

# INTRODUCTION TO ARDUINO

James Brown W7JHB

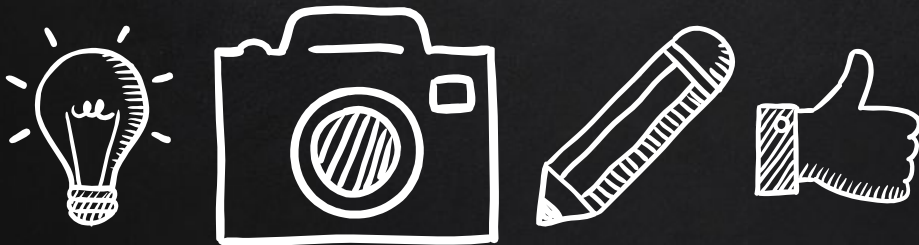
# UVARC ARDUINO PRESENTATION

Files at <https://github.com/jbrown123/UVARC-arduino-presentation>

Contact me for help

James Brown W7JHB

w7jhb@hmpg.net



# EMBEDDED SYSTEM BASICS

## AN (IMPERFECT) ANALOGY

### Cooking

Recipe (instructions)

Recipe card (remember recipe)

Chef / cook (follow the recipe)

Pointer (remember which step)

Kitchen timer (time for next step)

### Computers

Software / program / code

Persistent storage (ROM, FLASH)

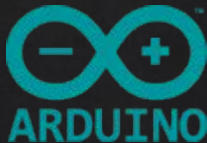
CPU (central processing unit / 'brains')

Memory (RAM, temporary storage)

Clock (execute next instruction)

# ARDUINO BACKGROUND

- ✗ Open source hardware & software
- ✗ Started in 2003 at Ivrea Interaction Design Institute in Italy
- ✗ Easy tool for fast prototyping
- ✗ No background in electronics or programming needed
- ✗ Started with Atmel AVR embedded controller (many others now)
- ✗ “Arduino” can refer to the hardware or the IDE or both
- ✗ Arduino or Genuino – legal dispute between founders



# ARDUINO ADVANTAGES

- ✗ Inexpensive – \$22 official boards; \$2.25 Pro mini “compatible”
- ✗ Cross platform – IDE on Windows, Linux, Mac; GCC support
- ✗ Choices – Scratch, IDE, GCC
- ✗ Open source & extensible software
- ✗ Open source & extensible hardware
- ✗ “Shields” and modules for about anything
- ✗ Libraries available for nearly any hardware / software
- ✗ Atmel AVR – Single chip computer \$2
- ✗ AVR-ISP (self replicating)





# “ARDUINO” BOARDS

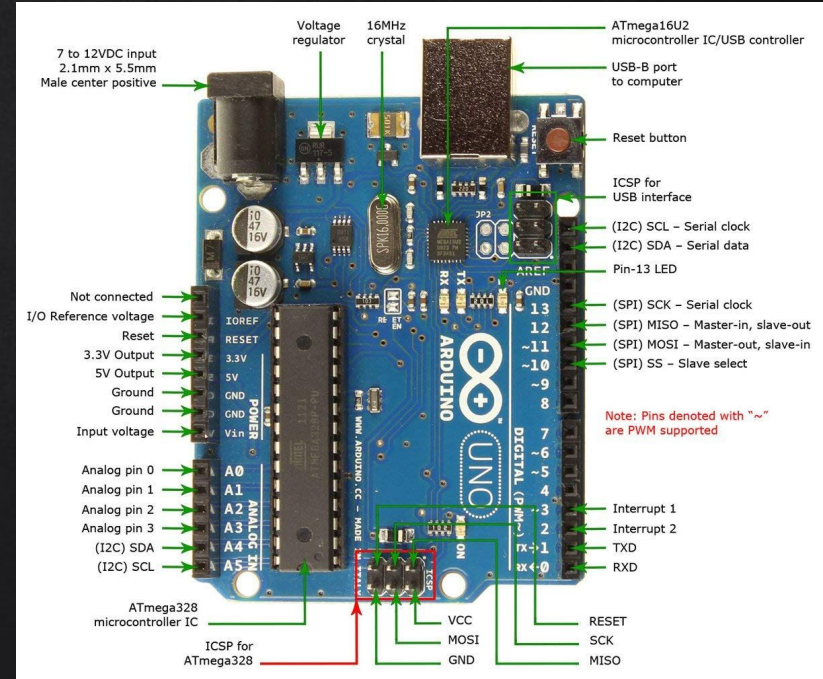
Tons of “arduino” boards out there – compatible with IDE

