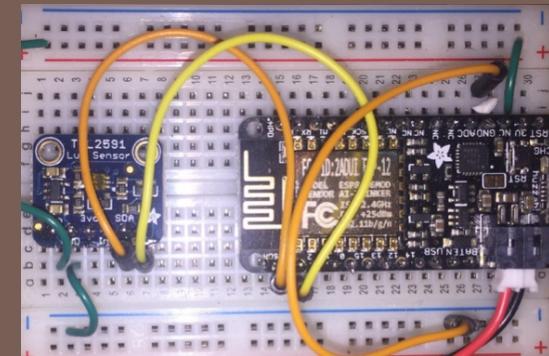


# MICROPYTHON IOT HACKATHON

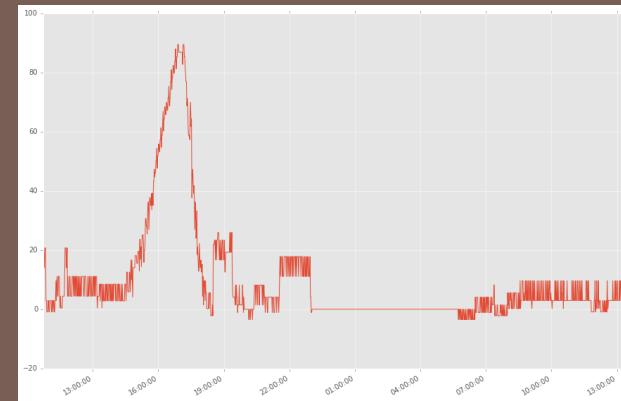
Featuring the ESP8266



Jeff Fischer

Daniel Mazyrycki

Robert Queenin



PyBay Conference August 2017

# Today's Agenda

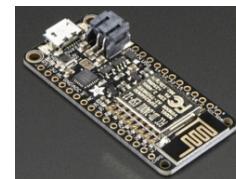
2

- Part 1:
  - Overview lecture
  - Build and test light sensor system (hardware and software)
- Part 2:
  - Break into teams
  - Brainstorm on projects
  - Build projects
  - Demos!

# Why Python for IoT?

3

- High-level, easy to prototype ideas and explore options
- Runs on embedded devices



