ENT 1280: Ins and Outs of Physical Computing

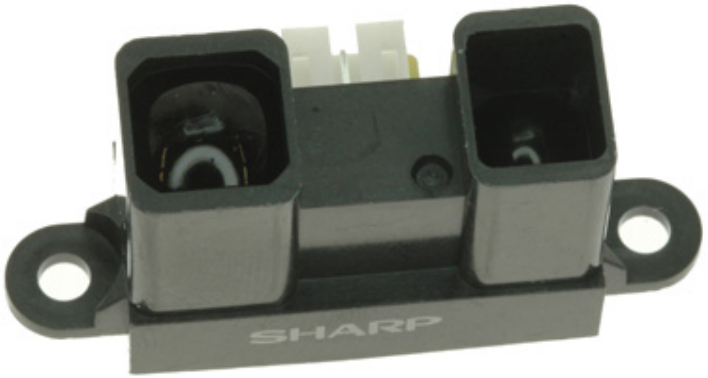
Course Description

- An introduction to interactive technology with a focus on **how we use technology to express ourselves and interact with our environment**. This class will combine a hands-on exploration of sensors and microcontrollers with concepts of interaction design employing a structured design process. Students will work on creative group projects and provide on-line documentation of their work. An array of sensing technologies from simple switches to video tracking will be introduced. Students will use the simple programming of microcontrollers to process incoming data from sensors.

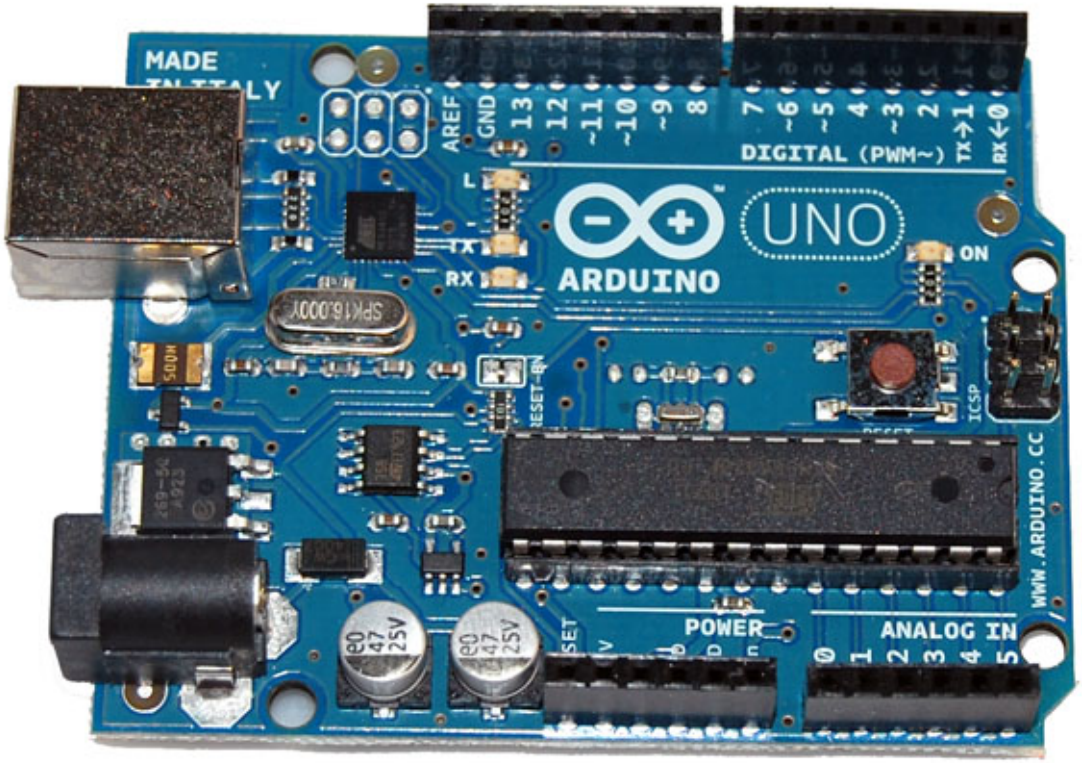
Physical Computing

- ….in the broadest sense, means building **interactive physical systems** by the use of software and hardware that can sense and respond to the analog world. While this definition is broad enough to encompass things such as smart automotive traffic control systems or factory automation processes, it is not commonly used to describe them. In the broad sense, physical computing is a creative framework for understanding human beings' relationship to the digital world. In practical use, the term most often describes handmade art, design or DIY hobby projects that use **sensors** and **microcontrollers** to translate analog input to a software system, and/or control **electro-mechanical devices** such as motors, servos, lighting or other hardware.

