

Introduction to Arduino

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credit where credit is due..

Most material in this training program is based on the Sparkfun [Activity Guide for SparkFun Tinker Kit](#) and is licensed similarly [Creative Commons Attribution Share-Alike 4.0 International License](#).

Who are you and why are you doing this?

- Mahesh Neelakanta
 - Director of ITS
 - IT Director at Engineering for 13 years and recently moved to Libraries in Fall 2019
- Library technology outreach initiatives to bring various areas of technology to the general student, faculty and staff population
 - 3D Printing (ITS Webinar by Hansy, Crystal and Yom)
 - Cloud Computing
 - Artificial Intelligence and Cloud Computing

Housekeeping

- Meeting is in webinar mode
 - Attendee mics will be muted (I can unmute if needed)
 - No video of attendees (only panelists)
 - Please ask your questions in Q&A and/or Chat
 - You can raise your hand as needed
- Polls
 - <https://meet.ps/mahesh>
- Slides and Documentation
 - <https://github.com/faumahesh/arduino>

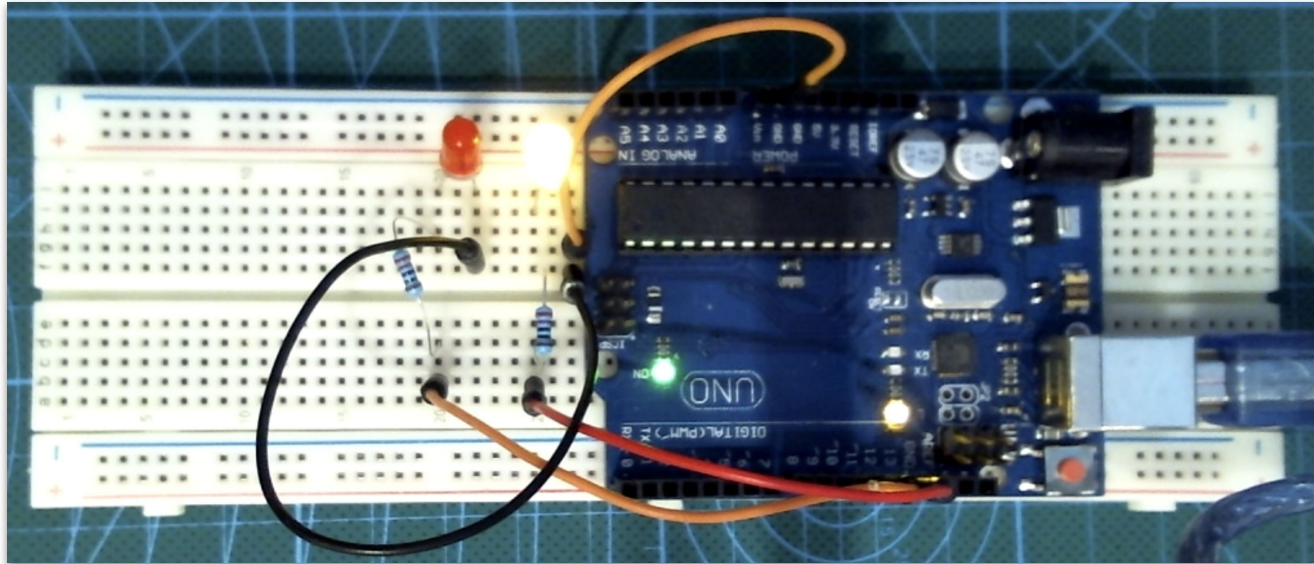
Module 1 - Goals

- Let's start with a demo!
- How is this series organized?
- What is Arduino and how to get started?
- What can you do with Arduino?
- The Sparkfun Tinkerkit Unboxing (<https://www.sparkfun.com/tinkerkit>)
- Let's Get Started!
 - Install Arduino Software
 - Circuit 1 - Blink an LED
- Module 2 Goals
- Additional Reading , Q&A

Let's start with a demo!

- Blinking LED

```
1
2 void setup() {
3   pinMode(13, OUTPUT); |
4   pinMode(12, OUTPUT);
5 }
6
7
8 void loop() {
9   digitalWrite(13, HIGH); // Turn on the LED
10  digitalWrite(12, LOW); // Turn on the LED
11  delay(1000); // Wait for two seconds
12  digitalWrite(13, LOW); // Turn off the LED
13  digitalWrite(12, HIGH); // Turn off the LED
14  delay(1000); // Wait for two seconds
15 }
16
```

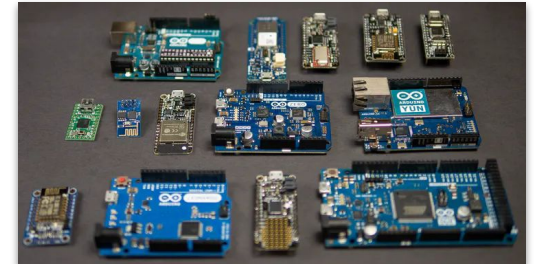


How is this series organized?

