

2022 - 2023

ANNUAL REPORT



Georgia Tech College of Engineering
School of Electrical
and Computer Engineering





“Our commitment to continuing growth extends beyond our institution — it’s about cultivating a much-needed domestic workforce of electrical and computer engineers.”

Dear friends,

As we reflect on the past fiscal year, it’s evident that our dedication to excellence has propelled us to remarkable heights. In the following pages of the 2022-2023 Georgia Tech School of Electrical and Computer Engineering (ECE) annual report, you’ll learn more about our achievements, innovations, and the strides we’ve made in shaping the future of electrical and computer engineering education and research.

One significant number to underscore our commitment to pushing the boundaries of knowledge is this year’s record amount of sponsored research funding. We are proud to announce that this year our research funding reached \$81 million, underscoring our position as leaders in the field.

In our pursuit of staying at the forefront of technological advancements, we have significantly grown our focus on Artificial Intelligence (AI). The ever-evolving landscape of AI presents both opportunities and challenges, and our programs are dedicated to equipping students with the skills and knowledge needed to excel in this dynamic field. Our investment in AI research and education has positioned us to contribute to groundbreaking discoveries and innovations.

As part of our commitment to educational excellence, we were thrilled to launch our Curriculum Partnership Initiative. The initiative represents our dedication to staying current with industry demands and ensuring that our curriculum remains both relevant and innovative. By forging partnerships with industry leaders, we are enhancing the educational experiences of our students and preparing them for success in the real world.

In line with our mission to nurture the holistic growth of our students, we have taken a significant step by creating the Office of Student Engagement and Well-Being. Our students are not just learners; they are the future leaders of the industry. This office provides comprehensive support, guidance, and resources to ensure that students thrive academically, emotionally, and socially during their time with us.

Looking ahead, we are excited about the bright future that awaits us. Our commitment to continuing growth extends beyond our institution — it’s about cultivating a much-needed domestic workforce of electrical and computer engineers. By empowering our students, fostering research excellence, and collaborating with industry partners, we are paving the way for a future where innovation and engineering excellence drive progress and change the world for the better.

As we navigate the challenges and opportunities that lie ahead, we do so with gratitude for your continued support and confidence in us. Together, we are shaping the future of engineering education and research, and we are excited to be partners in this journey with you.

Best,

Arijit Raychowdhury
Steve W. Chaddick School Chair and Professor

ECE OVERVIEW



[ENROLLMENT]

2,565
overall total

1,209
total undergraduate
enrollment, FY 22

567 B.S.E.E.
642 B.S.Cmp.E.

18% females
21% underrepresented
minorities

1,356
total graduate
enrollment, FY 22

634 M.S.E.C.E.
2 M.S. Bioengineering
8 M.S. Cybersecurity
70 M.S. Cybersecurity—online
14 MS Computational Science
and Engineering
602 Ph.D.
15 Ph.D. Bioengineering
29 Ph.D. Machine Learning

20% females
9% underrepresented
minorities



[DEGREES]

790
overall total

302
total undergraduate
degrees awarded, FY 22

145 B.S.E.E.
157 B.S.Cmp.E.

16% females
20% underrepresented
minorities

488
total graduate
degrees awarded, FY 22

357 M.S.E.C.E.
3 M.S. Bioengineering
1 M.S. Cybersecurity
20 M.S. Cybersecurity—online
88 Ph.D. ECE
1 Ph.D. Bioengineering
4 Ph.D. Machine Learning
3 Ph.D. Robotics

23% females
10% underrepresented
minorities



LEADERSHIP TRANSITIONS

New NEETRAC Director Joe Hagerman Aims for Center to Lead Amid Power Grid Transformation

NEETRAC, a leading research and testing resource for the electric energy industry, housed under ECE, announced the appointment of Joe Hagerman as its director on June 1, 2023. Hagerman joined NEETRAC after directing the Energy, Policy, and Innovation Center, a division of the Strategic Energy Institute.



New NEETRAC Director Joe Hagerman (front row, second to left) at the NEETRAC advisory board meeting in May.

It is an important moment for NEETRAC, as the nation's power grid undergoes a transformative shift with historic investment in clean energy. It presents the center with a distinct opportunity to showcase expertise, drive progress, and actively shape the future of the grid.

Harris Named Director of DEI Initiatives in Office of Undergraduate Education

Joyelle "Joy" Harris, a senior academic professional in ECE, joined the Office of Undergraduate Education as their inaugural Director of Diversity, Equity, and Inclusion Initiatives in Undergraduate Education (OUE).

In this role, Harris collaborates with Georgia Tech's minority-serving offices, programs, and organizations to analyze and identify barriers that impede under-resourced and under-represented students from engaging in OUE programs/services and other high impact practices. Harris also took on the role of director of the College's Women in Engineering program in August 2023.