- Python data analysis ecosystem



Array and matrix processing



High level data analysis tools



Numerical analysis routines

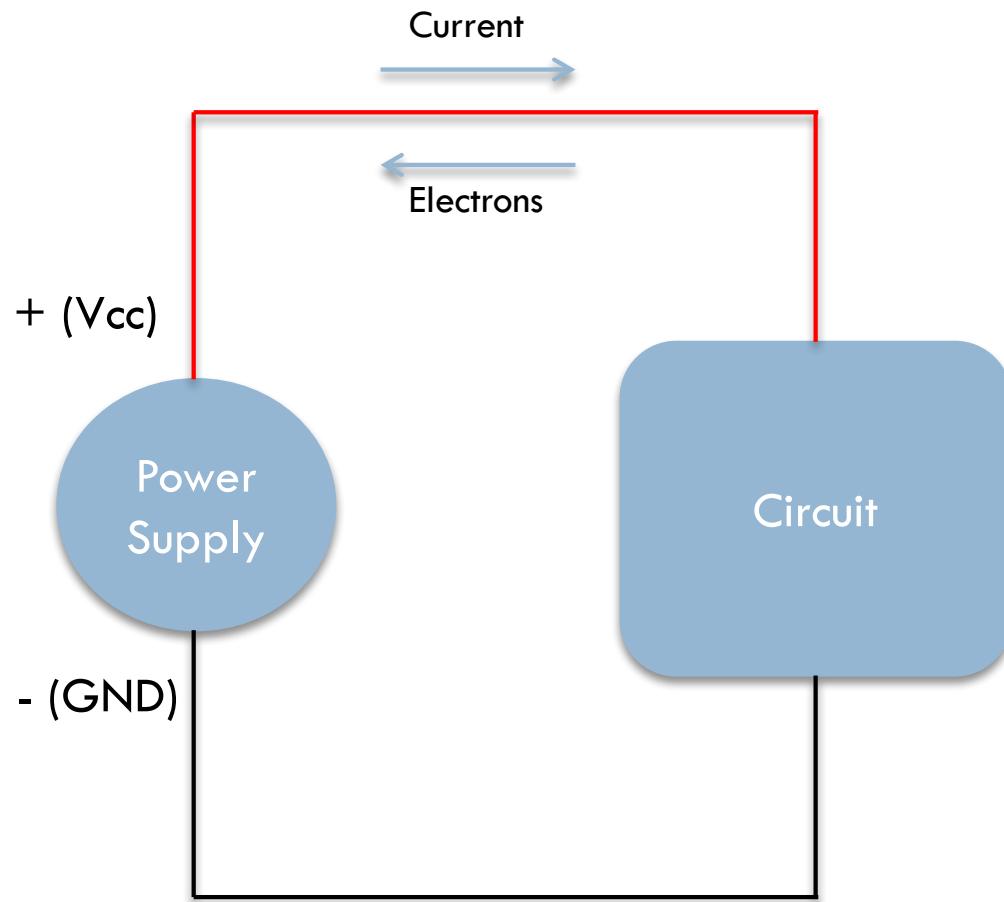


Machine learning

HMMLearn

# Basic Electronics

4



Voltage = Electrical Pressure  
Current = Flow of electric charge  
Resistance = Difficulty to pass electric charge

Ohm's Law

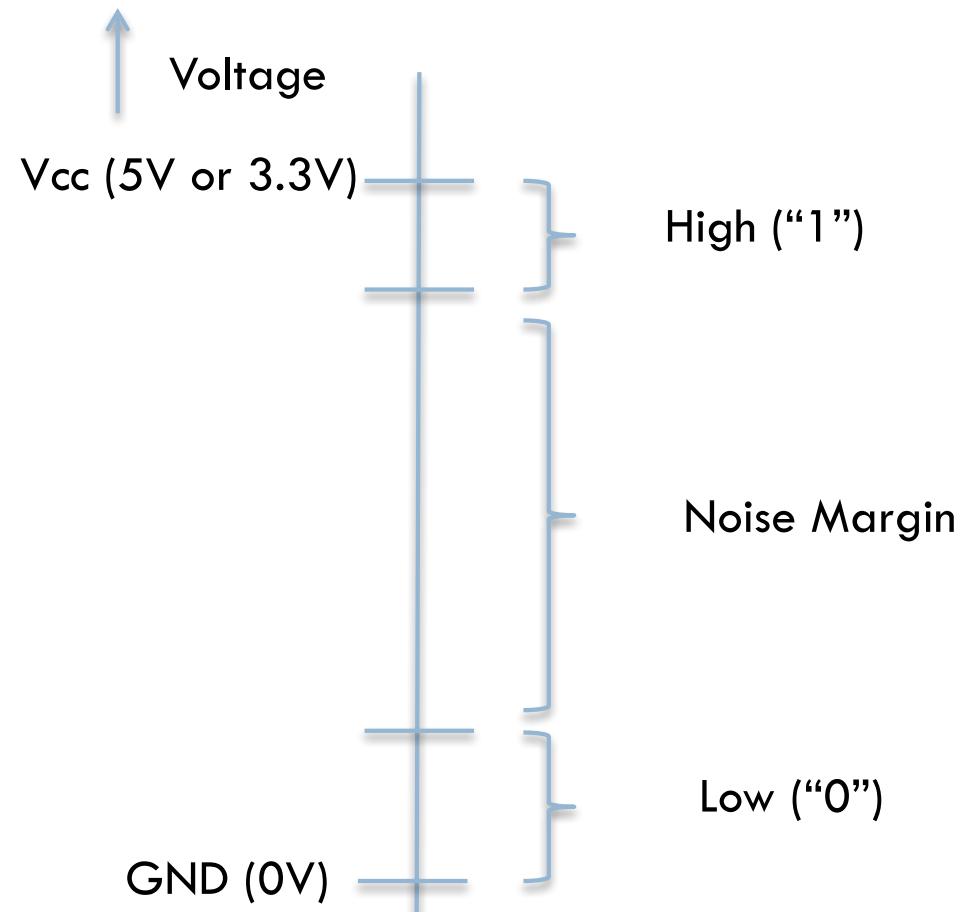
$$V = I R$$

arrows point from the words 'voltage', 'current', and 'resistance' to the corresponding terms in the Ohm's Law equation.

