Welcome!

John McNeill
mcneill@wpi.edu
Overview

- What is ECE anyway?
- ECE at WPI
- Careers for ECE graduates
- Student Q&A
NAE “Grand Challenges”

Health Care
Sustainability
Safety / Security
What is ECE?

Health Care  Solving Important
Sustainability Problems
Safety / Security Being Creative
Making a Difference
What is ECE?

Health Care
Sustainability
Safety / Security
Solving Important Problems
Being Creative
Making a Difference

WPI: Challenge + Support
Health Care

- Diagnostic Sensing / Imaging
- Assistive Technologies
- Neurally Controlled Prosthetics
- Clean Air, Water
Sustainable Energy

- Energy Storage
- Optimizing Solar Panel Energy Collection
- Smart Grid Security

Holy Name High School Wind Turbine that resulted from an ECE Undergraduate Project
Safety and Security

- Technology for first responders
- Data security
- Securing communication
- Smart grid security
• 24 full-time faculty
• 350 undergraduates, 140 full-time grad students
• ~ 80 BSECE, 60 MS, 4 PhD annually
• Innovative, project-based undergraduate program with a focus on creativity and teamwork
• Student project & research activity with corporations, National Science Foundation, Lincoln Labs, etc.
• Active graduate research program that integrates undergrads into many of the projects
Focus Areas within ECE

- Computers/Microprocessor systems
- Microelectronic Circuits
- Electromagnetics, Antennas
- Satellite and Indoor Positioning Systems
- Power Electronics and Systems
- Data Security, Cryptography
- Communications, Wireless Networking
- Software Defined Radio (SDR)
- Biomedical Signal Processing, Advanced Prosthetics
- Robotic Systems and Sensors
In ECE what is the first year like?

- Math, science, CS intro courses
- Humanities and arts
- ECE courses for first year students!
  - ECE 1799
  - ECE 2010
- INSIGHT first year advising program
- Get involved - play sports, join a theater group, work with a service organization, . . .

WPI ECE Seniors working on their MQP Capstone Projects
Worcester Polytechnic Institute
Two ways to get started
- You can start in any term: A, B, C, or D!

ECE1799: *Frontiers and Current Issues of ECE*
- Seminar based course for First Year students
  Survey breadth of activities, career choices, technologies across ECE.
- Primarily for students who have not decided on a major or who are unsure of an ECE major.

ECE 2010: *Introduction to ECE - An Application Oriented Approach*
- Laboratory-based introduction to the broad subject of ECE.
- Analyze, construct, test: iPod amplifier, RF transmitter, sensor systems ...
- Moderate depth treatment of a wide variety of fundamental topics.
- Typically followed immediately by ECE2019, ECE 2029 or ECE2049: Sensors & Circuits, Digital Circuit Design, Embedded Computing
Second year in ECE

ECE major area foundation courses
• \( \approx 60\% \) courses laboratory based
• We believe in “hands-on” experience as essential to learning in our courses!

ECE 2799 – Ideas in Action
• Projects based foundation integration course and MQP prep
• Work in teams to design a solution to an open ended problem using all your background
• Named by Seniors and alums as the single best and most important course they took in any department at WPI!!!!

Design that Matters: “Always Ready” Solar Charged LED Lantern
What is the third year like?

- Opportunity to participate in a Global Program project (over 600 WPI students / year)
- Continue taking major, minor and/or dual-major courses
- Focus on an area within ECE, develop background needed for the capstone (MQP) project
- Plan for fourth year capstone project experience
- Plan seriously for graduate school, other post graduation education/work

Bangkok Project Center
Fourth year in ECE at WPI

- Complete capstone project – Intensive project with real results, the WPI MQP
- Advanced major area courses and complete minors/dual majors
- GRADUATE and then: Get a job, start a company, graduate school, medical school, law school, MBA, ...
Example MQP Projects

Business
At WPI, a push to make smart wheelchairs
MQP project: Rescue Quadcopter

- Semi-autonomous search and rescue quad-copter
- Indoor reconnaissance for first responders

- Can fit through 22” x 6” opening
- Automatic collision avoidance
- Sensors: IR rangefinder, LIDAR and video camera
- Autonomous stable flight
- 1 kg payload capacity
MQP Projects – ECE Project Centers

Many ECE MQPs in collaboration with off-campus project sponsors:

• Lincoln Labs Project Center
  – Lexington MA
• MITRE Corp. Project Center,
  – Bedford MA
• Silicon Valley Project Center,
  – SRI, NVIDIA, Silicon Valley, CA
• General Dynamics Project Center,
  – Groton CT
• Wall Street/London Project Center,
  – New York, NY
• China Project Centers
Faculty Research Areas

- Cryptography and Information Security (CRIS) Laboratory
- Analog and Mixed Signal Microelectronics Laboratory
- Signal Processing and Information Networking Laboratory (SPIN)
- Embedded Computing Laboratory
- RF-Electronics and Medical Imaging Laboratory
- Cyber Security Laboratory
- Center for Advanced, Integrated, Radio Navigation (CAIRN)
- Antenna Laboratory
- Wireless Innovation Laboratory (WI Lab)
- Laboratory for Sensory and Physiologic Signal Processing (LSP)2
- Center for First Responder Technology / Precision Personnel Location

Many MQPs are based on these areas of faculty research and done in these research labs
Review: Why study ECE at WPI?

Year 1: Intro ECE: Theory and Practice (hands-on labs)

Year 2: ECE Design: Team Design Project

Year 3: Go Global: London, Venice, Bangkok, Melbourne, Washington, Cape Town, Hong Kong…

Year 4: Senior Design Project: Lincoln Labs, Silicon Valley, …
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State of the Art, Student Centered

• Modern, well equipped and well maintained laboratories.

• Projects and laboratory experiences that are “real” and make a difference.

• A strong advising system.

• Focus on teamwork.

• Friendly, supportive community.

• Open 24/7 for student use.
Very active student organizations:
- IEEE Student Chapter
- HKN Honor Society
- WECE (Women in ECE)
- Pizza Fridays
- IEEE Barbecues
- Senior Dinner
- The Spark Party
Goals for WPI Students

**Become an “Expert”**
- Master the discipline
- Get the answers right

**Solve Real Problems**
- Very un-disciplined
- Ask the right questions

**About Courses…**
- and the Discipline

**About Persistence…**
- and Experience
Goals for WPI Faculty

**Challenge**
- Provide structure
- Demonstrate knowledge

**Support**
- Unstructured problems
- Mentor through process

**About Courses…**
- and the Discipline

**About Relationship …**
- and Experience
In ECE at WPI you will be ...  

Welcomed  
Valued  
Challenged  
Supported
Questions?
Thanks for visiting today

Feel free to contact me:
John McNeill
mcneill@wpi.edu
508-831-5567
Computer Engineering or Computer Science??

• Hardware + Software vs. Software
• Engineering vs. Science
• Computer scientists discover underlying principles of computation: logic, language, knowledge organization…
• Computer engineers use these principles to solve problems in hardware and software involving an enormous number of applications, products and devices using embedded processors and DSPs
Some more senior projects

- Develop a system that integrates wireless networking and RFID technology so that every store item (quantity, type, price) can be automatically inventoried.
- Develop microcomputer controlled sun tracker for increased efficiency solar energy collector.
- Develop a multi-camera vision based robot tracker that will provide location information for all robots on a FIRST Competition field for use during autonomous scoring periods.
- Develop a high efficiency solar power converter for use on a nanosat.
- Develop an autonomous fire-finding and extinguishing robot.