



# Impact Report 2015-2016



The University of Texas at Austin  
**Electrical and Computer  
Engineering**  
*Cockrell School of Engineering*

From the Chair  
**Dr. Ahmed Tewfik**

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?

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

- 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?

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.

A handwritten signature in black ink that reads "Ahmed Tewfik".



## A New Era for Texas ECE

Set to open in 2017, the Engineering Education and Research Center (EERC) will further our culture of innovation and transform engineering education through cross-disciplinary teaching and research.



**Hands-on research and design-centric multidisciplinary instruction**



**21st-century teaching and research labs will enhance time-tested instructional methodologies**



# Measuring Impact Students

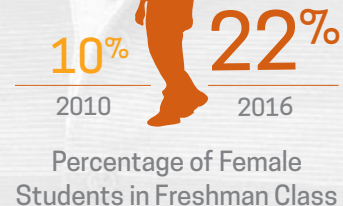
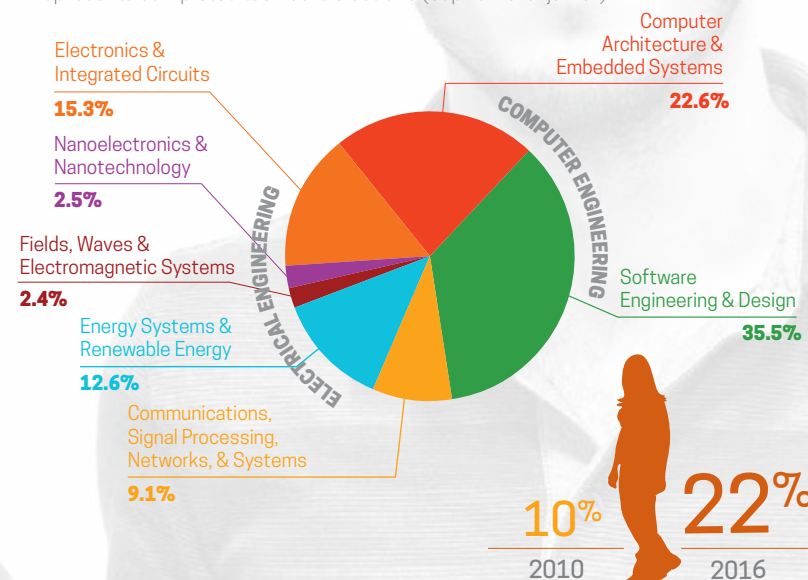
U.S. News & World Report  
Program Rankings

Source: U.S. News and World Report -  
Top Engineering Schools 2017



## Undergraduate Students By Technical Core

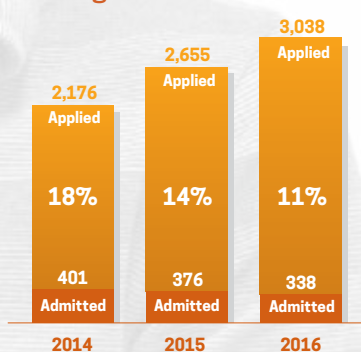
\*Represents completed tech core elections (sophomore/junior)



1,539 Total Undergraduates

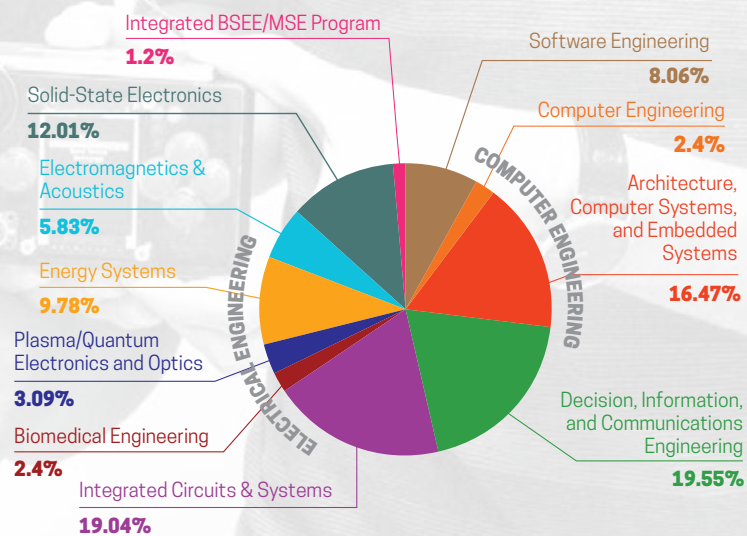
15% Female  
24% Underrepresented Minorities

