Arduino Programming Part 1

ME 120
Mechanical and Materials Engineering
Portland State University
http://web.cecs.pdx.edu/~me120

Overview

Arduino Environment
Basic code components
- Two required functions: startup() and loop()
- Variables
- Calling built-in functions

References

These notes borrow from
- Arduino web site
- Adafruit tutorial #1 and 2
  - http://www.ladyada.net/learn/arduino/lesson2.html
- Leah Buechley's Introduction to Arduino
  - http://web.media.mit.edu/~leah/LilyPad/03_arduino_intro.html
Arduino Web Site References

Overview of the development environment

Language reference

Code tutorials

Basic Process

Design the circuit:
- What are electrical requirements of the sensors or actuators?
- Identify analog inputs (sensors)
- Identify digital inputs & outputs (buttons, LEDs, relays)

Write the code
- Build incrementally
  - Get the simplest piece to work first
  - Add complexity and test at each stage
  - Save and Backup frequently
- Use variables, not constants
- Comment liberally

Writing and Downloading Code

Write sketch on PC

Download sketch to Arduino
Running Code While Tethered

Run sketch on Arduino and send data back to PC
Arduino interacts with its environment
Serial communication back to host

Running Code Stand-Alone

Run Arduino in stand alone mode
Arduino interacts with its environment and runs on battery power

Open the example sketch, blink.ino
Load “Blink” from the built-in examples

Arduino IDE

IDE = Integrated Development Environment


Common Code Structure
Code Structure: Header

Header provides information. Can also contain code.

Code Structure: setup function

setup function is executed only once at the start.

Code Structure: loop function

loop function is repeated indefinitely.
Details of the Blink Code

**Code**

```cpp
int led = 13; // creates a variable named "led" and stores 13 in that variable

pinMode(led, Output); // prepare pin number "led" for outputs of voltage

led = 13; // "led" is a variable

digitalWrite(led, HIGH); // Sets pin "led" to a value that means the voltage is "on"

delay(1000); // tells microcontroller to do nothing for 1000 ms = 1 s
```
digitalWrite(led, LOW)
Sets pin “led” to a value that
means the voltage is “off”

delay(1000);
tells microcontroller to do
nothing for 1000 ms = 1 s