ECE's Heck to Co-lead GT AI Hub

ECE Professor Larry Heck was tapped to co-lead Georgia Tech's newly announced Artificial Intelligence (AI) Hub. As an AI-powered university, Georgia Tech is embracing AI throughout the Institute, incorporating it into academic programs and research to assist and amplify human intelligence in all areas of work. The vision of AI Hub at Georgia Tech is to advance AI through discovery, interdisciplinary research, responsible deployment, and next-generation education to build a sustainable future.

Co-directors Heck and Irfan Essa, the senior associate dean in the College of Computing, will work to unite AI entities across campus, enabling the Institute to align on goals to become an international thought leader in AI.

THE OFFICE OF STUDENT ENGAGEMENT AND WELL-BEING

STRENGTHENING COMMITMENT TO STUDENT SUPPORT

In its inaugural year, the Office of Student Engagement and Well-Being (SEWB) has already taken measurable steps to significantly increase ECE's student support services.

Leveraging the achievements of last year's ECE Cares initiatives, SEWB operates as a support catalyst, enabling students to achieve success. Supporting both undergraduate and graduate students in their goals, these services promote habits of academic excellence, essential life skills, and mental health.

Directed by Lakshmi Raju, SEWB launched the Conference and Career Development Support Fund, organized wellness events around important topics both such as time-management and stress, established a more streamlined approach to matching faculty and students for research collaborations, and many other impactful endeavors this year.

Raju Named Inaugural Director of ECE SEWB

Integration into the School's organizational structure is a fundamental requirement for the success of the Office of Student Engagement and Well-Being. Lakshmi Raju, an accomplished ECE graduate with bachelor's, master's, and Ph.D. degrees, brings both the expertise and dedication needed to champion this vitally important initiative.

"My goal is simple: I want to make life a bit easier for students. The ECE major is tough, college itself is a challenge, and life, in general, can be very difficult," said Raju. "Some difficulties are just part of the process, but others don't have to be, and that's what we're targeting here."

Raju stresses that SEWB doesn't work in isolation. The office has already teamed up with other parts of campus to provide a complete support package. One success story is the partnership with the

Wellness Empowerment Center to provide wellness workshops for ECE students covering topics like stress and time management.

When it comes to mental health, SEWB works hand in hand with the Center for Mental Health Care and Resources to better connect students to the wide range of available campus support programs and initiatives.



Lakshmi Raju, director of the Office of Student Engagement and Well-Being.

New Travel Fund Takes ECE Students Beyond Campus to Learn and Network

ECE's Conference and Career Development Support Fund, launched by SEWB in December, helps students attend conferences and other experiences to complement their studies.

Highlights from the Spring 2023 semester include Cmp.E undergraduate Mohit Pinninti receiving support to attend MIT Reality Hack, and providing travel grants to seven ECE students to attend this year's National Society of Black Engineers (NSBE) Annual Conference in Kansas City.

"I wouldn't be going to the conference without the ECE fund," said Ph.D. candidate Micky Nnamdi, who attended NSBE with the help of the support fund. "This experience will help my research in a new way. Since the focus is a national event for Black engineers, I hope to expand my engineering knowledge and network with engineers and scientists in the industry."

Inaugural Graduate Fellowships and Awards Promote Professional Development

In partnership with the Office of Graduate Affairs, SEWB helped introduced three new fellowships and awards for graduate students this year, including the INSPIRE Fellowship for interdisciplinary research, the STEER Fellowship for teaching excellence, and the CREATION Award for enhancing graduate-level courses.

The initiatives aim to support the professional development and diverse career aspirations of exceptional graduate students while fostering innovation and collaboration within the ECE community.

"We are committed to exploring innovative ways to enhance the professional development of our doctoral students," said Matthieu Bloch, associate chair for graduate affairs and professor. "These new opportunities reflect the diverse career aspirations of our students, ranging from technical leadership to entrepreneurship and education."



The Georgia Tech cohort of attendees — including the Dean of the College of Engineering & Southern Company Chair, Raheem Beyah — at this year's National Society of Black Engineers (NSBE) Annual Conference in Kansas City. ECE was able to provide travel grants for seven students to attend NSBE this year.



This year's INSPIRE (INterdiSciPIInary REsearch) Fellowship recipients: (L-R) Wantong Li, Daniel Turizo Arteaga, and Yongyu Xie.

STUDENTS AND 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
- ECE Student Advisory Council
- Eta Kappa Nu
- Georgia Tech IEEE
- The Hive
- Women in Electrical and Computer Engineering
- The Amateur Radio Club

Award Winners

Our students receive awards through the Roger P. Webb Awards Program in ECE and awards events held by other organizations and offices on campus. This year's winners include:

Daniel Canales, Diego Fratta
ECE Graduate Teaching Assistant Excellence Award

Annie Lu, Ahmad Mustafa, Zishen Wan, Mohammadreza Zandehshahvar
ECE Graduate Research Assistant Excellence Awards

Huijin Chung, Xinpei Ni
ECE Undergraduate Research Award

Lydia Wuqiong Han
ECE Faculty Award

Theodore Lambert
ECE Outstanding Service and Outreach Award

Felix Pei
Outstanding Electrical Engineering Senior Award

Ethan G. Weinstock
Outstanding Computer Engineering Senior Award



ASIM GAZI MAKES HISTORY AS GEORGIA TECH'S FIRST SCHMIDT SCIENCE FELLOW

The Schmidt Science Fellows program, which

provides a \$100,000 stipend per year to postdoctoral scholars to solve the world's most pressing issues, named Asim Gazi as Georgia Tech's first Fellow. The Schmidt Science Fellows program seeks to identify the brightest minds in the natural sciences, mathematics, engineering, and computing.

