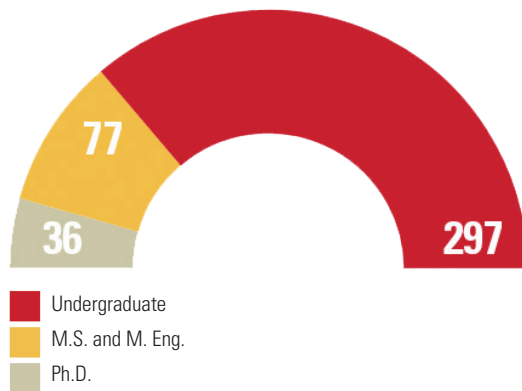
Materials, Devices, Circuits

ECpE recognizes the need to more fully understand and exploit the full potential of research in **materials, devices and circuits**, and is committed to making advances in this area.
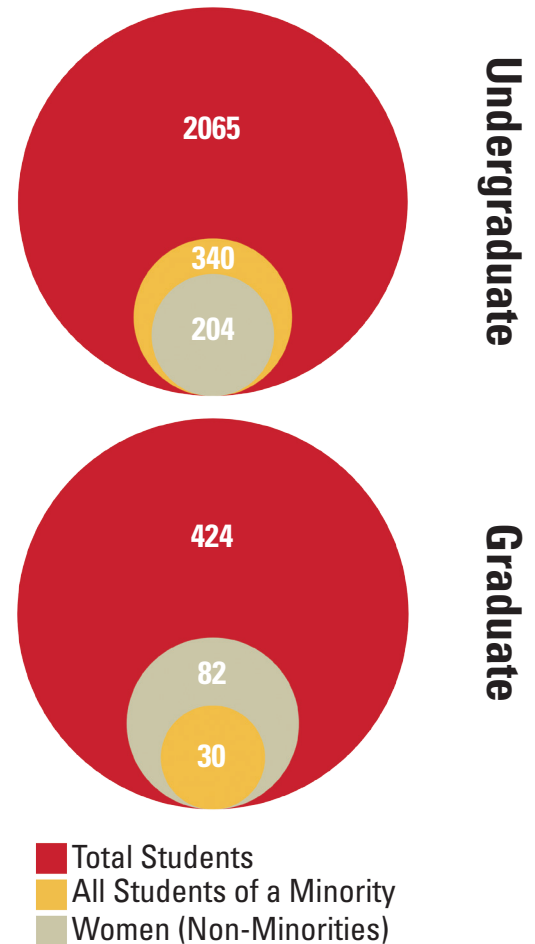
Students

Degrees Awarded 2016-17

- 77 M.S. and M. Eng.
- 36 Ph.D.
- 297 Undergraduate

Legend:
- Undergraduate
- M.S. and M. Eng.
- Ph.D.

90%

of students have jobs within six months of graduation

Students in ECpE

Undergraduate
- 2065
- 340
- 204

Graduate
- 424
- 82
- 30

Legend:
- Total Students
- All Students of a Minority
- Women (Non-Minorities)

Our students are studying...

Undergraduate Students

546 Electrical Engineering

836 Computer Engineering

682 Software Engineering

Graduate Students

- 75 M. Eng.
- 152 M.S.
- 196 Ph.D.
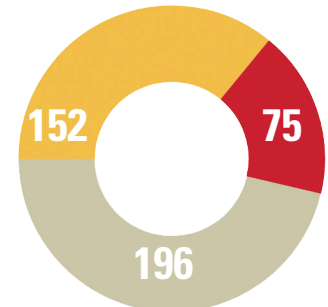
Legend:
- M. Eng.
- M.S.
- Ph.D.

*one completing certificate program

Digital Women is a student organization dedicated to encouraging, supporting and retaining women in computer science, software engineering, electrical engineering, computer engineering and Management Information Systems.

Electrical, Computer and Software Engineers as Leaders (ECSEL) is based upon work supported by the National Science Foundation (NSF). Their mission is to improve diversity and inclusion in electrical, computer and software engineering programs and in the workforce.

The Program for **Women in Science and Engineering (WiSE)** has been providing learning communities, scholarships and professional experience for women since 1986.

The Society of Women Engineers is a student-run organization that is also part of the national professional organization. It came to Iowa State over 40 years ago and currently has more than 200 members.

Racing across the Outback

Four ECpE students, Nathan Coonrod (EE), Lucas Ince (CprE), Jason Cheng (EE) and Jason Baldus (EE), traveled to the Australian Outback with Team PrISUm for the Bridgestone World Solar Challenge. The 3021-kilometer biennial race began on Oct. 8, 2017, in Darwin, Northern Territory Australia, and ended in Adelaide in Southern Australia on Oct. 15.

