

DREAM DESIGN BUILD

2018-2019
ANNUAL REPORT



[+] From the Chair



I am pleased to present the 2018-2019 annual report for the Georgia Tech School of Electrical and Computer Engineering (ECE). This report showcases our amazing students, faculty, and staff, and their accomplishments and activities. Ultimately, it all comes down to people, and anything impactful that we do—or hope to do—for our research and academic communities and for the City of Atlanta and across the state, nation, and world relies on the passion, creativity, and hard work of the people in ECE.

It is a privilege to support and promote our diverse and inspiring activities, like the launch of the Interdisciplinary Design Commons makerspace in the Van Leer Rotunda, a record-breaking research funding portfolio of over \$68 million, and programs that help people lead richer and more fulfilling lives. These activities stand for the priorities that I believe are important for ECE and its future—people, culture, and reaching out.

We are taking on today's (and tomorrow's) big issues and making advances in areas like biomedical devices, cybersecurity, robotics, and electronics technologies. At the same

time, the ingenuity and compassion that shine through our work and extracurricular activities are key to building community in ECE and at Georgia Tech, and even making the world a better place.

In the last year, I have spent much time on the road, getting to know our alumni, corporate and government partners, and friends. It is humbling to represent a school that has produced so many amazing graduates, and it is an honor to work with the companies, agencies, and organizations that are part of the extended ECE family. Whether you are new to ECE or a longtime supporter, we invite you to join us at being at the center of dreaming, designing, and getting it done!

Sincerely,

Magnus Egerstedt
Professor and Steve W. Chaddick School Chair

[+] ECE Overview



[RANKINGS]

Graduate and Undergraduate Rankings
U.S. News & World Report

#4

E.E. undergraduate program

#5

Cmp.E. undergraduate program

#6

E.E. graduate program

#5

Cmp.E. graduate program



[ENROLLMENT]

2,592

overall total

1,409

total undergraduate enrollment, FY 19

755 B.S.E.E. // **654** B.S.Cmp.E.

19% female
19% underrepresented minorities

1,183

total graduate enrollment, FY 19

577 M.S.E.C.E.
7 M.S. Bioengineering
547 Ph.D. E.C.E.
15 Ph.D. Bioengineering
33 Ph.D. Robotics
4 Non-degree seeking

20% female
8% underrepresented minorities



[DEGREES]

782

overall total

341

total undergraduate degrees awarded, FY 19

190 B.S.E.E. // **151** B.S.Cmp.E.

16% female
19% underrepresented minorities

441

total graduate degrees awarded, FY 19

350 M.S.E.C.E.
4 M.S. Bioengineering
83 Ph.D. E.C.E.
2 Ph.D. Bioengineering
2 Ph.D. Robotics

22% female
10% underrepresented minorities

[+] Interdisciplinary Design Commons

Georgia Tech Opens Newest Student Makerspace

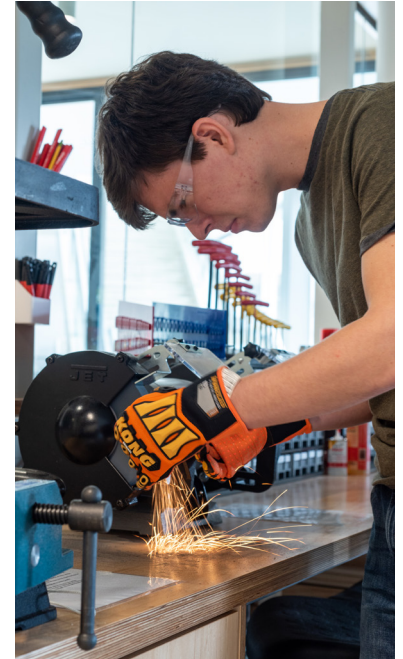
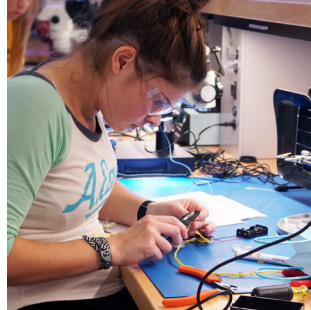
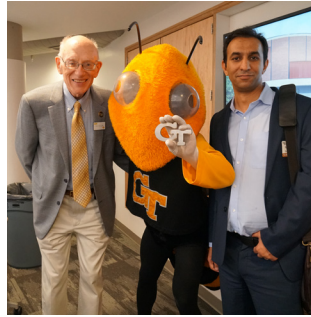
What used to be an auditorium on Georgia Tech's campus is now the largest electronics-oriented student makerspace in the country.