Fellows are placed in a full-time, 12–24-month postdoctoral Fellowship in a laboratory anywhere in the world where they conduct research in an area different from their Ph.D. This pivot in discipline is central to the program's aim to foster greater interdisciplinary research.

Gazi, who received his Ph.D. ECE in July, was advised by Professors Omer Inan and Christopher Rozell.



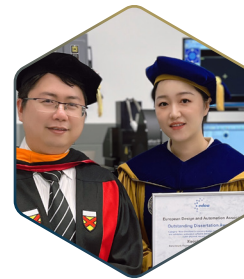
WEST AWARDED GEORGIA TECH UNIVERSITY CENTER OF EXEMPLARY MENTORING PH.D. FELLOWSHIP

Amanda West, a third-year Ph.D.

candidate, was awarded a Georgia Tech UCEM (University Center of Exemplary Mentoring) Ph.D. Fellowship. West is a member of the Advanced Computational Electricity Systems (ACES) Laboratory directed by Professor Santiago Grijalva.

The UCEM Fellowship aims to increase the number of outstanding engineering, science, and computing Ph.D. students from under-served populations. The Fellowship provides three years of support for students who have recently completed the Ph.D. Qualifying/Preliminary exam.

West's research seeks to develop a framework to design stable clustered community microgrids (CCM) to increase energy equity, economic development, and resilience within under-resourced communities



PENG'S WORK ON OPEN-SOURCED NEUROSIM SERIES RECOGNIZED

Xiaochen Peng (right) received the prestigious Donald O.

Pederson Best Paper Award in Transactions on Computer-Aided Design of Integrated Circuits and Systems (IEEE TCAD) for her research on compute-in-memory (CIM) accelerators.

Co-authored with Professor Shimeng Yu, their work presents an end-to-end benchmark framework for CIM accelerators, offering open-sourced NeuroSim series tools. This series, known for its versatility, has gained traction among industry giants like Intel, TSMC, IBM, Samsung, and SK Hynix, as well as global academia.

Peng, currently a principal engineer at TSMC Corporate Research, also earned the 2023 Outstanding Dissertation Award from the European Design and Automation Association (EDAA) for her NeuroSim series work.

FACULTY AND STAFF



FY2022 STATS

104

academic
faculty

11

academic
professionals

52

research
faculty

98

administrative
staff

39

faculty members
holding chairs or
professorships

39

IEEE
Fellows

3

NAE
members

New Faculty



Pan Li

Assistant Professor
Digital Signal Processing



Lakshmi Raju

Academic Professional; Director of
Student Engagement and Well-being

Promotion and Tenure

Promotion to Professor

Morris Cohen
Patricio Vela
Shimeng Yu

Promotion to Associate Professor with Tenure

Azadeh Ansari
Asif Khan
Brendan Saltaformaggio

Faculty & Staff Awards

External Awards & Honors

Sankaraleengam (Sankar) Alagapan | Georgia
Clinical and Translational Science Alliance (CTSA)
KL2 Transition Award

Pamela Bhatti | Executive Leadership in Academic
Technology, Engineering and Science (ELATES)
Program

Wenshan Cai | SPIE, the international society for
optics and photonics, Fellow

Deepakraj M. Divan | IEEE Power & Energy Society
(PES) Nari Hingorani Custom Power Award

Suman Datta | IEEE Symposium on VLSI Technology
and Circuits Test of Time Award

Stanislav Emelianov | SPIE, the international
society for optics and photonics, Fellow

Bonnie Ferri | American Automatic Control Council
(AACC) John R. Ragazzini Education Award

Omer Inan | IEEE Engineering in Medicine & Biology
Society (EMBS) Distinguished Lecturer

Sung Kyu Lim | Defense Advanced Research
Projects Agency (DARPA) Program Manager;
Institute of Electrical and Electronics Engineers
(IEEE) Fellow

Shaolan Li | National Institute of Biomedical
Imaging and Bioengineering (NIBIB) Trailblazer
R21 Award

Vidya Muthukumar | National Science Foundation
(NSF) CAREER Award

Athanasios P. (Sakis) Meliopoulos | IEEE PES
Outstanding Power Engineering Educator Award

