The Department of Electrical and Computer Engineering at The University of Texas at Austin is uniquely positioned to make a lasting impact on engineering education and our nation’s economic competitiveness.

On the eve of our move into the new Engineering Education and Research Center (EERC) in July 2017, we have been asking deep questions about the rise of disruptive technologies and their societal impacts, commoditization, and implications on how we train our students so that they succeed in the challenges they will experience not tomorrow, but in decades to come. These changes force us to re-examine the definition of an electrical or computer engineer.

In particular, what should we be teaching the next generation of computer and electrical engineers, why are we teaching what we are teaching and how should we adapt our engineering education?

- Why should our students come to the classroom?
- How do we leverage the technologies we are creating as electrical and computer engineers to train the next generation of disruptive innovators?
- How do we teach our students to take risks and learn outside of the classroom?
- How do we increase diversity in our student population to prepare them for the diversity they will encounter in the workplace and help them grasp the needs of an even more diverse world population?
- How should our faculty and students carefully determine their research projects in order to transform industry or create a new market or product category?

To answer these questions and prepare for future ones, we are embarking on an ambitious curriculum reform.

We will leverage the capabilities of the new EERC and the technologies we will deploy inside, in collaboration with key companies. Our alumni, students, faculty, industry partners, and collaborators across campus are actively engaged in crafting this new curriculum, which we will launch next fall. We will design the curriculum to be highly flexible, enhanced with additional design opportunities and programs to collaborate with alumni in industry.

I am very excited, and feel truly blessed, to be at Texas ECE at this juncture, striving to keep up with our community as they deliver the next wave of disruptive innovations. Our accomplishments are made possible and sustained by the generous time and financial support of all our friends and alumni like you.
**Measuring Impact**

**Students**

U.S. News & World Report Program Rankings

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>9th</td>
</tr>
<tr>
<td>Computer</td>
<td>7th</td>
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</tbody>
</table>

**Undergraduate Students By Technical Core**

- Electronics & Integrated Systems: 15.3%
- Fields, Waves, & Electromagnetic Systems: 2.4%
- Energy Systems & Renewable Energy: 12.6%
- Communications, Signal Processing, Networks, & Systems: 9.1%
- Software Engineering & Design: 35.5%
- Computer Architecture & Embedded Systems: 22.6%

<table>
<thead>
<tr>
<th>Percentage of Female Students in Freshman Class</th>
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</thead>
<tbody>
<tr>
<td>2010: 10%</td>
</tr>
<tr>
<td>2016: 22%</td>
</tr>
</tbody>
</table>

**Undergraduate Admissions**

- Total Undergraduates: 1,539
  - Female: 15%
  - Underrepresented Minorities: 24%

<table>
<thead>
<tr>
<th>Year</th>
<th>Applied</th>
<th>Admitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2,376</td>
<td>2,176</td>
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<td>11%</td>
<td>10%</td>
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</table>

In 2016, Texas ECE received a record number of applications.

**Graduate Students By Primary Research Area**

- Software Engineering: 2.4%
- Computer Engineering: 8.06%
- Architecture, Computer Systems, and Embedded Systems: 2.4%
- Decision, Information, and Communications Engineering: 15.05%
- Biomedical Engineering: 2.4%
- Integrated Circuits & Systems: 19.04%
- Integrated BSEE/MSE Program: 1.1%
- Energy Systems: 16.47%
- Plasma/Quantum Electronics and Optics: 3.09%
- Materials Science: 2.5%
- Nanoelectronics & Nanotechnology: 12.81%
- Electromagnetics & Acoustics: 5.83%

<table>
<thead>
<tr>
<th>Year</th>
<th>Total PhD Students</th>
<th>Total MS Students</th>
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<tbody>
<tr>
<td>2010</td>
<td>406</td>
<td>262</td>
</tr>
<tr>
<td>2016</td>
<td>2,176</td>
<td>1,951</td>
</tr>
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<td>9%</td>
</tr>
<tr>
<td>2015</td>
<td>195</td>
<td>8%</td>
</tr>
<tr>
<td>2016</td>
<td>188</td>
<td>7%</td>
</tr>
</tbody>
</table>

**Electrical Engineering**

- 9th

**Computer Engineering**

- 11th

**Measuring Impact**

**Faculty**

**Faculty Endowments**

- $51,833,149 in endowed positions including
  - 13 Chairs
  - 20 Fellowships
  - 15 Professorships
  - 13 Chairs
  - 20 Fellowships
  - 15 Professorships

**Current faculty includes**

- 27 IEEE Fellows
- 2 National Academy of Engineering Members
- 3 ACM Fellows
- 12 NSF CAREER Awards
- 14 DOD/ONR Young Investigator Awards
- 3 NSF PECASE Awards

**New Faculty**

Texas ECE will be adding 10+ new faculty in the next two years.

- Dr. Andrea Thomaz
  - Assoc. Professor
- Dr. Edison Thomaz
  - Research Asst. Professor
- Dr. Dan Wasserman
  - Assoc. Professor

**Faculty Innovation**

Prof. Andrea Alù awarded the 2016 Simons Investigators in Physics award

Prof. Alù’s work on the manipulation of light in artificial materials and metamaterials has shown how clever designs may surpass what had previously been thought to be limitations on wave propagation in materials. He has developed new concepts for cloaking, one-way propagation of waves in materials, dramatic enhancement of nonlinearities in nanostructures, and ultrathin optical devices based on metasurfaces and twisted metamaterials.