voltage      current      resistance

# Digital Logic

5



# Cautions

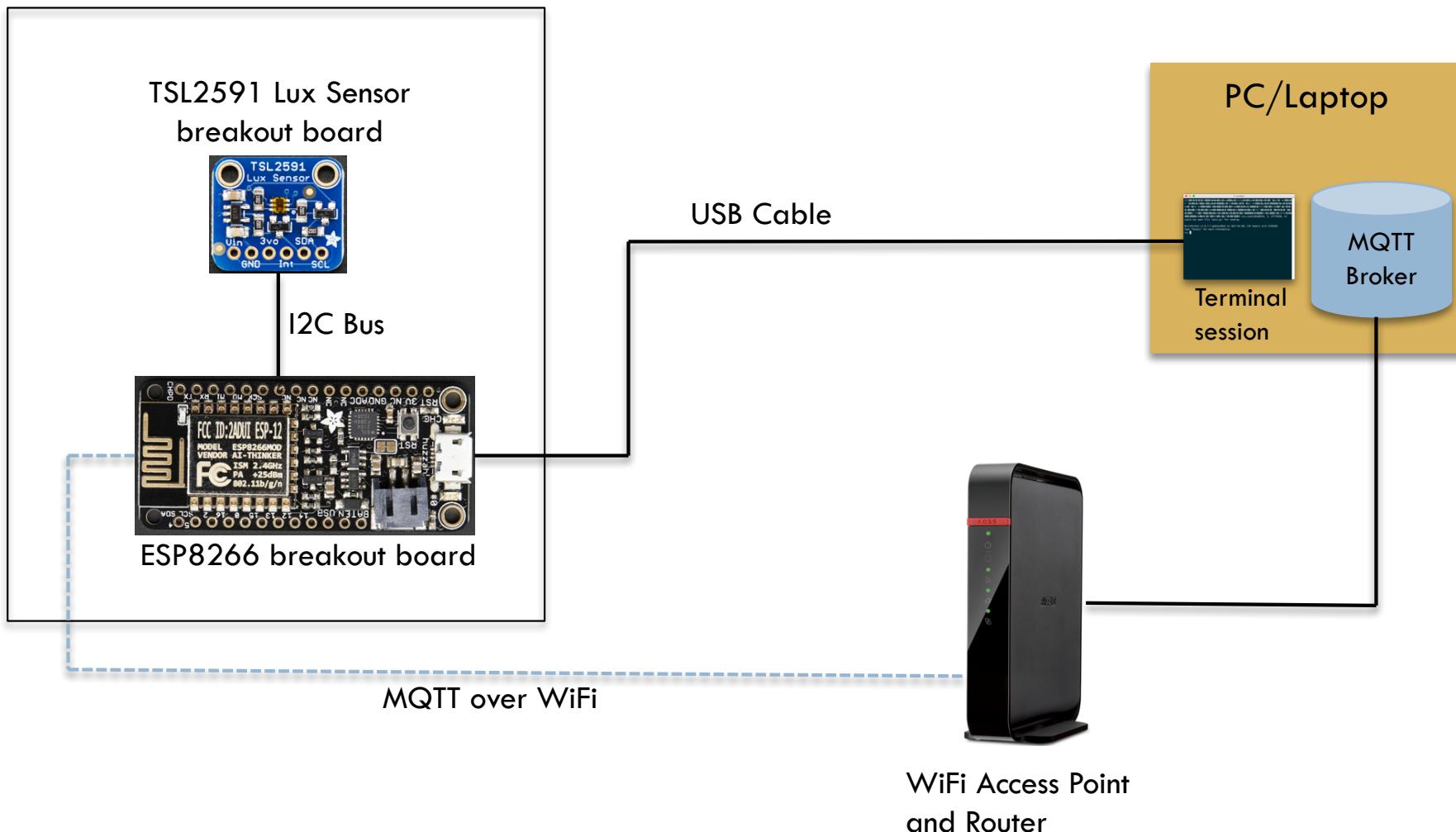
6

- Do not connect power and ground directly to each other (“shorting”)
- Chips are sensitive to static discharge, be careful
  - You might touch some metal (e.g. your laptop chassis before handling the electronics)



