Fall 2014
[Thursdays 10/2 – 12/11/2014]

6:30PM – 9:30PM

2697

Introduction to Arduino

Instructor: Daniel Jay Bertner
E-Mail: danbertner@gmail.com
Phone: 786-253-4040

Overview

Engineers, artists, designers, architects, hobbyists and anyone interested in creating interactive objects or environments will find Arduino an exceptionally useful platform. This inexpensive microcontroller can accept inputs from a wide variety of sensors and output to a computer or a variety of motors, switches and actuators. It is an open-source electronics prototyping platform, based on a flexible, easy-to-use license, can be adapted by users to a wide variety of uses. Participants will learn to set up electrical circuits and program Arduino devices.

Goals

- Students will understand the resources available locally and on the web to further their development post course.
- Discussions on assorted interactive systems for installation.
- Students will have a firm knowledge on basic coding structures in the Arduino IDE, and options for integrating external software with the Arduino Platform.
- Firm knowledge in basic electronics principles, hardware load devices.
- Students will have discussions throughout the course of project/installation ideas with the professor and students.
- Students will fabricate discussed proposals and display for a final critique at the end of the course.

Requirements

No prior experience working with coding or electronics is required. This serves as a purely introductory course. Students who do have some experience may join the course if they have a personal project in mind they need help to develop. Please bring any type of documentation (Web, files, photos, etc) of personal work completed on the first day of class. This can range from anything involving media/design, arts, science, math, sports, etc.

Materials (class and students)

- Students are expected to all come with current Mac, Windows, Linux Laptops.
- Arduino introductory starter kit
- Overhead projector

Introduction to Arduino Outline and Calendar

(This outline may have modifications throughout semester)

Day 1

- Introduction and Syllabus outline.
- Introductions of instructor/students background & personal work
- Lecture on the concept of physical computing/creative coding and importance of the open source movement.
- Look at other designers/artists along with supporting resources utilizing these technologies.
- Resources: creativeapplications.net, makezine, Arduino.cc, hackaday, sparkfun, info arts, Eyebeam center, etc.
- Discussion on formulating project ideas towards the end of the course
- Discussion on materials in students kit, what is Arduino and installing/navigating the IDE.

Day 2

- Discussion on AC/DC voltage, Ohms law, Batteries, safety
- Discussion on using a multimeter
- Product datasheets
- Lecture on misc. types of electronic load devices (motors, sensors, lighting, etc).
- Discussion on resistors
- Begin construction of basic series/parallel circuits with LEDs and motors.
- Soldering lecture
- Navigating through Arduino website,IDE, and microcontroller. If time, begin “blink” example.

Day 3

- Refresher on Arduino IDE / controller and begin “Blink” program.
- Discussion on coding structures/logic.
- Begin constructing live examples manipulating blink program and utilizing code structures and the microcontroller pins

- Discussion on Pulse Width Modulation

Day 4

- Students are asked to begin thinking about proposals for their end of semester projects (individual or group projects welcome)
- Proposal formatting discussion for next class session
- Continue lectures on coding structures/logic
- Exercise: Control a DC motor/multiple LEDs
- Discussion on misc. types of sensors (digital, analog)
- Exercise : hook up photocell, potentiometers, temperature sensors, buttons
- Discuss H-brige / Mosfet transistor

Day 5

- Each student will share their idea with the course
- Individual meetings will be had with each student throughout the day to discuss project needs and offer suggestions.
- Discussion on electronics/industrial suppliers to order from
- Students will have time to begin research and ask any questions to help solidify their project ideas.
- If time permits, begin next set of lectures

Day 6

- Lecture on shift registers, motor drivers, shields
- Lecture on wireless networking and Serial communication with the physical world/development environments.
- Lecture on integrating sensors with for weather beacons
- Construct shift register to control array of leds
- Begin discussion on IDE, Processing and ways to merge hardware and software communication
- Students may begin to research and ask further questions pertaining to projects

Day 7

- DANGER, HIGH VOLTAGE! Controlling high voltage load devices (light bulbs, motors)
- Lecture on transistors/Mosfets
- Students may begin constructing projects in class/asking questions

Day 8

Work day! Any and all questions discussed to further development of students projects.

- *Ambient background lecture on navigating Processing IDE* ☺
- Interfacing Arduino hardware devices with software programs

- Advanced lecture on creating custom class/functions in Arduino IDE

Day 9

Work day! Any and all questions discussed to further development of students projects. If time, lecture on wireless protocols such as ZigBee & Bluetooth protocols.

Day 10

Present final projects, and have a critique. Plans for further project ideas can be discussed as well at this time.

Reference Links

Suppliers

http://Jameco.com

http://Mcmastercarr.com

http://sparkfun.com

http://www.adafruit.com/

http://osepp.com

http://www.taobao.com/

http://www.seeedstudio.com/depot/

http://digikey.com/

Tutorials:

http://Bildr.org

https://learn.sparkfun.com/

https://learn.adafruit.com/

References

http://www.arduino.cc/

http://processing.org/

http://www.creativeapplications.net/