Most common / generic is the Uno R3

*\* note the DIP package*

Micro, Pro Mini, Nano, Mega, Due, Leonardo, Yun, many others as well

WiFi: ESP32, ESP8266, & others



# ARDUINO AND AMATEUR RADIO

Over 40 projects on Hackaday labeled Ham Radio, many use Arduino

Several ARRL books

7M+ google results

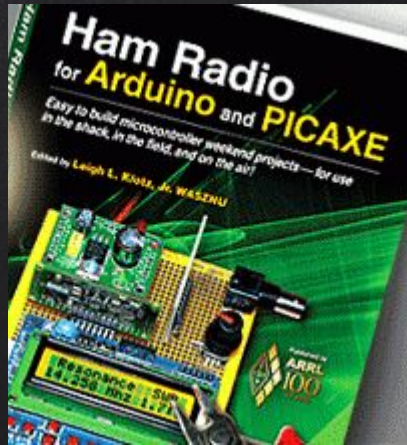
Baofeng backpack

Solar charge controller

Iambic keyer

Field day satellite tracker

Talking SWR meter



# ADOBE TECH SUMMIT BADGE

Jared (K7PCB) & I designed & built these

2x RGB LEDs

5x Buttons

Light Sensor

128x64 Display

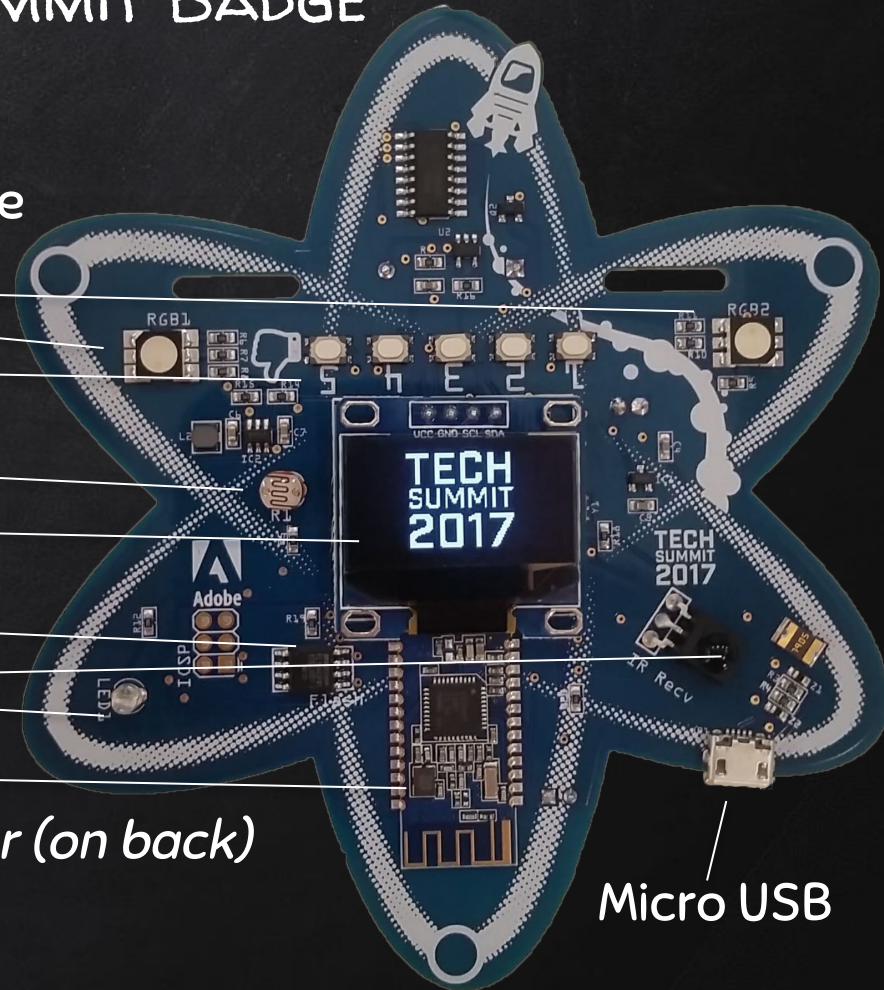
4M external flash

IR send & receive

BLE radio

AVR 32u4 (under display)