Linda Milor | Institute of Electrical and Electronics
Engineers (IEEE) Fellow



From left: Deepakraj M. Divan, Suman Datta, and Bonnie Ferri

Daniel Molzahn | National Science Foundation
(NSF) CAREER Award

Moinuddin K. Qureshi | Institute of Electrical and
Electronics Engineers (IEEE) Fellow; Association for
Computing Machinery (ACM) Fellow

Manos M. Tentzeris | IEEE Electronic Packaging
Society (EPS) Distinguished Lecturer

Madhavan Swaminathan | National Academy of
Inventors (NAI) Fellow

Maryam Saeedifard | IEEE Power Electronics
Society (PELS) Distinguished Lecturer

Internal Awards & Honors

Farrokh Ayazi | Regents' Entrepreneur

Joseph Benzaquen | Research Spotlight Award

Jeanetta Clinton | Soaring Jacket Award

Morris Cohen | Outstanding Mid-Career Faculty
Member Award

Nikkia Green | Hats Off Performance Award

Tushar Krishna | Richard M. Bass/Eta Kappa Nu
Outstanding Junior Teacher Award

Christopher Malbrue | Spirit of Georgia Tech Award

Daniel Molzahn | Outstanding Junior Faculty
Member Award

Azad Naeemi | Class of 1934 Outstanding
Innovative Use of Education Technology Award; W.
Marshall Leach/Eta Kappa Nu Outstanding Senior
Teacher Award

Julie Ridings | Academic Spotlight Award

Justin Romberg | Distinguished Faculty
Achievement Award

Maryam Saeedifard | D. Scott Wills Mentoring
Award

Brendan Saltaformaggio | College of Engineering
Cybersecurity Fellow

Dylan Summer | Hats Off Performance Award

Tasha Torrence | Hats Off Performance Award

Linda Wills | Chair's Professorship for Teaching
Excellence

Saman Zonouz | College of Engineering
Cybersecurity Fellow

COLLABORATION WITH APPLE PAVES THE WAY FOR FUTURE CHIP DEVELOPMENT COURSES

In the fast-paced world of VLSI (Very Large-Scale Integrated) design, where innovation and technological advancements are constant, the demand for engineers equipped with a comprehensive understanding of the entire chip manufacturing process is soaring. Recognizing this need, ECE and Apple collaborated to launch an innovative undergraduate course: ECE 4804 VLSI Design: Theory to Tapeout.

The academia-industry course is one of very few in the country that offers undergraduate students an opportunity to delve into the intricacies of the complete VLSI design cycle — from system specification and architectural design to fabrication and testing.

Designed and taught by Professor Visvesh Sathe, the course goes beyond mere industry training and directly addresses the escalating demand for expertise in real-world hardware design. Students experience the thrills, challenges, and satisfaction of prototyping a digital SoC (system on a chip) within the confines of a classroom.

“There is an emerging and obvious need for VLSI professionals to better understand how the sausage is made, so to speak,” said Sathe. “By comprehending the complete picture, regardless of their specific role, students will be better equipped to excel and make meaningful contributions in various roles within the hardware industry.”

The two-semester course of 20 students began with a broad introduction to VLSI design principles, semiconductor physics, and digital system design, establishing a strong theoretical foundation.

Students then dove into hands-on design projects that replicated real-world scenarios. The projects fostered collaboration and individual work in the design and implementation of VLSI chips to be fabricated in Taiwan Semiconductor Manufacturing Company (TSMC)’s 65nm complementary metal-oxide-semiconductor (CMOS) process.

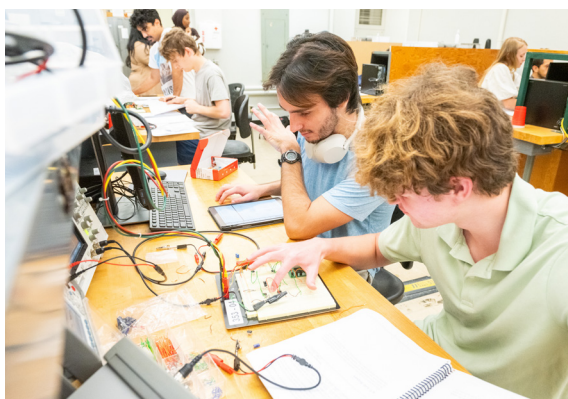
A distinctive aspect of the course is the utilization of industry-standard Electronic Design Automation (EDA) tools, providing students with a practical experience in chip simulation and verification. By using these tools, rather than open-source or academic alternatives, students refined their debugging, testing, and design correctness skills.



“The success of this course is a testament to the synergy between the Institute and the support from Apple. Offering a course of this caliber is expensive and time-consuming, but thanks to Apple, we have paved the way for an exceptional educational experience that can serve as a template for others.”

**— Arijit Raychowdhury,
Steve W. Chaddick School Chair and Professor**

ECE LAUNCHES CURRICULUM PARTNERSHIP INITIATIVE



Ensuring a highly skilled workforce is vital for sustaining the competitiveness of the nation’s technology sector and fostering a steady stream of talented professionals.