The new Van Leer Interdisciplinary Design Commons (IDC) opened to students in September 2018. This facility offers students from all majors a hands-on learning environment where they can work together to solve technology design challenges.

Any student who comes to the center with an idea will be able to leave with a prototype they built, according to Randy Deng, president of [The Hive](#), the student group overseeing the space. The IDC and The Hive provide students with equipment, assistance, and most importantly, a friendly, collaborative community. The makerspace is fully staffed and run by trained student instructors from a variety of majors.

The IDC is a three-floor building, and each floor has a different technical focus. The first floor features a woodshop, 3D printers, laser cutters, and a plasma cutter. The second hosts lab benches equipped with function generators, multimeters, power supplies, soldering irons, and additional benchtop equipment. The third floor includes computers and embedded systems equipment, as well as open meeting space.

The \$11 million renovation of Van Leer received financial support from alumni and corporate donors. This open, beautifully designed makerspace provides access to premier equipment that is industry standard, giving students access to hands-on design projects that are woven throughout the curriculum.



Thank You to IDC Donors

The School is grateful to the following donors for contributing major gift support to the IDC.

Texas Instruments
Harris Corporation
Murata Electronics
General Motors
Warren L. Batts

Steve W. Chaddick
H. Allen Ecker
Randall E. Poliner
Gene Sapp, Jr.
Aleksander Szlam

Thank You to The Hive's Founding Students

The School recognizes the monumental effort of these students in founding [The Hive](#) and establishing the foundation for future leadership in the IDC.

Latifah Almaghrabi
Yilun Chen
William Cuthbertson
Randy Deng
Marites Hendrix

Hiba Murali
Satwik Nandala
Jefferson Patz
Lukas Yoder

[+] Students & Student Groups

ECE student groups provide outlets for community building, K-12 outreach and service, and professional development. Our students also participate in interdisciplinary clubs and many social, professional, and cultural organizations at Georgia Tech.

[Student Groups]

[ECE Ambassadors](#) • [ECE Graduate Student Organization](#) • [Eta Kappa Nu](#) • [Georgia Tech IEEE The Hive](#) • [Women in Electrical and Computer Engineering](#)

[Award Winners]

Our students were honored at ECE's annual Roger P. Webb Awards Program and at campus award ceremonies. This past spring, Devleena Das received the highest accolade presented to an undergraduate female engineering student, and Rafael Marin received the highest award presented to graduate teaching assistants.

Georgia Tech Awards

Devleena Das | [Helen Grenga Outstanding Woman Engineer Award](#)

Razi Dehghannasiri, Sean Rodrigues | [Sigma Xi Best Ph.D. Thesis Award](#)

Nicholas Joaquin, Subhachote (Shane) Pornprinya | [College of Engineering Honors Day Awards](#)

Rafael Marin | [Center for Teaching and Learning Graduate Teaching Assistant of the Year Award](#)

Roger P. Webb Awards

Lara Orlandic | [Outstanding Electrical Engineering Senior Award](#)

Victor Barr | [Outstanding Computer Engineering Senior Award](#)

Mahmoud Mehraban, Lakshmi Raju | [ECE Graduate Teaching Assistant Excellence Awards](#)