# Light Sensor System Overview

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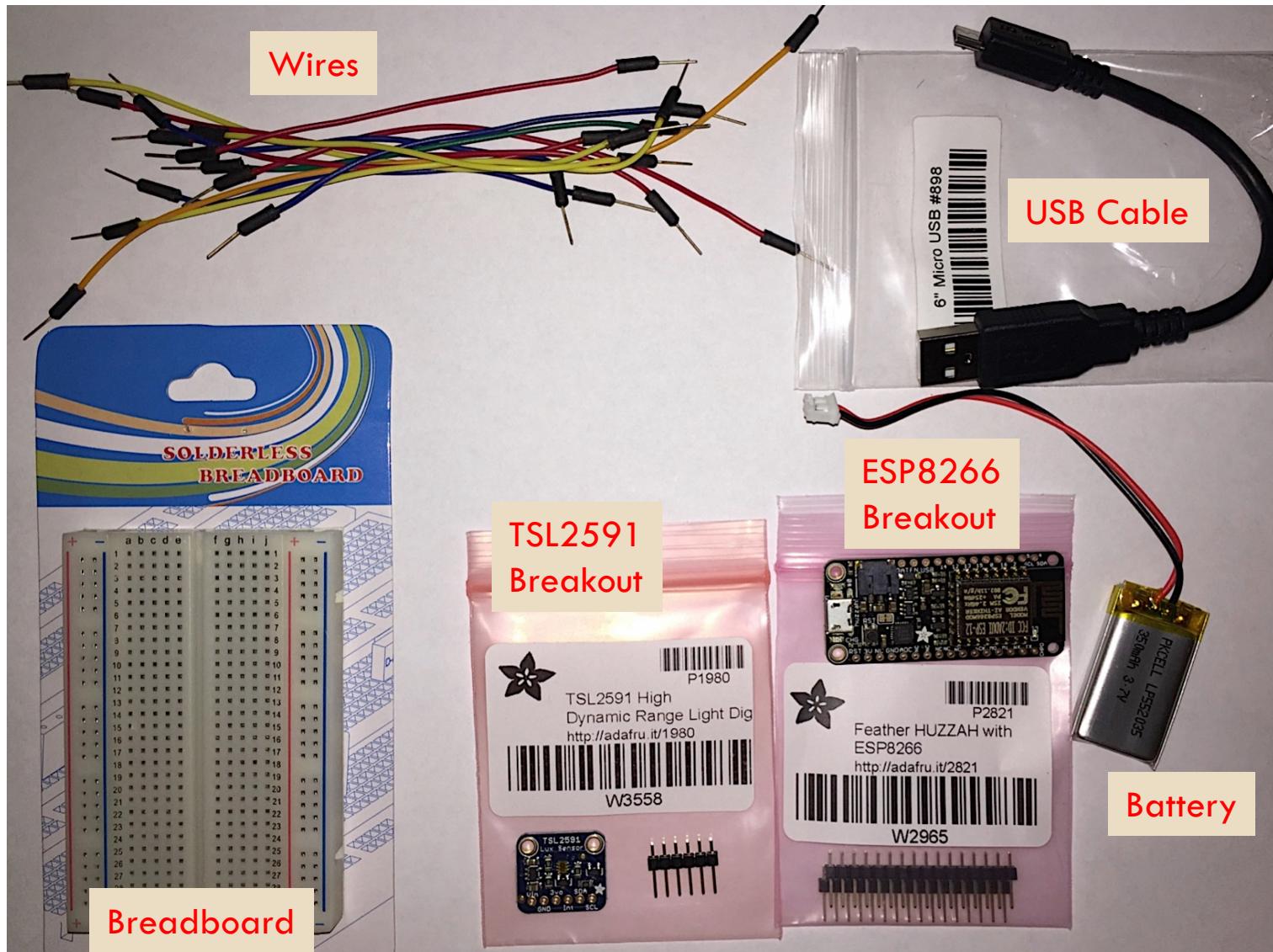
# Steps