Prof. Deji Akinwande Receives Presidential Early Career Award for Scientists and Engineers

Prof. Akinwande is known for his groundbreaking research on nanomaterials, sensors, devices and flexible technology. He is considered one of the top researchers in the world in the areas of graphene, silicon electronics and 2-D nanomaterials for use in flexible electronics.
Measuring Impact
Research

5G • Real-time data analytics • Cybersecurity • Man-machine symbiosis • Cloud storage • Imaging and display • Identity management
Computer architecture • Software testing • Pervasive computing • EM simulations • Metamaterials • CMOS RF electronics • MEMS audio transducers
Flexible electronics • Graphene/silicene devices and electronics • Photonics • Nanomanufacturing for mobile computing

Research Expenditures

<table>
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<tr>
<th>Year</th>
<th>Amount (USD)</th>
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<tbody>
<tr>
<td>2015-2016</td>
<td>$20,825,855</td>
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<tr>
<td>2014-2015</td>
<td>$20,396,030</td>
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<td>2013-2014</td>
<td>$19,999,208</td>
</tr>
<tr>
<td>2012-2013</td>
<td>$19,241,678</td>
</tr>
</tbody>
</table>

**8%** since 2012

Research Highlights

**Silicene Transistor Named to Discover Magazine’s Top 100 Stories of 2015**

Prof. Deji Akinwande and his team’s first-of-their-kind devices represent the thinnest of any semiconductor material, a long-standing dream of the chip industry, and could pave the way for future generations of faster computer chips.

**Prof. Ananth Dodabalpur** has demonstrated that the performance of inkjet-printed carbon nanotube-based transistors with relatively small channel lengths is almost comparable to that of aligned carbon nanotube-based transistors made with more conventional methods that are more complex and expensive.

**New “GreenWeb” Tools Aim to Create an Energy-Efficient Web**

To help mobile device users maximize their limited battery storage, Prof. Vijay Janapa Reddi and graduate student Yuhao Zhu have developed what they are calling “GreenWeb,” a set of web programming language extensions that enable web developers to have more flexibility and control over the energy consumption of a website. The researchers have made the framework available to the public.

Two teams led by Texas ECE awarded unprecedented Multidisciplinary University Research Initiative (MURI) projects for the same topic.

After a competitive process, MURI grants were awarded to two teams led by principal investigators Andrea Alù and Ray Chen of Texas ECE, both in the area of Attojoule Nanooptoelectronics.

Prof. Andrea Alù and team received $8.8 million to fund work aimed at introducing and developing novel concepts to model, design, analyze, fabricate, and characterize ultralow-power, ultrafast, high-density, compact, scalable, optoelectronic nanodevices for the next generation of integrated nanophotonic systems.

Prof. Ray Chen and team received $6.5 million for their work in the field of attojoule nanooptoelectronics. Chen’s team will develop solutions to reduce the power consumption and increase the bandwidth of data communications for data centers and computing systems using innovative nanophotonic devices.

**National Science Foundation funds Texas Nanofabrication Facility**

The National Science Foundation will provide funding over six years to create the **Texas Nanofabrication Facility**. The goal of the program is to open UT Austin’s nanotechnology characterization, fabrication, metrology, and other tools and capabilities to outside users, encouraging economic growth in Texas for nano-focused businesses and startups. Future plans include involving the Dell Medical School deeply in National Nanotechnology Coordinated Infrastructure (NNCI) activities.

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**Defense Secretary Ash Carter Announces Defense Innovation Unit Experimental (DIUx) Presence in Austin**

“Austin’s commitment to innovation, access to talent and academia, as well as the department’s longstanding ties to Texas make this an ideal next location for DIUx,” said Secretary Carter.

**Secretary of State John Kerry meets with ECE faculty**

Faculty discussed advancements taking place in renewable energy and showed Kerry the progress they are making in alternative energy and renewable technologies, from solar cells, to grid infrastructure, to biofuels.
Measuring Impact
Vision

Next-Gen Education
Massive Open Online Courses
Texas ECE recently launched its second MOOC, “Real-Time Bluetooth Networks—Shape the World,” an online class based in hands-on learning that teaches real-time operating systems with Bluetooth connectivity.

Project-Based Learning
Texas ECE has a hands-on learning philosophy to create graduates with the necessary skills that will best translate to industry or academic research.

Integrated BSEE/MSE Program
Increasingly, in fields related to ECE, the MS degree is becoming the “terminal” degree. This program offers a smooth, accelerated connection between the BSEE degree and the MSE degree.

In the past five years, more than 35 corporate partners have collaborated on 165 capstone design projects. Students work in teams to design and build potential solutions to problems identified by industry partners. Texas ECE currently offers projects that are honors-based, and plans are underway to create (under-level) and interdisciplinary capstone projects with industry collaboration and support. Plans are also underway to develop an industry panel of project judges.

Cameron International, an industry partner, shared its view of the projects:
“It is a good opportunity to advance the state of knowledge and readiness of a technique or technology and, through mentoring students, to impart a greater understanding of industrial priorities and processes to the next generation of engineers.”

Entrepreneurship
Longhorn Startup
An enterprising program led by award-winning Professor of Innovation Bob Metcalfe, Entrepreneur-in-Residence Ben Dyer, and Specialist of Computer Science Joshua Baer, fostering interdisciplinary startup innovation for undergrads, faculty, and tech leaders.

Texas ECE student Ashar Malik helps develop an app that engages and connects students at The University of Texas at Austin

Texas ECE undergrad Ashar Malik, along with Texas Physics senior Eric Ngo, recently launched an app named “Kickit,” which helps students around the campus initiate spontaneous events and community activities.

Partnersing with Industry
The Accreditation Board for Engineering and Technology (ABET) recently highlighted Texas ECE’s strong industrial relations and programs as a particular strength.

“...