"The race was a challenge and at times very stressful, but being here in Adelaide and looking back on everything I did to make this car a possibility has been my greatest college experience," Ince said.

photo by Nick Fetty

Research

Leading the Nation in ECE Education

ISU 1 of 7 programs in the U.S. to receive $2 million NSF RED grant

- Reinventing the Instructional and Departmental Enterprise, known as RIDE, is the new **collaborative instructional** model for course design and integration of professional and sociotechnical topics
- RIDE model will broaden **participation** in the field of electrical and computer engineering
- Project activities will emphasize design thinking and **inclusive teaching practices** and **learning** experiences in the classroom
- RIDE will serve as a **model** for electrical and computer engineering departments nationwide

NSF grants multimillion-dollar S-STEM award to ISU ECpE

- Provides **scholarships** and student experiences for diverse, academically talented students with financial need
- Awarded a **$4 million** grant from **NSF** over the next five years, with an additional $1 million to community college partners
- One curricular area is **cybersecurity**
- Project will perform research on how diverse students develop and sustain their **engineering identities** and what drives these students to persist in these programs
- One of the **first** multi-million dollar S-STEM awards in the United States

RIDE faculty and staff members: (L-R) Mani Mina, Mari Kemis, Ashfaq Khokhar, Diane Rover, Sarah Rodriguez, Megan Heitmann, Mack Shelley.

Ten ECpE women at Iowa State were selected to be the first cohort of students benefiting from S-STEM.

$13.5m
in Research Expenditures

Grants awarded to Mehl Professor Manimaran Govindarasu for power grid cyber defense

- Professor Manimaran Govindarasu was awarded NSF grants to optimize **power grid security** and develop a **realistic testbed**
- Project looks at modeling, risk and contingency analysis for the power grid using **game theory**
- Govindarasu received a grant from the U.S. Department of Energy for **preventing attacks**
- Govindarasu hosted **Ukrainian engineers** for a study tour at ISU to learn about preventing future attacks

Seven Federal Grants in Two Years

Assistant Professor Meng Lu receives NSF CAREER Award

- Project will develop next generation **diagnostic technology** using an engineered paper strip
- Has the potential to **drive down the cost** of the health care system
- Lu hopes to bring state-of-the-art diagnostic technology to **patients' homes** in times of need

Assistant Professor Zhaoyu Wang wins seventh federal grant in two years

- **Zhaoyu Wang** received two NSF grants to **modernize energy systems** by laying the data foundation
- Wang was awarded $1.4 million from the U.S. Department of Energy for **data-driven, real-time distribution** grid monitoring and modeling

Research Centers

The **Microelectronics Research Center** (MRC) is a multi-disciplinary center focusing on the study of semiconductor materials, devices and applications. Its purpose is to bring together researchers from engineering and the basic sciences in a collaborative atmosphere to pursue fundamental and applied research in semiconductor electronics and photonics.

The **Electric Power Research Center** (EPRC) promotes and expands research of interest to faculty and the companies who support the center through membership. Goals include maintaining a strong electric power and energy research program and educating students at the B.S., M.S. and Ph.D. levels.

Since 2000, the **Information Assurance Center** (IAC) has strived to become a nationally recognized authority in information assurance research, teaching and outreach. The center is designated as a charter Center of Excellence in Information Assurance by the National Security Agency.

ISU ECpE New Faculty Hires

Andrew Bolstad, Adjunct Assistant Professor, Signal Processing and Computer Engineering
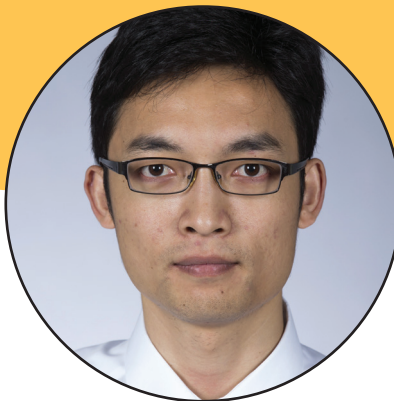
Yongxin Chen, Tenure-Track Assistant Professor, Controls

Henry Duwe, Tenure-Track Assistant Professor, Computer and Software Engineering

Cheng Huang, Tenure-Track Assistant Professor, Microelectronics and VLSI

Goce Trajcevski, Tenure-Track Associate Professor, Software Engineering

Hongwei Zhang, Associate Professor with Tenure, Computer Network Systems and Software Engineering