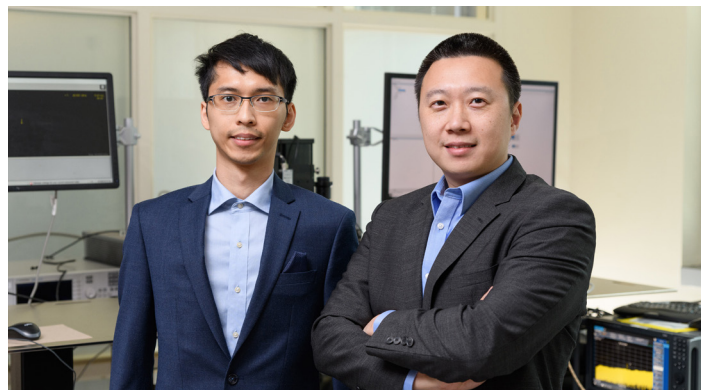
Mehrdad Tahmasbi, Hakki Mert Torun | [ECE Graduate Research Assistant Excellence Awards](#)



[Three ECE Students Become Rising Stars in Academia](#)

Three women from ECE took part in the [MIT Rising Stars Workshop](#), held October 28-30, 2018 at the MIT campus in Cambridge, Massachusetts. They were Ph.D. candidate [Nil Gurel](#), postdoctoral research fellow [Yiyang Zhu](#), and May 2018 ECE Ph.D. graduate [Wenjing Su](#).

The program aims to identify and mentor top female graduate students who are interested in pursuing academic careers in electrical engineering and computer science. The goal is to help fill the gender gap in science, technology, engineering, and math education.



[Huang Selected for Marconi Society Award](#)

ECE's Min-Yu Huang (left) was the first Georgia Tech Ph.D. student selected for the Marconi Society Paul Baran Young Scholar Award. This award recognizes scientists and engineers younger than 28 years old who demonstrate exceptional capability and potential. He is advised by ECE Associate Professor Hua Wang (right).



ECE graduate student award winners pictured with Steve W. Chaddick School Chair Magnus Egerstedt (center) at the 2019 Roger P. Webb Awards Program.

[+] Faculty & Staff



[New Faculty]



Angelos D. Keromytis

John H. Weitnauer, Jr. Chair and Georgia Research Alliance Eminent Scholar
Computer Systems and Software



Negar Kiyavash

Associate Professor
Digital Signal Processing



Daniel Molzahn

Assistant Professor
Electrical Energy



Shimeng Yu

Associate Professor
Nanotechnology; VLSI Systems and Digital Design

[Faculty Awards]

ECE faculty members were honored by Georgia Tech and external groups for their excellence in teaching, advising and mentoring, research, professional service, and commercialization.

External Awards

Muhannad Bakir | [McKnight Technological Innovation in Neuroscience Award](#) (honored with Sam Sober, Emory University Department of Biology)

Sam Coogan | [AFOSR Young Investigator Award](#)

Magnus Egerstedt | [Foreign Member of the Royal Swedish Academy of Engineering Sciences](#) and [O. Hugo Schuck Award from the American Automatic Control Council](#)

Ayanna Howard | [Richard A. Tapia Achievement Award for Scientific Scholarship, Civic Science, and Diversifying Computing](#)

Omer Inan | [Georgia Power Professor of Excellence Award](#) and [IEEE Sensors Council Young Professional Award](#)

Tushar Krishna | [IEEE Micro Top Pick](#), [Google Faculty Research Award](#), and [Facebook Faculty Research Award for AI System Hardware/Software Co-Design](#)

Abdallah Ougazzaden | [Chevalier de la Legion d'Honneur](#)

Moinuddin Qureshi | [Non-Volatile Memory Workshop Persistent Impact Prize](#)

Arijit Raychowdhury | [IEEE/ACM "Innovator Under 40 Award"](#)

Maryam Saedifard | [IEEE Industrial Electronics Society J. David Irwin Early Career Award](#) and [IEEE Region 3 Outstanding Engineer Award](#)

Shyh-Chiang Shen | [OSA Fellow](#)

Marilyn C. Wolf | [IEEE Computer Society Harry H. Goode Award](#)

Alenka Zajic | [IEEE Atlanta Section Outstanding Engineer Award](#)