8

1. Hardware Assembly
2. Firmware and software install
3. Application to read the sensor
4. Messaging with MQTT

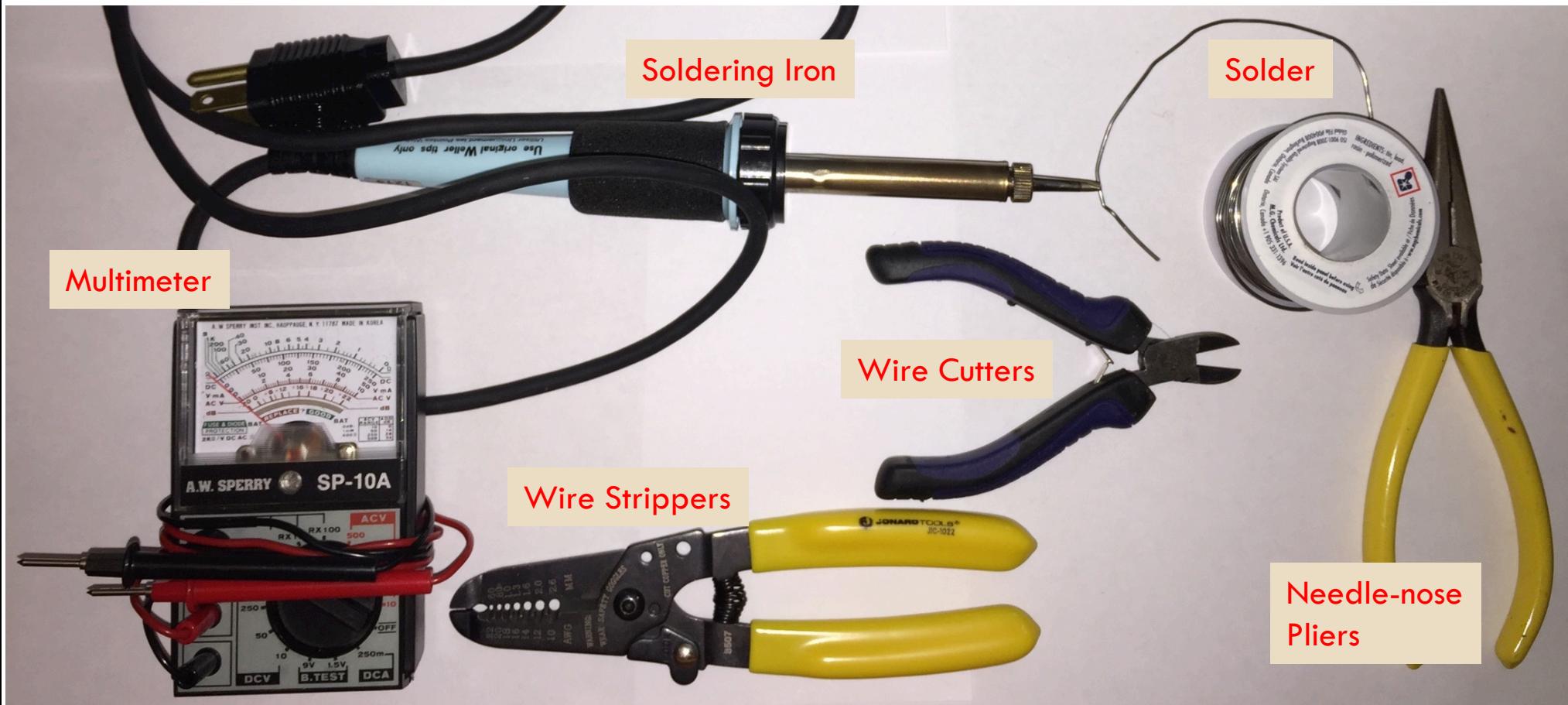
# Parts

9



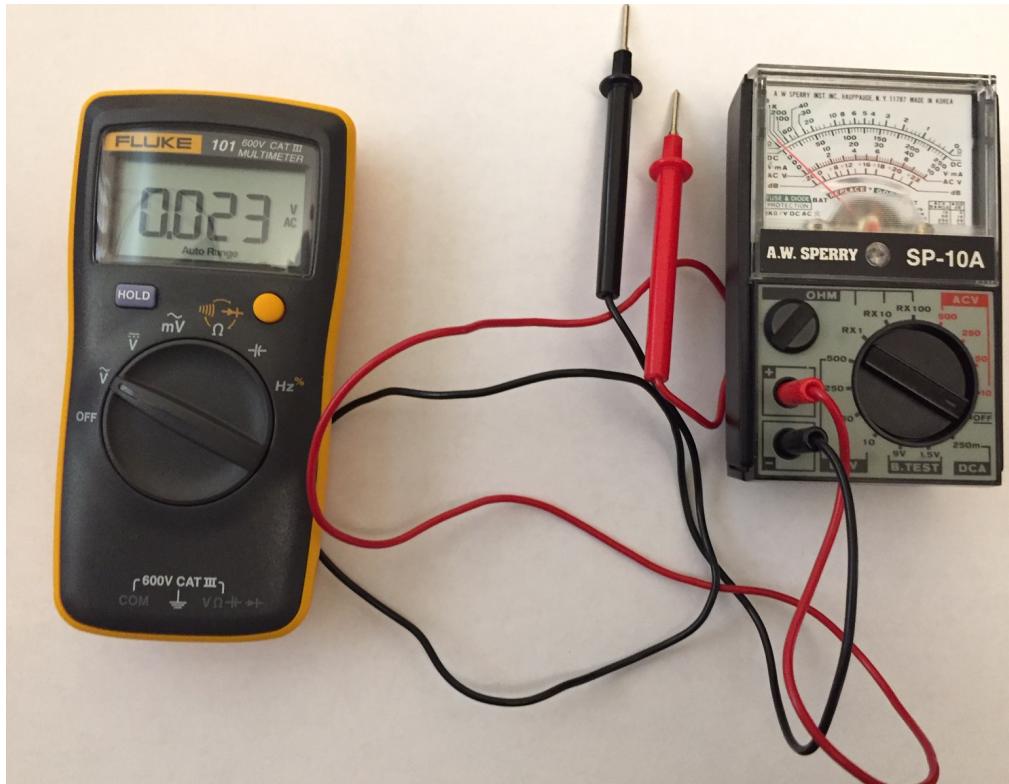
# Recommended Tools

10



# Multi-testers

11

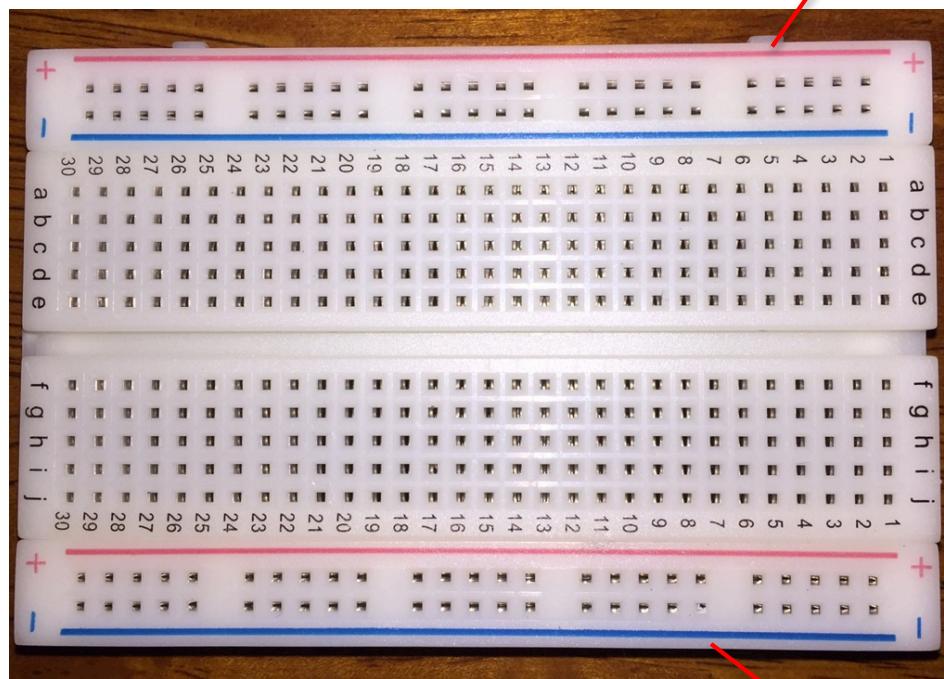