Driven by this propose, ECE has introduced the Curriculum Partnership Initiative (CPI), a groundbreaking model of industry-academia engagement. This highly flexible and scalable strategy enhances traditional classroom environments while reinforcing the significance of existing apprenticeship-type research programs, like ECE 4804 highlighted above.

By partnering with industry leaders, the CPI ensures that students are equipped with relevant and up-to-date knowledge and practical experience. It addresses the need for a quick ramp-up to industry by providing students opportunities for hands-on learning, access to industry-standard tools, and exposure to real-world problem-solving scenarios, ultimately enhancing students’ readiness and employability upon graduation.

The CPI offers diverse collaborative opportunities in areas aligned with industry, including semiconductor devices and packaging, digital VLSI and computer architecture, circuits and systems for sensing and communication, machine learning, and more. CPI investment can yield numerous benefits for industry including talent enrichment, bridging skill gaps, and sustainable collaboration. For more information reach out to ECE’s Development Office: Jeff Colburn (jeff.colburn@ece.gatech.edu) or Etta Pittman (etta.pittman@ece.gatech.edu).

GEORGIA TECH RECEIVES \$65 MILLION GRANT FROM SEMICONDUCTOR RESEARCH CORPORATION FOR JUMP 2.0 CENTERS

Last year, the Semiconductor Research Corporation (SRC) and the Defense Advanced Research Projects Agency (DARPA) announced a new program to improve the nation's information and technology infrastructure. With a global chip shortage, supply chain issues, and other challenges in play, a group of Georgia Tech faculty members jumped at the opportunity to participate.

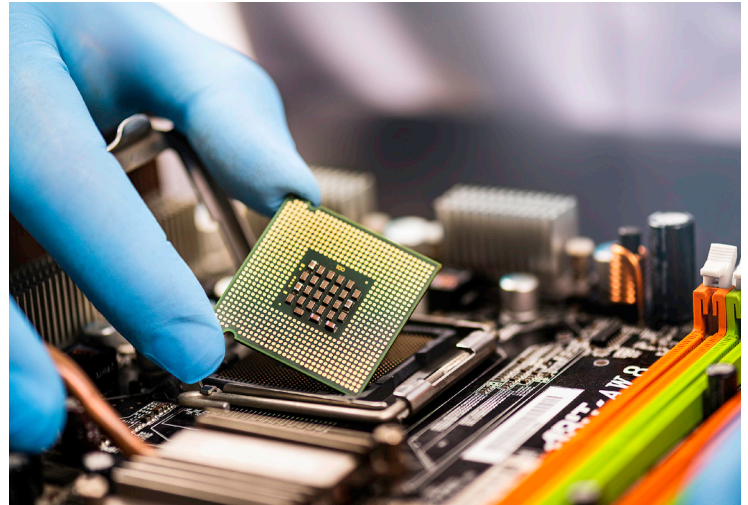
Their landing was perfect. Two new research centers, representing an investment of about \$65.7 million, were awarded to Georgia Tech through the SRC-administrated Joint University Microelectronics Program 2.0, or JUMP 2.0.

JUMP 2.0 will support the work of dozens of inter-disciplinary researchers from multiple universities, tackling the technological issues of an increasingly connected world. The goal is to improve the nation's performance, efficiency, and capabilities for both commercial and military applications.

"Georgia Tech ECE won two of the seven centers, which is not only fantastic, but also speaks highly about the breadth and depth of our research enterprise," said Arijit Raychowdhury, the Steve W. Chaddick School Chair.

The two new Georgia Tech research centers, both headquartered within ECE are:

- CoCoSys: Center for the Co-Design of Cognitive Systems (theme area: cognition), under the direction of Raychowdhury;
- CogniSense: Center on Cognitive Multispectral Sensors (theme area: intelligent sensing to action), under the direction of Saibal Mukhopadhyay, Joseph M. Pettit Professor in ECE.



RESEARCHERS PIONEER PROCESS TO STACK MICRO-LEDS

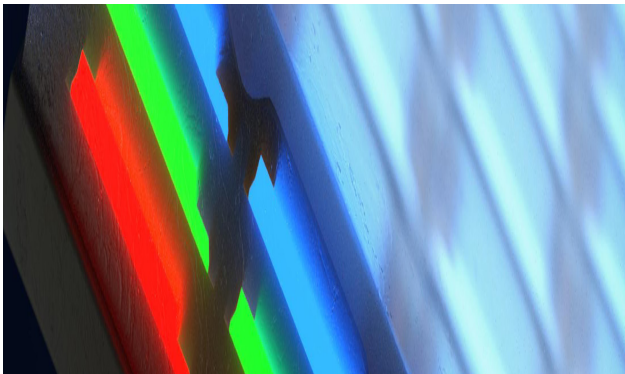


Image of the high array density micro-LEDs

Georgia Tech-Europe Professor Abdallah Ougazzaden and research scientist Suresh Sundaram (who both also hold appointments in ECE) collaborated with researchers from MIT to turn the conventional LED manufacturing process on its head — literally.

