

### DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING



Department Chair: Distinguished Professor Petar M. Djurić https://www.stonybrook.edu/electrical/

#### About Us

The Stony Brook ECE department has 28 full-time faculty members, 511 undergraduate students, 159 Master's degree students, and 79 Ph.D. students.

GATEWAY to ENGINEERING

Our faculty and students conduct cutting edge research in a number of areas including wireless, mobile, and optical networks, cloud and mobile computing, optoelectronic devices and systems, semiconductor devices, nanoscale IC design, signal processing, computer vision, reconfigurable hardware, cyber-physical and embedded systems, sensing systems, and smart energy systems.

The work of the faculty and the students is regularly published in most prestigious international journals and conference proceedings.

#### **Recent News:**

Grand opening of the North Atlantic Industries Engineering Teaching Lab, an innovative studio lab facility for several of the department's initiatives including outreach activities, professional development, and undergraduate and graduate courses

Appointment of Assistant Professor Ji Liu, whose research focuses on distributed control and computation. Before joining us at Stony Brook, Prof. Liu earned a Ph.D. from Yale University and was a postdoctoral research associate at the University of Illinois and Arizona State University.

The ECE department has received new funding from the SUNY Empire Innovation Program to hire two senior faculty members in power systems and power electronics.

The College of Engineering and Applied Sciences dedicated the lobby of the Engineering Building to honor our alumnus Dr. Myung Oh '72 for his lifetime of service to Stony Brook University as

"The Dr. Myung Oh Gateway to Engineering."

### ABOUT STONY BROOK ECE

#### RECENT FACULTY & STAFF AWARDS

Prof. Emre Salman: Technological Innovation Award, IEEE Region 1

Prof. Mónica F. Bugallo: SUNY Chancellor's Award for Excellence in Teaching

Prof. Wendy Tang: SUNY Chancellor's Award for Excellence in Faculty Service

Anthony Olivo: SUNY Chancellor's Award for Excellence in Professional Service

> Prof. Fan Ye: Google Faculty Research Award

Prof. David Westerfeld: Athanasios Papoulis Outstanding Educator Award, IEEE region 1

# EDUCATIONAL PROGRAMS

**BE in Electrical Engineering** 

BS in Electrical Engineering Online

BE in Computer Engineering

Undergraduate Programs HIRITIA

Graduate Programs Master's Thesis Option

Master's Non - Thesis Option

Doctoral Program

**Innovative graduate certificate programs**: As part of their graduate studies, students can additionally earn certificates in three areas:

- Engineering Machine Learning Systems
- Engineering the Internet-of-Things
- Networking and Wireless Communications

## OUTREACH PROGRAMS

The complex technological challenges facing our nation require solutions that leverage broad input from a multicultural engineering workforce. At ECE, our rich outreach programs focus on strategies to enhance diversity, engaging students at all levels, teachers/counselors, and faculty in the passion, challenge and opportunity of engineering—a profession that promotes social and economic

> mobility. The initiatives are committed to meet the requirements of the **Next Generation Science** Standards (NGSS).

Student activities -The Engineering Teaching Laboratories expose middle and high school students to daylong hands-on activities in different fields of engineering during the academic year. The Engineering Enterprise is a one-week long summer camp for rising 8th and 9th grade students that combines different engineering activities with a focus on design and data analysis.

Counselors/teachers/administrators activities – Professional learning activities offer academic-year-long modules for in-service science and mathematics teachers on hands-on (engineering) learning as well as training/informative workshops on STEM with particular emphasis on engineering for school counselors during the calendar year. Annual meetings with superintendents and school administrators inform them about NGSS and strengthen our partnership with the school districts to facilitate NGSS implementation.

The newly designed WISE Honors program, led by our faculty member Mónica Bugallo, offers educational and professional STEM opportunities for women at all levels. The program focuses through different educational initiatives on the recruitment of more students to STEM education, retention of those who initially choose STEM study, and partnering with faculty, students, campus offices and industry to promote STEM research. WISE is the Flagship Program of the College of Engineering and Applied Sciences (CEAS) to promote women in science and engineering.

### COMPUTER ENGINEERING

#### COMMUNICATIONS, SIGNAL PROCESSING, NETWORKING

Dynamic networks: Learning, inference, and prediction with nonparametric Bayesian methods

SpecSense: Bringing spectrum sensing to the masses

Advancing adaptive importance sampling for signal processing

Passive network of tags for smart spaces

Safe and secure network control for smart and connected hospitals

Human-in-the-loop sensing and control for commercial building energy efficiency and occupant comfort

Spatially oversampled dense multi-beam millimeter-wave communications for exponentially increased energy efficiency

Fundamental techniques for incentive-aware, efficient, and reliable cloudlet management and services

#### **COMPUTER ENGINEERING**

Ultra-high-speed energy-efficient superconductor flux quantum filters for deep packet inspection

Game theory and simulation for accelerator control systems

Heterogeneous multi-sensor collaboration networks

Pervasive edge computing

Enterprise scale IoT management

Modular, composable hardware and software platform for pervasive edge sensing and computing

Hardware architectures for fast and energy efficient deep learning

Flexible hardware acceleration using field-programmable gate arrays in data centers

# ACTIVE SPONSORED **RESEARCH PROJECTS**

### ELECTRICAL ENGINEERING

#### **DEVICE & QUANTUM ELECTRONICS**

Device-integrated graphene films. Understanding, controlling, and optimizing the surface chemistry and electronic states of graphene-substrate interfaces

Widely tunable cascade diode lasers for spectroscopy

High power mid-infrared photonic crystal surface emitting lasers

Compact room temperature operated THz emitters.

Development of InAlAsSb based heterostructures with engineered lattice constants and energy bands for infrared sensors

Field shaping scintillator-coupled high-gain avalanche rushing photoconductor for active matrix flat panel imager

Selenium solid-state photomultiplier

Selenium multi-well avalanche detector for medical imaging applications

Carrier dispersion and nontrivial topological phases in ultra-low-bandgap metamorphic InAsSb ordered alloys

#### **CIRCUITS & VLSI**

AC computing for wirelessly powered IoT devices

Hardware Security for 3D ICs

Heterogeneous 3D SoCs

Front-end electronics for a self-powered implantable sensor for total knee replacement

Low voltage clocking

Near-zero power circuits for backscatter and ambient communication

Energy harvesting for RF powered tags and implantable devices