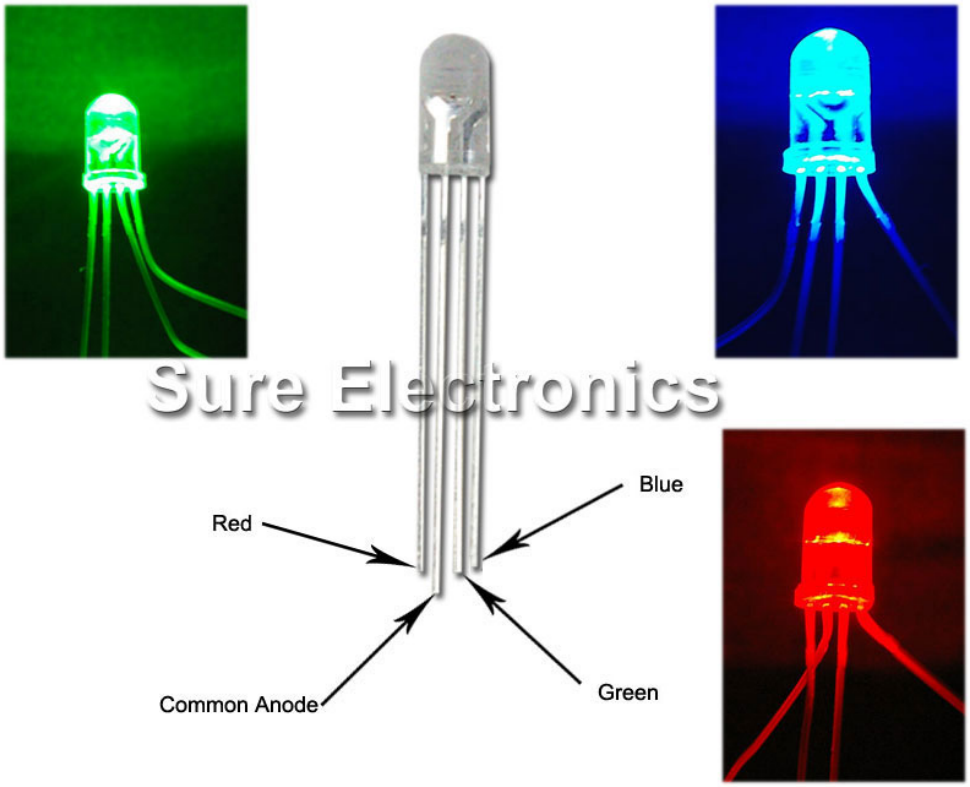
Sensors



Controllers



Actuators



Previous Course Structure

- Weeks 1-2 Introduction to basic concepts and tools
- Weeks 3-8 exercises using the tools to develop basic familiarity with what can be done
- Weeks 9-10 individual project design
- Weeks 11-14 individual project development
- Week 15 Document and present final project

Or…

- Step 1: Teach them some stuff
- Step 2: Have them do a project where they apply the stuff you taught them
- Step 3: Hope their projects turn out great

Some projects were great!!!

- Control systems for autonomous drones(i.e. Remote controlled toy airplane)!!!

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Some not so great….

- A thing you can wave your hand in front of and a light blinks …

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- D:

What went wrong

- Their projects had all the basic parts (Sensors, Actuators, and Controllers) they just didn't provide the sort of meaningful interaction that was intended. All the boxes on the list of technologies to cover and instructional objectives were getting checked off and some of the students did great but for too many no meaningful learning about the concept of interaction was happening.

What is being changed

- Continuous documentation of all work using the **OpenLab**
- Emphasizing **group projects** that bring together diverse skill sets
- **Collective feedback** on projects and ideas through voting/ranking

OpenLab

- At every step along the way of the class students will be posting progress reports and documentation of their projects to the OpenLab site. They will document their process and problem solving methodology not just their final product.

Group Projects

- Instead of each student doing a single individual project all students propose and present a project idea. Their classmates then vote to rank the proposals and the top five projects move forward.

Collective Feedback

- Every presentation by the students gets voted on by their fellow classmates who have to rank them from best to worst and to provide comments. Ranking contributes a small portion to their final grade but more importantly it encourages participation and healthy competition between students. More checkpoints have been added to provide more opportunities for feedback early on.

New Course Structure

- Weeks 1-2 Introduction to basic concepts and tools
- Weeks 3-8 exercises using the tools to develop basic familiarity with what can be done
- Week 9 initial project proposals
- Week 10 feasibility studies of proposals
- Week 11 revised project proposals
- Week 12 Group project prototype development
- Week 13 Project Prototype Presentation
- Week 14 Group Project Final Development
- Week 15 Presentation of final project