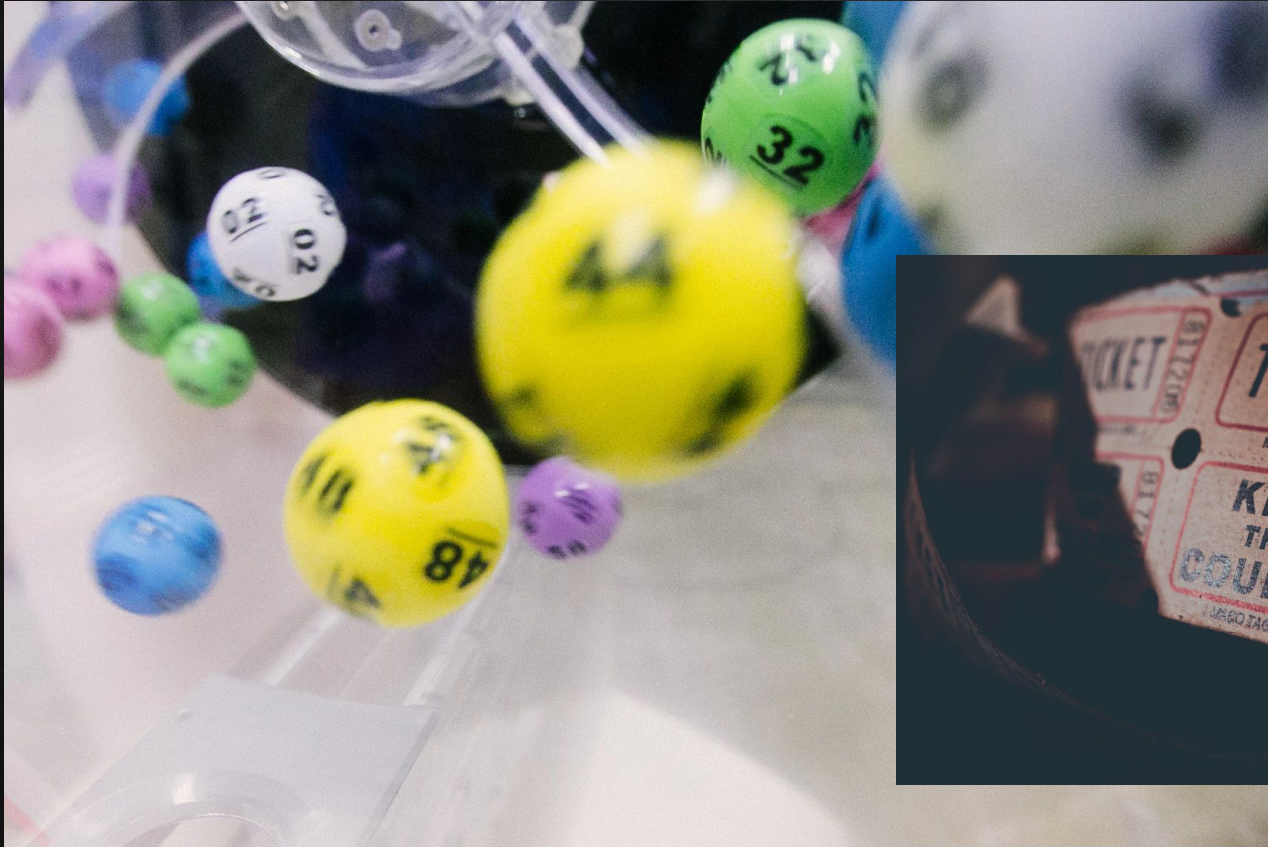
Tilt sensor (on back)



Micro USB



## DOOR PRIZES (A LITTLE EARLY)



DOOR PRIZES (A LITTLE EARLY)