Georgia Tech Awards

Robert J. Butera | [ANAK Award](#)

Bernard Kippelen | [Steven A. Denning Faculty Award for Global Engagement](#)

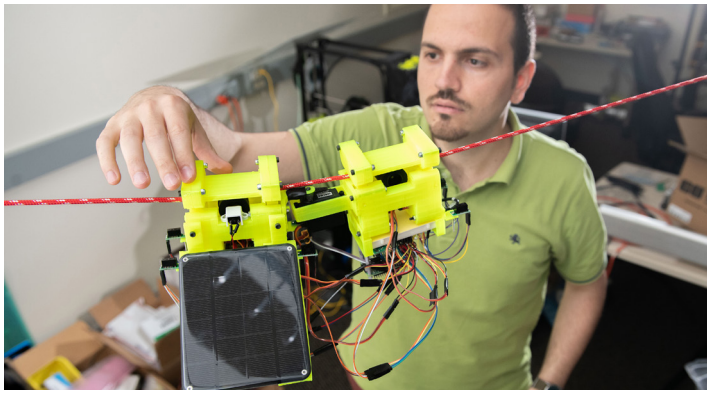
Christopher J. Rozell | [Class of 1940 W. Howard Ector Outstanding Teacher Award](#)

Raghupathy Sivakumar and **Joyelle Harris** | [Center for Teaching and Learning Curriculum Innovation Award](#) (honored with Ray Vito and Craig Forest (Mechanical Engineering); Karthik Ramachandran (Business); Keith McGreggor and Olufisayo Omojokun (Computer Science); and Timothy Lee (Bioengineering))



Above left: Maryam Saedifard. Above right: Abdallah Ougazzaden (right) with Mayor Dominique Gros.

[+] Research & Education Highlights



[Slothbot Takes a Leisurely Approach to Environmental Monitoring](#)

For environmental monitoring, precision agriculture, infrastructure maintenance, and certain security applications, slow and energy efficient can be best. Enter the “SlothBot,” a project led by Magnus Egerstedt, the Steve W. Chaddick School Chair in ECE.

Powered by solar panels and designed to linger in the forest canopy, SlothBot moves only when it must to measure environmental changes that can be observed only with a long-term presence. To date, SlothBot has operated in a network of cables at Georgia Tech. A new 3D-printed shell—making it look more sloth-like—will protect its components from the elements.

The next version of SlothBot will be used for longer-term studies in the tree canopy at the Atlanta Botanical Garden. Jonathan Pauli, an associate professor in the Department of Forest & Wildlife Ecology at the University of Wisconsin-Madison, and Professor Ron Arkin in Tech’s School of Interactive Computing, worked with Egerstedt and his team on this project.



[Researchers Help Close Security Hole in Popular Encryption Software](#)

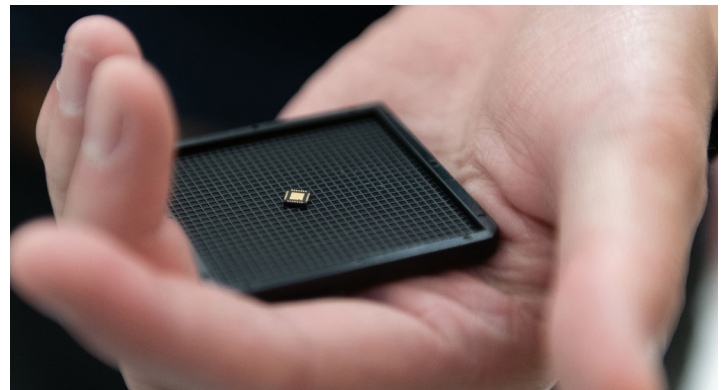
ECE Associate Professor Alenka Zajic and Computer Science Professor Milos Prvulovic have helped close a security vulnerability that could have allowed hackers to steal encryption keys from a popular security package by briefly listening in on unintended “side channel” signals from smartphones.

The attack, which was reported to software developers before it was publicized, took advantage of programming designed to provide better security. The attack used intercepted electromagnetic signals from the phones that could have been analyzed using a small portable device costing less than a thousand dollars.