- We will be covering the [Sparkfun Activity Guide](#) for the Tinker Kit over a period of 5-6 sessions
- Each session (except #2) will have 1-2 circuits from guide, ad-hoc circuit followed by a Q&A period
- Session 2 (next one) will focus on Arduino "C" language introduction
- This is a beginner course. At the end of the series, we will gauge interest for an intermediate class (WiFi, Shields) and an advanced class (IoT, Cloud)
- Sessions will be recorded for replay at FAU Libraries Youtube or Facebook
- Survey at the end of this session on what schedule works best for everyone
 - Weekly, twice a month, monthly?

What is Arduino and how to get started?

- Easy to use hardware framework to learn (hands-on) electronics and coding
- Cheap enough to experiment-destroy-restart (\$10 - \$30)
- Open source hardware and lots of software to get started quickly
- Rich ecosystem of "shields" for easy extensibility - <https://store.arduino.cc/usa/arduino/shields>
- Common platform and jumping point to more advanced devices
- Program in "C" or Visually using Blockly (or Python with higher end units)
 - Arduino IDE (what we will be using) - <https://www.arduino.cc/en/main/software>
 - Otto Blockly - <https://github.com/OttoDIY/blockly>



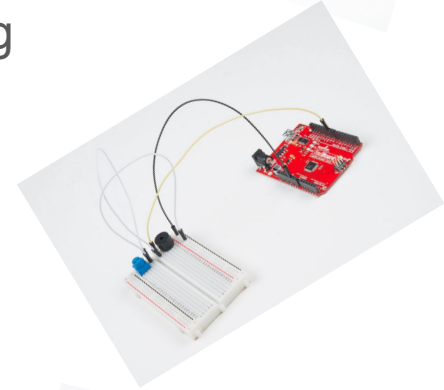
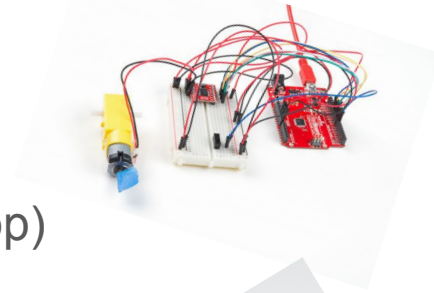
Arduino Boards (microcontrollers)

- Open Source hardware by
- Uno for entry level playground
 - Arduino Uno - \$23
 - SparkFun RedBoard - \$20
 - AdaFruit Metro - \$18
 - Amazon Generic Uno - \$13
 - Generic from China - \$4
- Due, Mega, Nano, Zero
 - Different form factors and capacities
 - https://www.sparkfun.com/standard_arduino_comparison_guide
 - <https://electropeak.com/learn/arduino-buying-guide-how-to-choose-right-arduino-board/>



What can you do with Arduino?

- Learn to code with an physical device (vs on desktop/web/app)
- Learn the basics of electronics and circuits by experimenting
- Build devices with sensors and displays
 - Check temperature, humidity, barometric pressure, light
 - Turn a switch on/off
 - Play a tune
 - Make a motor rotate
- Bond with your kids with hands on activities
- Enter into a much wider world of connected devices such as home automation and Internet-of-Things (IOT)
- What about you? <https://meet.ps/mahesh>