## Undergraduate Admissions



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

## Graduate Students By Primary Research Area

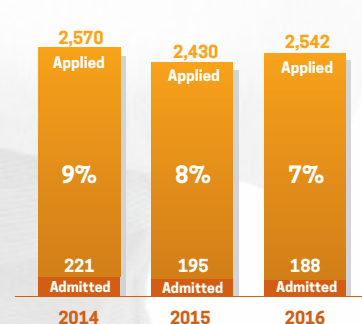


406 Total PhD Students

262 Total MS Students

16% Female  
4% Underrepresented Minorities

## Graduate Admissions



# Measuring Impact Faculty

## Faculty Endowments

\$51,833,149

in endowed positions including

13 Chairs  
20 Fellowships  
15 Professorships

## Current faculty includes

27 IEEE Fellows  
2 National Academy of Engineering Members  
3 ACM Fellows

Our faculty have been recognized with

29 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

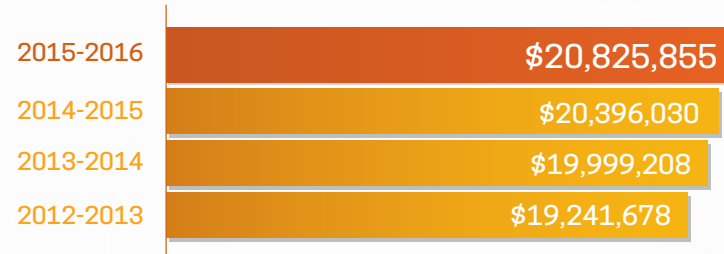
Prof. Akinwande is known for his groundbreaking research on nanomaterials, sensors, devices and flexible technology. He is considered one of the top researchers in the world in the areas of graphene, silicon electronics and 2-D nanomaterials for use in flexible electronics.



# 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



↑8%  
since 2012

## Research Highlights

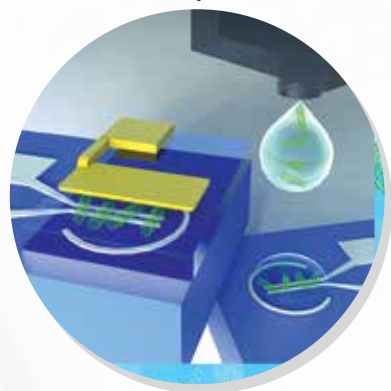
### Printing the Future of Electronics

**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.



### 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.



### 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 than ever before 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 Nanophotonics.

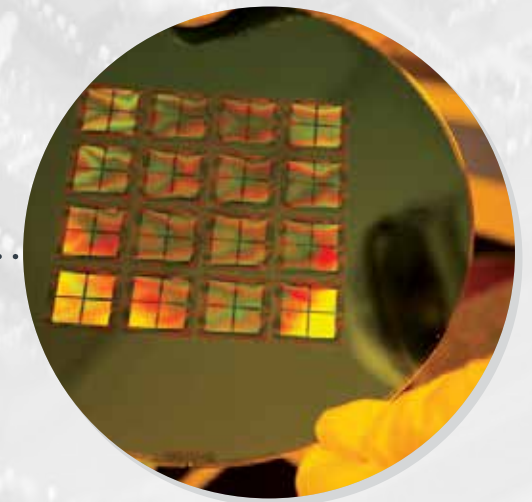
**Prof. Andrea Alù** and team received \$8.8 million to fund work aimed at introducing and developing novel concepts to model, design, analyze, fabricate and characterize ultralow-power, ultrafast, high-density, compact, scalable, optoelectronic nanodevices for the next generation of integrated nanophotonic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



**Prof. Ray Chen** and team received \$6.5 million for their work in the field of attojoule nanophotonics. 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.



### 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

# Teaching + Research + Disruptive Innovation

## 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.



## 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.



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 junior-level and interdisciplinary capstone projects with industry collaboration and support. Plans are also underway to develop an industry panel of project judges.

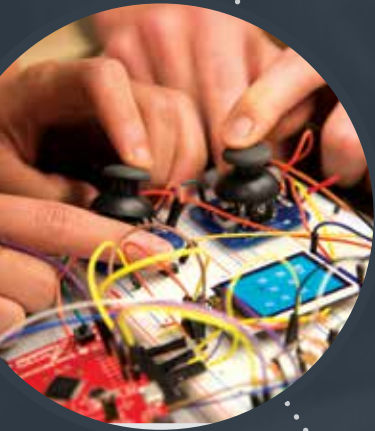
**Cameron International**, an industry partner, shared its view of the projects:

"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."

## Partnering with Industry

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





Department of Electrical and Computer Engineering  
The University of Texas at Austin  
1616 Guadalupe St. Austin, TX 78701

[ece.utexas.edu](http://ece.utexas.edu)

connect with us



[utexasECE](https://www.facebook.com/utexasECE)   [@utexasECE](https://twitter.com/utexasECE)



The University of Texas at Austin  
WHAT STARTS HERE CHANGES THE WORLD