[Georgia Tech Creates Online Cybersecurity Master’s Degree Online](#)

Georgia Tech launched a new online cybersecurity master’s degree in January 2019 with 250 students enrolled. The program costs less than \$10,000 and is delivered in collaboration with edX.

The [Online Master of Science in Cybersecurity \(OMS Cybersecurity\)](#) is designed to address a severe global workforce shortage in the field. It offers the same three interdisciplinary tracks available on campus: information security, policy, and energy systems. The faculty lead for OMS Cybersecurity is Raheem Beyah, the Motorola Foundation Professor in ECE.



[Ultra-Low Power Chips Help Make Small Robots More Capable](#)

An ultra-low power hybrid chip inspired by the brain could help give palm-sized robots the ability to collaborate and learn from their experiences. Combined with new generations of low-power motors and sensors, the new application-specific integrated circuit (ASIC)—which operates on milliwatts of power—could help intelligent swarm robots operate for hours instead of minutes.

The chips use a hybrid digital-analog time-domain processor in which the pulse-width of signals encodes information. The neural network IC accommodates both model-based programming and collaborative reinforcement learning, potentially providing the small robots larger capabilities for reconnaissance, search-and-rescue, and other missions. This project is led by ECE Associate Professor Arijit Raychowdhury.

[Control System Simulator Helps Operators Learn to Fight Hackers](#)

A simulator could help operators of chemical processing plants—and other industrial facilities—learn to detect attacks by hackers. Developed by Motorola Foundation Professor Raheem Beyah and his team, the simulator will also help students and researchers better understand the security issues of industrial control systems.

Facilities such as electric power networks, manufacturing operations, and water purification plants are among the potential targets for malicious actors because they use programmable logic controllers to open and close valves, redirect electricity flows, and manage large pieces of machinery. Efforts are underway to secure these facilities, and helping operators become more skilled at detecting potential attacks is key to improving security.

[+] Development

The ECE Development Office cultivates and coordinates the School's fundraising efforts with industry, alumni, and other interested people and organizations. This group manages the ECE Access Program, the ECE Career Fair, and other networking and social activities to promote alumni and corporate involvement.



Jeff Colburn recently joined the School's development team as the director of ECE Alumni Development. From 2005-2019, Colburn served as the director of Development for the Goizueta Business School at Emory University, and he was the director of Alumni Relations at the Georgia Tech Alumni Association from 1997-2005. ECE is pleased that he has returned to the Georgia Tech family.

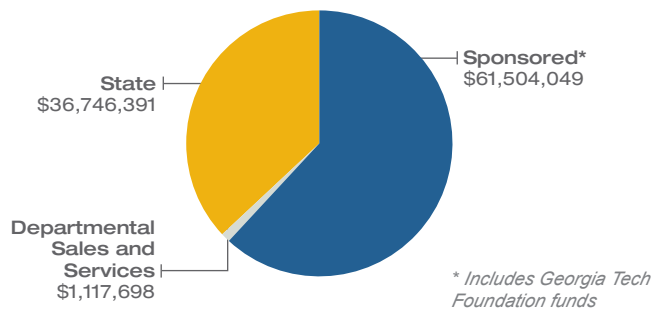
For more information about the School's fundraising activities, contact [Colburn](#) at 404.894.0274; [Anna Walker](#), director of ECE Alumni Development, at 404.894.2273; or [Etta Pittman](#), director of ECE Corporate Development, at 404.894.6888.

