ARDUINO BASICS: PROTOTYPING YOUR FIRST PROJECT

COLUMBIA UNIVERSITY SCIENCE & ENGINEERING LIBRARIES
HELLO!
(again)

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QUICK NOTE:

- This is not a hands-on session.
- This session assumes prior knowledge of the Arduino hardware and software system.
What You’ll Learn:

- Brainstorming project ideas and seeing them to completion.
- Where to get help!
THE BIG QUESTION:
MOTIVATION
EXERCISE #1

First question:

Think about the perfect gadget you *desperately* need, but don’t have (or, perhaps, doesn’t even exist yet). What would it do? What problems would it solve?
ARDUINO PROJECT EXAMPLES:
USEFUL PROJECTS
LAUNDRY

text message alert

TWITTER

automated coffee pot

http://lifehacker.com/5726455/diy-twitter-powered-coffee-pot
FINGERPRINT garage door opener

MOTION SENSOR

LED bed lights

http://lifehacker.com/make-a-motion-triggered-night-light-for-under-the-bed-1627999765
ENOUGH
ALREADY
muting mechanism

http://lifehacker.com/5831884/the-enough-already-mutes-your-tv-when-overexposed-celebrities-come-on
THE “EYE WRITER”

eye tracking system

http://www.instructables.com/id/The-EyeWriter-20/
TURN SIGNAL

arduino wearables

http://www.instructables.com/id/turn-signal-biking-jacket/
AUTOMATIC PET FEEDER
3D printed and user programmed

http://www.instructables.com/id/Automatic-Arduino-Powered-Pet-Feeder/
FUN

PROJECTS
ROBOTIC ARM

FLAMETHROWING
Jack-O-Lantern

CHALLENGING

PROJECTS
ARDUSAT

arduino satellite

EXERCISE #1

Let’s try this again:

Reconsider the original question: think about the perfect gadget you *desperately* need, but don’t have (or, perhaps, doesn’t even exist yet). What would it do? What problems would it solve?
EXERCISE #2
BREAKING IT DOWN:

- Logically -- what is your project doing? Walk me through what happens from event A (turning on the device) to event Z (shutting it off).
- What kind of information are you recording or storing?
- What boards, sensors, screens, or other devices do you need to successfully run your project from start to finish?
- Does your Arduino need to communicate with other devices for this project? If so, which ones?
- Does completing this project require specialized knowledge you don’t have?
Sensor detects motion

Event A

Motion triggers servo motor

Event B

Food trickles down into bowl

Event C

25 seconds elapse; servo responds

Event D

Cat beings eating

Event E

AUTOMATIC PET FEEDER
AUTOMATIC PET FEEDER

Event A: Sensor detects motion

Event B: Motion triggers servo motor

Event C: Food trickles down into bowl

Event D: 25 seconds elapse; servo responds

Event E: Cat begins eating
SAMPLE IDEAS:

- Create an Arduino bot that records some sensor’s data, then updates a corresponding Twitter feed and texts you its results.

- Create an arduino wearable that records and responds to some kind of motion.
EXERCISE #3
# Programming

```c
#include <Servo.h>

Servo myservo; // create servo object to control a servo
               // twelve servo objects can be created on most boards
int pos = 0;   // variable to store the servo position

void setup()
{
  myservo.attach(8);  // attaches the servo on pin 9 to the servo object
}

void loop()
{
  for(pos = 0; pos <= 180; pos += 1) // goes from 0 degrees to 180 degrees
  {
    myservo.write(pos); // in steps of 1 degree
    delay(15); // tell servo to go to position in variable 'pos'
    delay(15); // waits 15ms for the servo to reach the position
  }
  for(pos = 180; pos>=0; pos--)
  {
    myservo.write(pos); // goes from 180 degrees to 0 degrees
    delay(15); // tell servo to go to position in variable 'pos'
    delay(15); // waits 15ms for the servo to reach the position
  }
}
```

motion → servo → food → servo → eating
RECOMMENDED RESOURCES:

- What is electricity?
- A First Lab in Circuits and Electronics
- All About Circuits
- Arduino “How To” e-books
- SparkFun PCB Basics Guide
- Software: Fritzing and LTSpice
- Youtube (in this case) is better for finding video tutorials; try Jeremy Blum’s comprehensive Tutorial Series for Arduino
- SparkFun (detailed guides with pictures and linked explanations)
- Adafruit (detailed guides and some video content)
- Connecting Arduino with other programming languages
GET HELP

Science and Engineering Libraries:
ref-sci@columbia.edu or jcb2257@columbia.edu
Arduino project guidance forum
Project books
Stack Exchange
Reddit forum
SURVEY!

bit.ly/CUSELWorkshopSurvey

Other questions? Comments? You can find me at @jeninthelib & jcb2257@columbia.edu
THANK YOU!

Special thanks to all the people who made and released these awesome resources for free:

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