The study showed that the world's thinnest and smallest pixelated displays can be enabled by an active layer separation technology using 2D materials such as graphene and boron to enable high array density micro-LEDs resulting in full-color realization of micro-LED displays.

"We have now demonstrated that this advanced 2D, materials-based growth and transfer technology can surpass conventional growth and transfer technology in specific domains, such as in virtual and augmented reality displays," said Ougazzaden, the lead researcher of the Georgia Tech team.

NIH BRAIN GRANT FUNDS EMORY-GEORGIA TECH CENTER FOR NEXT-GENERATION NEUROTECHNOLOGY

Georgia Tech and Emory University received a \$4.8 million grant from the National Institutes of Health (NIH) BRAIN Initiative to establish a center to make and globally distribute next-generation micro-technologies for neuroscience. The funds will be awarded over a five-year period.

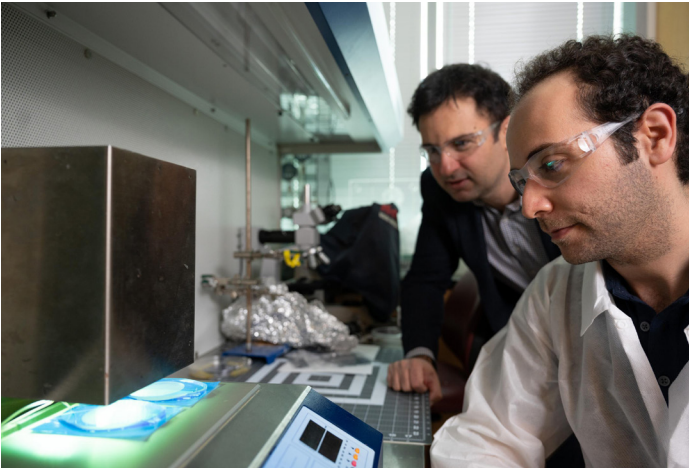
The Center for Advanced Motor BioEngineering and Research will make cutting-edge biosensors that were developed jointly by the two universities, disseminate them to neuroscientists across the country and around the world, and provide training and other resources for how to use the biosensors to explore a range of research questions.

Co-principal investigators for the project are ECE Professor Muhannad Bakir and Samuel Sober, Emory associate professor of biology.

"The potential to develop new microscale technologies — with advances commonly used in semiconductor chip manufacturing — to enable scientific and medical discoveries in neuroscience is incredibly motivating," Bakir said. "It's the inspiration driving this project."



Co-principal investigators for the project are (left) Samuel Sober of Emory and Muhannad Bakir of Georgia Tech. Ann Watson, Emory Photo



Associate Professor Fatih Sarioglu (back) and the graduate student Mert Boya fabricating the microfluidic chips.

NEW CHIP COULD MAKE TREATING METASTATIC CANCER EASIER AND FASTER

Cancer spreads via circulating tumor cells (CTCs) that travel through the blood to other organs, and they are nearly impossible to track. Now, researchers have found a detection method that could revolutionize cancer treatment by showing how cancers metastasize and what stage they are. This could lead to earlier and more targeted treatment, beginning with a simple blood test.

Associate Professor Fatih Sarioglu's lab invented a new type of chip called the Cluster-Well, combining the precision of microfluidic chips with the efficiency of membrane filtration to find CTC clusters. Using micron-sized features, microfluidic chips can precisely locate each cell in a blood sample and determine if it's cancerous.

"Microfluidic chips give you more control as a designer to actually ask whatever question that you want to ask those cells," Sarioglu said. "It increases the precision and sensitivity, which is what you need for an application like this because you want to find that single cell out of many blood cells."

Sarioglu presented the research in "High Throughput, Label-free Isolation of Circulating Tumor Cell Clusters in Meshed Microwells," recently published in Nature Communications.

EXPLORING EUROPA POSSIBLE WITH SILICON-GERMANIUM TRANSISTOR TECHNOLOGY

Europa is more than just one of Jupiter's many moons – it's also one of most promising places in the solar system to look for extraterrestrial life. Under 10 kilometers of ice is a liquid water ocean that could sustain life. But with surface temperatures at -180 Celsius and with extreme levels of radiation, it's also one of the most inhospitable places in the solar system. Exploring Europa could be possible in the coming years thanks to new applications for silicon-germanium transistor technology research at Georgia Tech.



John D. Cressler

Regents' Professor John D. Cressler and his students have been working with silicon-germanium heterojunction bipolar transistors (SiGe HBTs) for decades and have found them to have unique advantages in extreme environments like Europa.

"Due to the way that they're made, these devices actually survive those extreme conditions without any changes made to the underlying technology itself," said Cressler. "You can build it for what you want it to do on Earth, and you then can use it in space."

Cressler and his students, together with researchers from NASA Jet Propulsion Lab and the University of Tennessee, demonstrated the capabilities of SiGe HBTs for this hostile environment in a paper presented at the IEEE Nuclear and Space Radiation Effects Conference in July, 2022.