[+] Finances

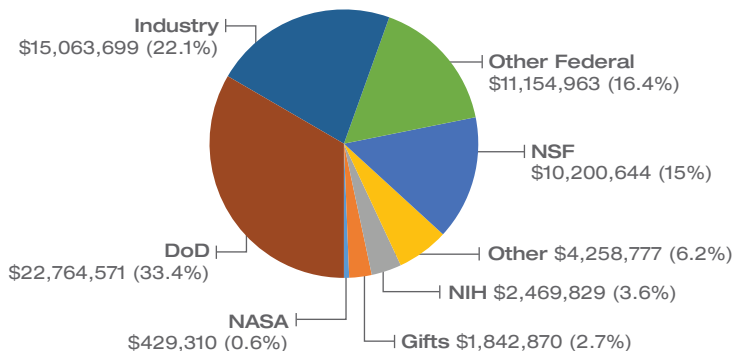
Research funding for FY 19 totaled \$68,184,663 from grants and contracts, an all-time record for the School and an increase of 14% over last year. This support also includes gifts designated for research that were received through the Georgia Tech Foundation. Of the \$68.2 million total, 22% came from industry, 69% came from federal government sources, 3% came from Georgia Tech Foundation gifts, and 6% came from other sources. Sponsored funding acquired by ECE and its affiliated research centers made up 17% of Georgia Tech's research funding portfolio (excluding GTRI) and 27% of the research funding in the College of Engineering, the largest share of any CoE unit.

The School spent \$99,368,138 from state, sponsored research, and departmental sales and services sources. This money mostly pays for faculty, staff, and researcher salaries, and the rest is used for materials and supplies, travel, and equipment in support of our research and educational missions.

FY 19 Expenditures



FY 19 Research Funding



[FY 19 Donors]

We would like to thank the following corporations, organizations, and individuals for contributing \$4,760,931 to the School and its affiliates during FY 19.

INDIVIDUALS | William H. Allen • Anonymous • Steve A. Barton • Gina D. Bauer • Harry L. Beck • Suzy Briggs • Hugh A. Brown • Karen Brunavs • Robert John Butera, Jr. • Domenic A. Carr • Thomas R. Collins • J. Alvin Connelly • Robert T. Dyal • Bonnie H. Ferri • Richard M. Fujimoto • Clete L. Gardenhour • Thomas K. Gaylord • Mary A. Gordon • Gennadiy Gurevich • Michael H. Hammer • Shigefumi Honjo • Amol M. Joshi • Jay Kirchoff • K.L. Kummer • Tanner J. Leggett • Henry W. Little • Kenneth E. MacKenzie • Paige A. McCarthy • Norma J. McLees • Theresa A. Maldonado, PE • John Maxwell • Gary S. May • Philip M. Moulthrop • Fernando A. Mujica • Ragnar-Miguel Myhrer • Kristine S. Nagel • Naomi Nagel • Chad E. Patterson • John B. Peatman • Alessandro Pellegrini • Etta Pittman • Darrell W. Preble • John J. Riemer • Jennifer Riley • Paul G. Steffes • C. Meade Sutterfield • Aleksander H. Szlam • Michael T. Tuley • Judith Vanderboom • Raymond P. Vito • Anna Walker • Kevin K. Wang • Patrick Wathen • Sabine Wathen • Anita Wathen-Brownlee • Roger P. Webb • Erica M. Werner • Douglas B. Williams • Rose A. Williams • Kay Williams • G. Tong Zhou

FOUNDATIONS/ NON-PROFIT ORGANIZATIONS | BASF Foundation, USA • Boyce and Gail Dooley Family Foundation • Breast Cancer Research Foundation • Community Foundation for Greater Atlanta • Corning Glass Works Foundation • Eastman Foundation, Inc. • Fidelity Investment Charitable Gift Fund • Harris Foundation • Renaissance Charitable Foundation, Inc. • Schwab Charitable Fund • Silicon Valley Community Foundation • Southern Company Charitable Foundation • Vanguard Charitable Endowment Program • Wells Fargo Community Support Campaign

PROFESSIONAL, RESEARCH, AND ACADEMIC ORGANIZATIONS | Association of Old Crows, Peachtree Roost • Electric Power Research Institute • IEEE • Northwestern University • Radio Club of America, Inc. • Space Solar Power Institute

