


living with the lab 

Gerald Recktenwald
Portland State University
gorry@me.pdx.edu



Introduction to
Arduino Programming


living with the lab 

references

these notes borrow from . . .

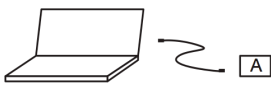
- Arduino web site
 - <http://arduino.cc/en/Guide/Environment>
 - <http://arduino.cc/en/Tutorial/HomePage>
- Adafruit tutorial #1 and 2
 - <http://www.ladyada.net/learn/arduino/lesson2.html>
- Leah Buechley's Introduction to Arduino
 - http://web.media.mit.edu/~leah/LilyPad/03_arduino_intro.html

2


living with the lab 

writing and downloading code

Write sketch on PC



Download sketch to Arduino



3

living with the lab

running Code while tethered

Run sketch on Arduino and send data back to PC

Arduino interacts with its environment

Serial communication back to host

4

living with the lab

running code stand-alone

Run Arduino in stand alone mode

Arduino interacts with its environment and runs on battery power

5

living with the lab

Arduino IDE

IDE = Integrated Development Environment

<http://www.arduino.cc/en/Guide/Environment>

11

living with the lab

code structure: header

```
/*
 * Blink
 * Turns on an LED on for one second, then off for one second, repeatedly.
 * This example code is in the public domain.
 */
void setup() {
  // initialize the digital pin as an output.
  // Pin 13 has an LED connected on most Arduino boards:
  pinMode(13, OUTPUT);
}

void loop() {
  digitalWrite(13, HIGH); // set the LED on
  delay(1000);           // wait for a second
  digitalWrite(13, LOW);  // set the LED off
  delay(1000);           // wait for a second
}
```

header provides information and can also contain code

7

living with the lab

code structure: setup function

```
/*
 * Blink
 * Turns on an LED on for one second, then off for one second, repeatedly.
 * This example code is in the public domain.
 */
void setup() {
  // initialize the digital pin as an output.
  // Pin 13 has an LED connected on most Arduino boards:
  pinMode(13, OUTPUT);
}

void loop() {
  digitalWrite(13, HIGH); // set the LED on
  delay(1000);           // wait for a second
  digitalWrite(13, LOW);  // set the LED off
  delay(1000);           // wait for a second
}
```

setup function is executed only once at the start

8

living with the lab

code structure: loop function

```
/*
 * Blink
 * Turns on an LED on for one second, then off for one second, repeatedly.
 * This example code is in the public domain.
 */
void setup() {
  // initialize the digital pin as an output.
  // Pin 13 has an LED connected on most Arduino boards:
  pinMode(13, OUTPUT);
}

void loop() {
  digitalWrite(13, HIGH); // set the LED on
  delay(1000);           // wait for a second
  digitalWrite(13, LOW);  // set the LED off
  delay(1000);           // wait for a second
}
```

loop function is repeated indefinitely

9

living with the lab

code

```
void setup() {  
  // initialize the digital pin as an output.  
  // Pin 13 has an LED connected on most Arduino boards:  
  pinMode(13, OUTPUT);  
}
```

digital I/O functions:

- pinMode
- digitalWrite
- digitalRead

10

living with the lab

code

```
void loop() {  
  digitalWrite(13, HIGH); // set the LED on  
  delay(1000);           // wait for a second  
  digitalWrite(13, LOW); // set the LED off  
  delay(1000);           // wait for a second  
}
```

digital I/O functions:

- pinMode
- digitalWrite
- digitalRead

11

living with the lab

code

```
void loop() {  
  digitalWrite(13, HIGH); // set the LED on  
  delay(1000);           // wait for a second  
  digitalWrite(13, LOW); // set the LED off  
  delay(1000);           // wait for a second  
}
```

digital I/O functions:

- pinMode
- digitalWrite
- digitalRead

12

```
code  
Blink | Arduino 0021  
Blink  
//  
// Blink  
// Turns on an LED on for one second, then off for one second, repeatedly.  
//  
// This example code is in the public domain.  
//  
//  
// Initialize the digital pin as an output.  
// Pin 13 has an LED connected on most Arduino boards.  
// To see the LED light up, activate the pin with digitalWrite(13, HIGH);  
// To turn the LED off, activate the pin with digitalWrite(13, LOW);  
// pinMode(13, OUTPUT);  
}  
  
void loop() {  
  digitalWrite(13, HIGH); // set the LED on  
  delay(1000);           // wait for a second  
  digitalWrite(13, LOW); // set the LED off  
  delay(1000);           // wait for a second  
}
```

digital I/O functions:

- pinMode
- digitalWrite
- digitalRead

digitalWrite(13, LOW)
sets pin 13 to voltage
that means "off" or zero volts