Photo of Europa

CYBER FACULTY SETS OUT TO PROTECT NATION'S INVESTMENT IN AI MANUFACTURING

As researchers begin to shape the future of artificial intelligence in manufacturing, Georgia Tech recognizes the potential risks to this technology once it is implemented on an industrial scale. That's why Saman Zonouz, an associate professor in ECE and the School of Cybersecurity and Privacy, is researching ways to protect the nation's newest investment in manufacturing.

The project is part of the \$65 million grant from the U.S. Department of Commerce's Economic Development Administration to develop the Georgia AI Manufacturing (GA-AIM) Technology Corridor. While main purpose of the grant is to develop ways of integrating artificial intelligence into manufacturing, it will also help advance cybersecurity research, educational outreach, and workforce development in the subject as well.

"When introducing new capabilities, we don't know about its cybersecurity weaknesses and landscape," said Zonouz. "In the IT world, the potential cybersecurity vulnerabilities and corresponding mitigation are clear, but when it comes to artificial intelligence in manufacturing, the best practices are uncertain. We don't know what all could go wrong."



Saman Zonouz

A RECORD BREAKING YEAR FOR ECE RESEARCH

ECE Secures Historic \$81.1 Million in Research Funding, Driving Future Technologies and Addressing Workforce Challenges

This fiscal year, ECE received \$81.1 million in sponsored research funding, representing the highest amount in the School's history. Additionally, the School set a new expenditure record of \$103.3 million for FY 22, with \$62.3 million dedicated to sponsored research. The figures reflect a broader trend of growing research investment and activity for the School.

The considerable funding interest from industry, governmental entities, and philanthropy is geared at fueling cutting-edge research taking place at the School that broadly aims to enhance current technologies and pave the way for future innovation.

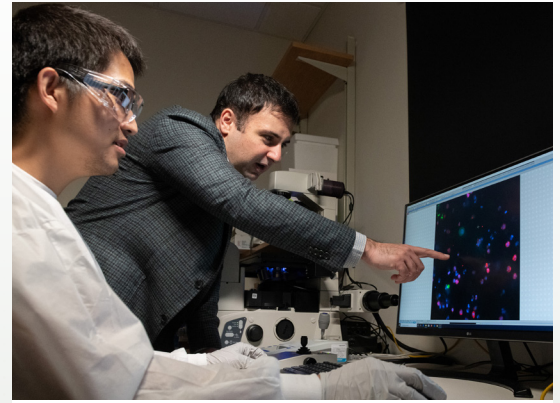
It also underscores the need to cultivate the future workforce of electrical and computer engineers crucial to addressing a significant shortage of workers in the field. The U.S. semiconductor industry faces a shortfall of roughly 67,000 workers by 2030, according to a study from the Semiconductor Industry Association and Oxford Economics.

An important contributor of ECE's funding success was winning awards to set up two research centers under the Semiconductor Research Corporation-administered Joint University Microelectronics Program (JUMP 2.0).

"These new highs signify a remarkable accomplishment for the entire ECE community," said Arijit Raychowdhury, the Steve W. Chaddick School Chair. "It truly takes a collective effort, involving knowledgeable staff, committed students, and top-tier faculty members, to achieve something of this magnitude. The active support of ECE alumni, woven into a broad network, is also integral to success. Without the collaboration of all these elements, this transformative achievement wouldn't be possible. It goes beyond marking funding milestones; it has far-reaching societal significance. Thank you to all who were part of this historic year."

ECE's record research numbers align with funding trends across Georgia Tech, which broke into the top 20 in higher education research and development spending for the first time in a decade. The ranking, based on an annual survey conducted by the National Science Foundation, reflects a year of innovations in healthcare, computing, and sustainability research. Georgia Tech was the only technological university to place in the top 20 and had the second highest year-to-year growth. A top 20 ranking is particularly significant, as Georgia Tech achieved it without a medical school.

The tangible impact of research funding is evident in Georgia Tech's noteworthy contribution of over \$4.5 billion to the state economy in fiscal year 2022, reflecting a 7.4% growth from the preceding year and the most significant economic contribution among the 26 member institutions of the University System of Georgia.



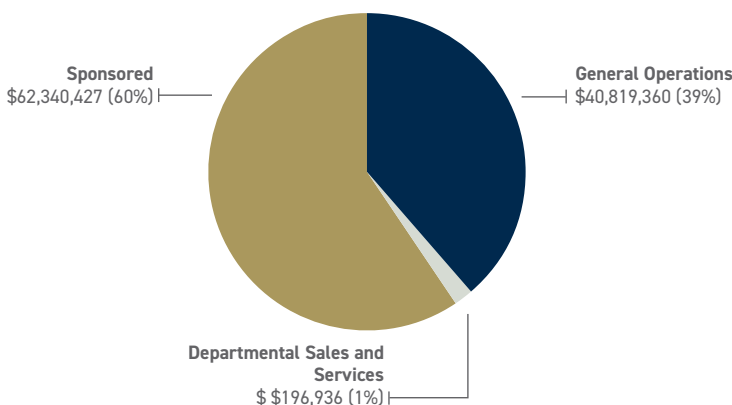
Some highlight figures of this year's record amount of sponsored research funding and expenditures include an all-time high of \$15.6 million spent on graduate student assistant support (from research funds) and 13 faculty members with research expenditures of over \$1 million.