COMPANIES | 3M Worldwide • Accenture • AMLI Development Company, LLC • Analog Devices, Inc. • Anaren Microwave, Inc. • Applied Materials, Inc. • AT&T, Inc. • Avanos Medical, Inc. • Benevity Community Impact Fund of AEF • BMW Manufacturing • Chick-Fil-A, Inc. • Cisco Systems, Inc. • Comcast Corporation • ConocoPhillips Corporation • Corning, Inc. • Data Power Source • Eaton Corporation • ExxonMobil Corporation • Fives Cortx • Florida Power and Light Company • General Motors Corporation • Green Hills Software, Inc. • Honeywell International, Inc. • Inphi Corporation • Integrated Device Technology, Inc. • Intel Corporation • International Paper Company • IQE KC, LLC • IvySys Technologies, LLC • Keysight Technologies • Linear Technology Corporation • Lockheed Martin • Lockheed Martin Aeronautics Company • LyondellBasell Industries • Microdesigns • Microsoft Corporation • Mitsubishi Electric Information Technology Center America • National Corporate College Consultants, Inc. • Nokia Solutions and Networks Oy • Northrop Grumman Corporation • Powers Law Group • Qualcomm, Inc. • RACEMARK International, LLC • Raytheon Company • Robert Bosch Corporation • Salas O'Brien South, LLC • Silicon Labs • Solar Inventions, LLC • Southern Company Services • SRC • Stanley Black & Decker, Digital Accelerator • Systems & Technology Research • Taylor Exhibition Services, Inc. • Tektronix, Inc. • Texas Instruments, Inc. • The Aerospace Corporation • The Boeing Company

[+] Student Stories: Going Global



Powering Haiti

For the last five years, a Georgia Tech team has worked with a Georgia church group to bring solar power to Thoman, Haiti.

Students from the Opportunity Research Scholars Program and the IEEE Power & Energy Society—along with Frank Lambert, a principal research engineer with the National Electric Energy Testing, Research, and Applications Center—built portable solar panel systems that connect to a battery housing two USB ports. In May 2018, the team took 25 systems to Thoman residents, thus providing a safe power source for cell phone charging and light.

In 2019, two more trips were made. Lambert and three students installed a small solar power system in a school and a system for “solar sewing” in January. In May, Lambert and recent M.S.E.C.E. graduate Jake Smith installed a 5kW solar power system for a new computer classroom, with help from a Haitian student previously trained by the group.

The team hopes to bring more solar panel systems to Haiti and expand the program to other places that have limited electrical infrastructure.



ECE Outreach Goes Global

ECE Ph.D. student Victor A. Rodriguez-Toro taught 37 Colombian high school students about solar power and organic solar cell fabrication, an experience that was extra meaningful since he is Colombian.

Through the nonprofit, [Clubes de Ciencia](#), Rodriguez-Toro joined two professors from Universidad del Valle and a Ph.D. student from Friedrich-Alexander Universität (FAU) to work in two places: Cali, Valle, a city of 2 million people, and the rural town of Caicedonia, Valle.

The students visited silicon-based solar parks and experimented with solar energy-powered gadgets like flexible cellphone chargers and toys. They also participated in [Cubes in Space](#), a partnership between NASA and IDoodle Learning. Three of the solar cells produced by the students were included in the payload for a NASA suborbital flight, and four students visited two German institutions, FAU in Erlangen-Nuremberg and the Max Planck Institute of Colloids and Interfaces in Berlin, to receive additional training in solar cell fabrication.

[+] Alumni

ECE Graduates Honored at College of Engineering Alumni Awards

Three ECE alumni were honored at the [2019 Georgia Tech College of Engineering Alumni Awards Induction Ceremony](#), held on April 6 at the Four Seasons Hotel in Atlanta.

ENGINEERING HALL OF FAME



Jerry S. Johnson, BEE '57
Chairman and CEO (Retired)
Adcor Electronics
Marietta, Georgia

ACADEMY OF DISTINGUISHED ENGINEERING ALUMNI



R. Thomas Dyal, BEE '88
Co-Founder and General Partner
Redpoint Ventures
Menlo Park, California



Mary A. Gordon, BEE '81
Former Vice President, Altria
Glen Allen, Virginia

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<http://bit.ly/GTECEAlumni>

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