ADVANCED ELECTRONIC AND PHOTONIC DEVICES

ELECTRICAL & COMPUTER ENGINEERING
UNIVERSITY of WASHINGTON

OVERVIEW

The Advanced Electronic and Photonic Devices (AEP) concentration is all about diving deeper into how things work and what devices of the future are likely to look like. Quantum computing? Super tiny transistors? Wearable sensors? LEDs? Solar cells? Communicating by light?

If you are intellectually curious, fascinated with how modern electronic and photonic devices work, or looking for exposure to multiple disciplines while pursuing your ECE degree, AEP is the place to be!

AREAS OF IMPACT

- Computing Data and Digital Technologies
- Environment Sustainability and Energy
- Health and Medicine

WHAT RESEARCH OPPORTUNITIES ARE AVAILABLE TO UNDERGRADUATES IN THIS CONCENTRATION?

A huge range of research opportunities are available to AEP students in areas related to photonics (Prof. Lih Lin), nanotechnology and nanophotonics (Prof. Arka Majumdar), numerical simulation and building experiment testbeds (Prof. Mo Li), sensors and wearable systems (Prof. Denise Wilson), quantum devices and quantum computing (Prof. Kai-Mei Fu, Prof. Anant Anantram), and microelectromechanical systems (Prof. Karl Bohringer). Interested students should contact faculty directly for an information session to explore exciting research opportunities. Undergraduates in AEP have also participated in research at other universities remotely, creating layouts for photonic circuits and pursuing other exciting research opportunities.

STUDENTS MIGHT BE INTERESTED IN THIS CONCENTRATION IF THEY ENJOY:

Math, physics, optics, nanofabrication, sensors, wearable devices, quantum computers, state-of-the-art fabrication tools, device simulation, and answering the question, “Why does it work that way?” Students in ECE who enjoyed chemistry and biology will find opportunities to apply these subjects in the highly interdisciplinary AEP concentration. AEP is where physics, chemistry, biology, biophysics, material science, medicine, and engineering all intersect.

WHAT KIND OF INTERNSHIPS DO STUDENTS PURSUE?

A wide range of REU (research experience for undergraduates) programs are available for students in the AEP concentration. An REU program is a research-oriented internship that gives students a paid opportunity to spend a summer at another university doing state-of-the-art research with other students and faculty who have similar interests. In more traditional industry internships, AEP students find positions at such companies as Uber, Micron Technologies, Intellectual Ventures, NREL (National Renewable Energy Laboratory), Wood Harbinger, Facebook, Apple, Verathon, and Microsoft, Technical Systems Incorporated, and nLight Photonics. However, AEP students are not confined to internships that focus only on sensors or photonics. Instead, AEP straddles several disciplines and facilitates real-world experience in VLSI, electromagnetics, and other semiconductor/ integrated circuit positions.

WHAT CLASSES OUTSIDE OF ECE WILL HELP STUDENTS LEARN RELATED AND USEFUL SKILLS?

Classes that focus on programming (including modeling physical systems, instrument control, and data analysis), quantum mechanics, optics, math (especially linear algebra), solid state physics, electromagnetics, optics, materials science courses, thermodynamics, and chemistry courses.

WHAT KIND OF PROJECTS DO STUDENTS COMPLETE IN THEIR CAPSTONE?

AEP students have completed capstone projects that involve designing optical sensors for underwater imaging, developing software for a novel prosthetic leg, and integrating solar panels into ocean buoys.

DO STUDENTS NEED A GRADUATE DEGREE SPECIALIZING IN THIS AREA TO BE MARKETABLE IN INDUSTRY?

While having an MS in the field helps, it is not necessary and AEP industries are rapidly changing. The skills students learn in electronic devices and circuits, sensors, photonic devices and systems, are useful for a very wide range of jobs in industry. Often, students pursue graduate school after completing AEP classes because they find that a BS leaves them with unanswered questions about how devices work and their curiosity drives them to pursue an advanced degree.

WHAT KINDS OF JOBS DO STUDENTS GET AFTER GRADUATING?

Many students opt to create their own job via a startup, as is the case with companies like Bridger Photonics, AdvR, Lightmatter, and S2. Other AEP graduates go on to graduate school. Companies that handle large amounts of data (Google, Amazon, Microsoft) have photonics personnel because they want to streamline their data centers. Even Intel has a photonics division. AIM Photonics is a joint corporate-government venture with the goal of making America a leader in photonics design.

Other companies that seek to hire AEP graduates for devices as well as photonics expertise include Intel, Lawrence Berkeley Labs, Palo Alto Research Center, Kythera Space Solutions, Pure Storage, Tesla Motors, Boeing, Juno Therapeutics, Intermec Technologies, Oculus, Apple, Intellectual Ventures, Coherent, Lam Research, Broadcom, HEE Energy, Quantcast and Unity (data science companies), Sandia National Labs, Fluke, Analog Photonics, Atom Computing, Rockley Photonics, and Micron Technology.

QUESTIONS? Contact us at: undergrad@ece.uw.edu or attend a prospective drop in session: *bit.ly/eceadvising*