- Measures Volts, Amps, and Ohms (resistance)
- Digital and analog flavors
- Analog may require manually setting the range
- Use resistance to check continuity:  
0 Ohms = Connection

# Breadboards

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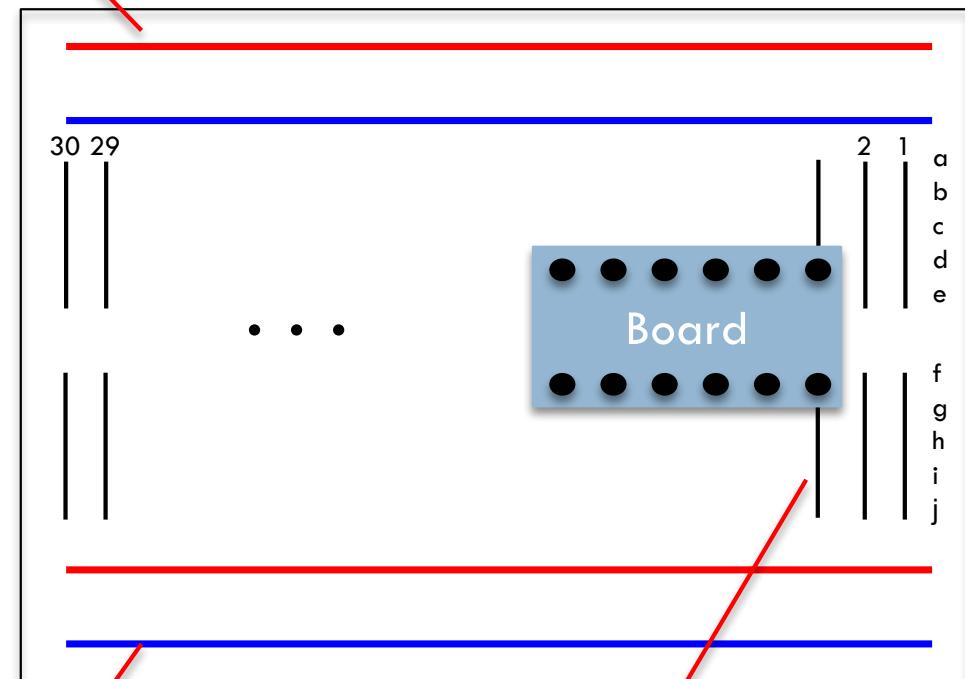
Photo