Sparkfun Tinker Kit Unboxing

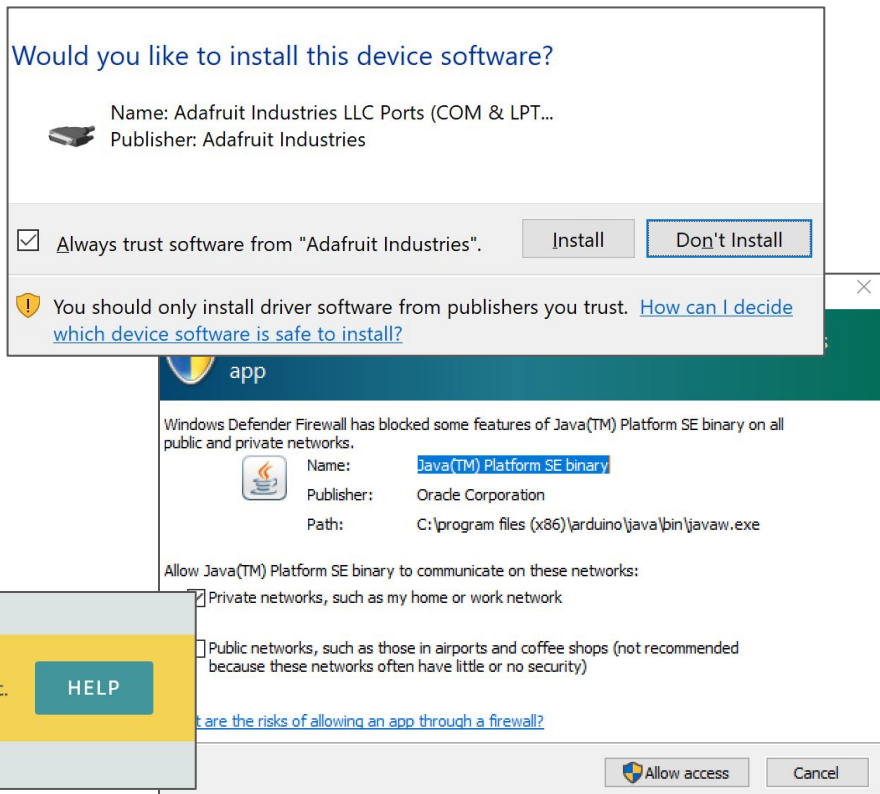
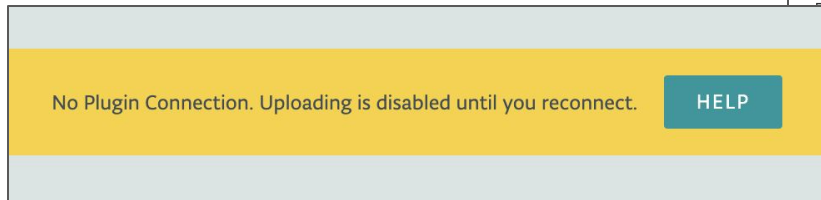
- <https://www.sparkfun.com/products/14556>
- SparkFun RedBoard
- SparkFun Motor Driver (with Headers)
- Breadboard - Self-Adhesive (White)
- Servo -- Sub-Micro Size
- Hobby Gearmotor -- 200 RPM (Pair)
- Temperature Sensor -- TMP36
- Mini Photocell
- Piezoelectric Speaker
- SparkFun USB Mini-B Cable -- 6 Foot
- Jumper Wires -- 7" M/M 30 AWG (30 Pack)
- LED - RGB Diffused Common Cathode
- Red, Blue, Yellow, and Green LEDs
- Red, Blue, Yellow, and Green Buttons
- Mini Power Switch
- 10K Trimpot
- Battery Holder - 4xAA to Barrel Jack Connector
- 330 and 10K Resistors

Let's Get Started!

Arduino Software

1. Download and install on Mac, Windows or Linux
2. Web based interface on <https://create.arduino.cc/>
3. Software simulator at <https://www.tinkercad.com/>

<https://learn.sparkfun.com/tutorials/installing-arduino-ide>



Circuit 1 - Blink a LED

- <https://learn.sparkfun.com/tutorials/how-to-use-a-breadboard>
- <https://learn.sparkfun.com/tutorials/redboard-hookup-guide>
- <https://learn.sparkfun.com/tutorials/activity-guide-for-sparkfun-tinker-kit/circuit-1-blink-an-led>
 - Build the circuit
 - Copy the code
 - Test the circuit
 - Modify the circuit to add a second LED
 - Modify the code and circuit to control the two LEDs separately
 - Modify the code to blink the two LEDs opposite of each other

<https://www.tinkercad.com/>



Additional Reading

- <https://learn.sparkfun.com/tutorials/what-is-an-arduino>
- <https://learn.sparkfun.com/tutorials/what-is-a-circuit>
- <https://www.arduino.cc/en/Guide/Introduction>
- https://files.seeedstudio.com/wiki/Book_and_stickers/A_Brief_Intro_to_Electronics.pdf
- <https://learn.sparkfun.com/tutorials/redboard-hookup-guide>

Module 2 - Goals

- Arduino "C" Language Tutorial
- Extending Blinking LEDs with some logic

Q&A

- Contact information
 - Course related questions: libticket@fau.edu
 - Non course related email: mahesh@fau.edu

Module 3 - Goals

- Questions from previous session?
- What are some other embedded devices?
- Basic electronics and circuits
- Circuit 2 - Potentiometer
- Circuit 3 - Photoresistor
- Q&A