FINANCES

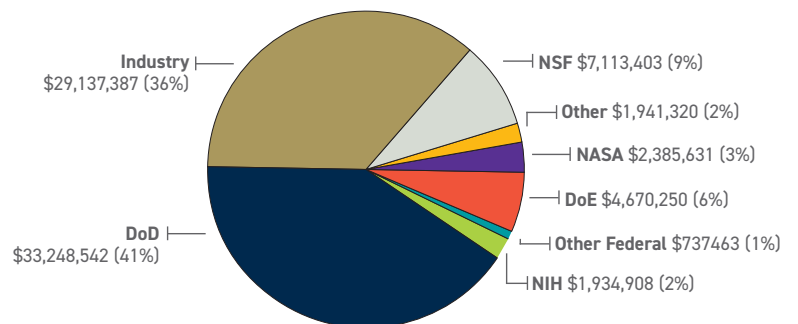
New external research funding in FY 22 totaled \$81,168,904 from grants and contracts, a record number for ECE. Of the \$81.1 million total, 62% came from federal government sources, 36% came from industry, and 2% came from other sources.

The School spent \$103,356,723 from state, sponsored research, and departmental sales and services sources. This money mostly pays for faculty, staff, graduate student support, and researcher salaries, and the rest is used for materials and supplies, travel, and equipment in support of our research and educational missions.

FY 2022-23 EXPENDITURES



FY 2022-23 NEW EXTERNAL RESEARCH FUNDING





Over the next five years, with the support of alumni, parents, faculty, staff, friends, corporations, and foundations, Georgia Tech – and ECE – can secure the resources that will help us achieve the most ambitious goals in our history.

For more information about “Transforming Tomorrow” and ECE’s fundraising activities, contact Jeff Colburn, director of ECE Alumni Development at jeff.colburn@ece.gatech.edu or Etta Pittman, director of ECE Corporate Development, at etta.pittman@ece.gatech.edu.

FY 2022-23 DONORS

We would like to thank the following corporations, organizations, and individuals for contributing \$4,172,599 to the School and its affiliates during this fiscal year.

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TWO ECE ALUMNI NAMED TO THE FORBES 30 UNDER 30 LIST

ECE was well-represented in the 2023 Forbes 30 Under 30 list.

Ph.D. candidate and master's degree graduate Allyson McKinney (left), the co-founder and CEO of SoloPulse, was featured in this year's Manufacturing and Industry category, and Lydia Hylton (right), who earned a bachelor's degree in computer engineering and is a partner at Bain Capital Crypto, was featured in the Finance category.



FIVE OUTSTANDING ECE GRADUATES HONORED AT COLLEGE OF ENGINEERING'S 2023 ALUMNI AWARDS

The College of Engineering Alumni Awards Induction Ceremony for 2023 took place on April 29 in Atlanta, honoring exceptional graduates across five prestigious categories. The ceremony, which is a highlight of the College's annual calendar, recognized alumni from all eight Schools within the College.

This year, five outstanding graduates from the ECE were honored for their significant contributions to the Institute, profession, field, or society at large: Michael Burnette (B.E.E. 1998), Mel Coker (B.E.E. 1987), Fernando Mujica (Ph.D.E.C.E. 1999), Vedant Pradeep (B.Cmp.E. 2019), and Kartik Sundareswaran (B.S.Cmp.E. 2003).

The ceremony is a testament to the College's commitment to excellence and the remarkable achievements of its alumni.

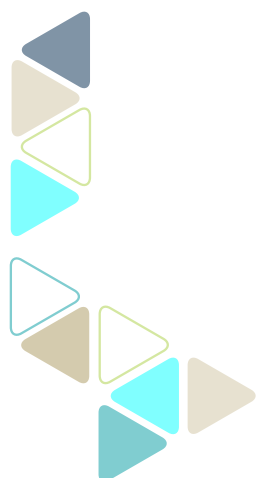


The College of Engineering Alumni Awards Induction Ceremony honorees including ECE alumni Kartik Sundareswaran (top row, second from left), Fernando Mujica (top row, third from left), and Michael Burnette (bottom row, right).

ALUMS NAMED TO THE 2023 CLASS OF 40 UNDER 40

ECE grads Vedant Pradeep (CmpE 19, ChBE 19), Tyler Sisk (EE 17), and Kendrick Treadwell (EE 10) were recognized as part of the 2023 class of 40 Under 40 by the Georgia Tech Alumni Association.

The annual program showcases how Tech alumni impact every field worldwide and work to improve the way we live through their diligence and expertise from an early age.



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