Use for Power

Use for GND

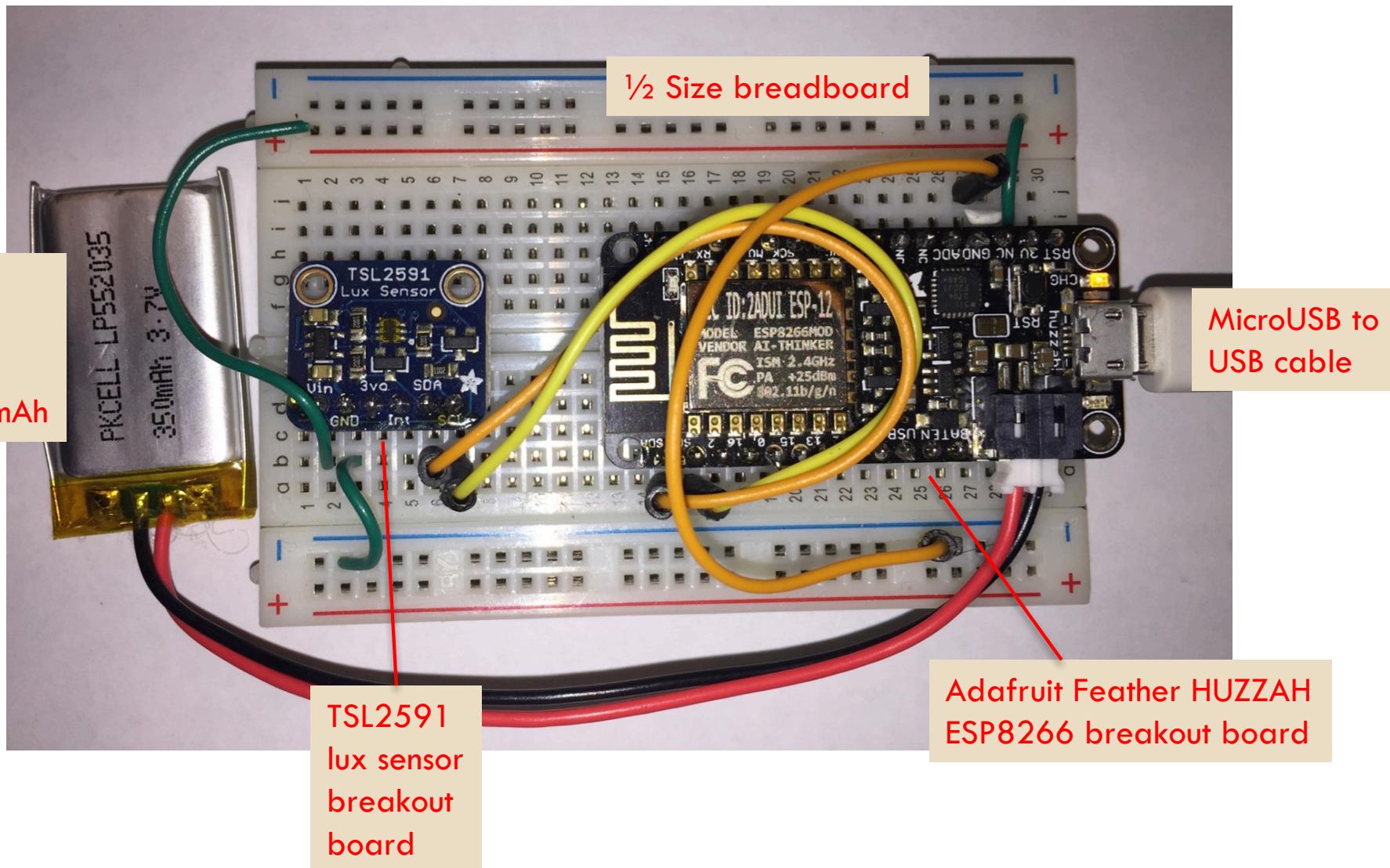
Electrical Connections



Use for pin connections

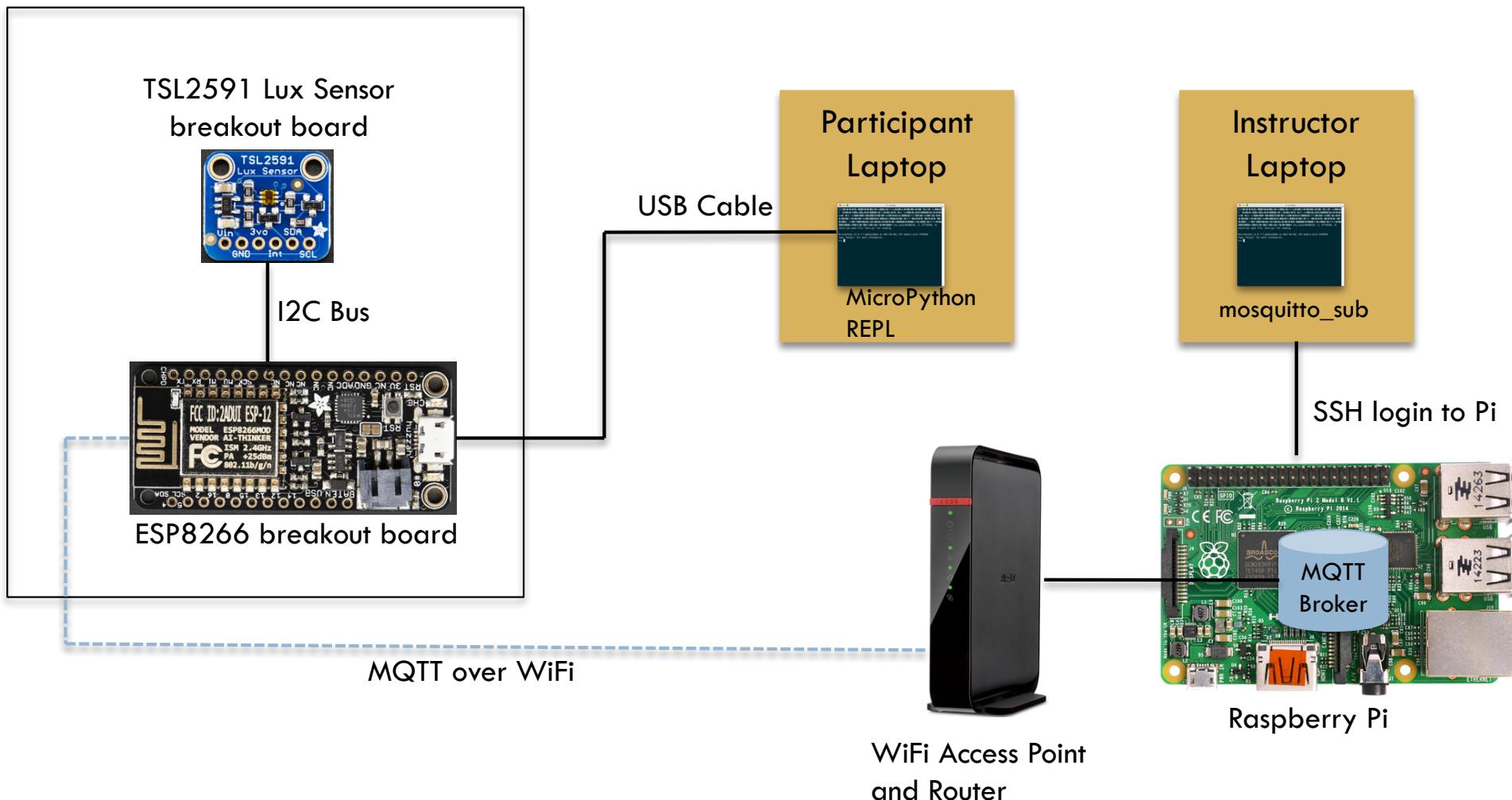
# System with Adafruit Feather HUZZAH

13



# Today's MQTT Setup

14



# Zip Directory Tree Structure

15

- micropython-iot-software/
  - docs/
    - micropython-iot-hackathon/
    - thingflow-python/
  - drivers/ (for MacOS and Windows)
  - **esp8266-20170612-v1.9.1.bin** (Firmware image)
  - micropython/ (thingflow and other code for ESP8266)
  - micropython-iot-hackathon/ (repo with example code)
  - python-tools/ (Python libraries for your laptop)
  - terminal/ (PuTTY for Windows, screen for Linux)
  - thingflow-python/ (repo with source and example code)

# Next Steps

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- Follow the detailed instructions in the HTML documentation, starting with “Hardware Assembly”
- For software install, use either the shorter version (chapter 9 for Linux and Mac only) or the longer version (chapter 4)
- You can skip the section on the MQTT broker – you can connect to my Raspberry Pi
- If you get done early, take a look at the extra projects section
- Feel free to ask for help!

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# Thank You

Questions?

More information

**Email:** [jeff@data-ken.org](mailto:jeff@data-ken.org)

**Hackathon Tutorial:** <http://micropython-iot-hackathon.readthedocs.io/en/latest/>

**Website and blog:** <https://data-ken.org>

**ThingFlow:** <https://github.com/mpi-sws-rse/thingflow-python>