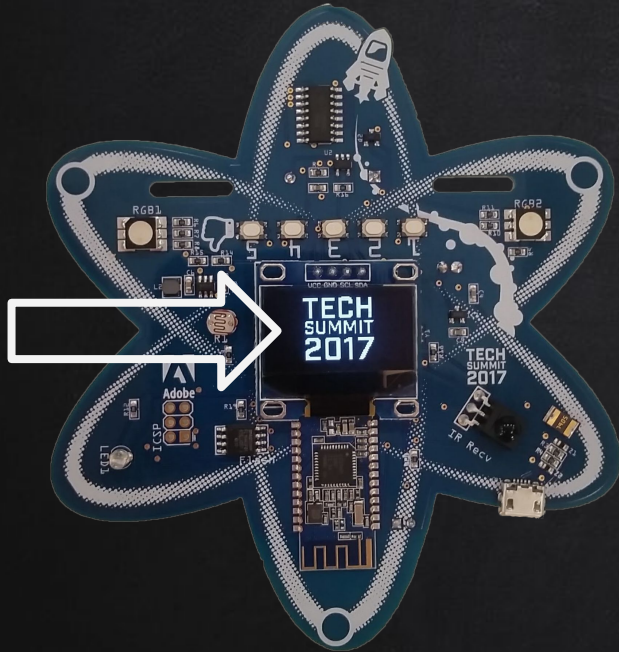




# TWO DIFFERENT STYLES OF BADGES

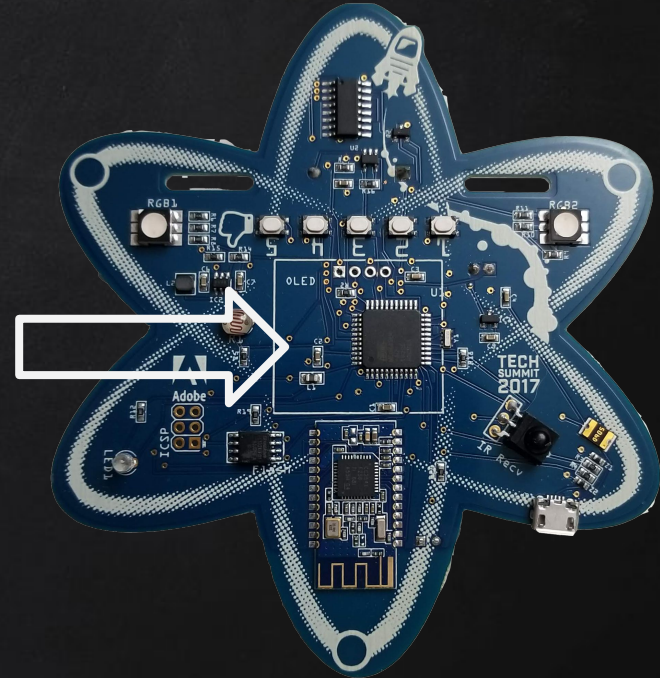
If your ticket ends in a '3', '6', or '9'

Take a badge with a display



If your ticket ends in any other number

Take a badge without a display



# ENOUGH TALK – LET'S CODE!

## Scratch



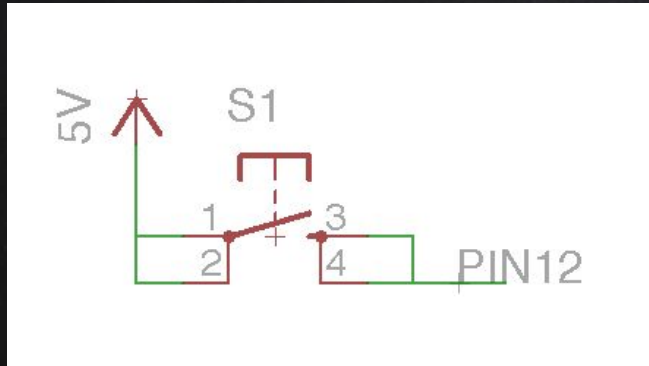
## Arduino IDE



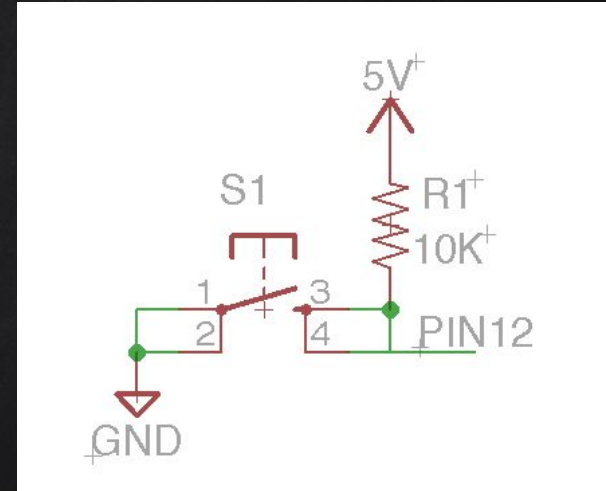


# SWITCHES & PULL UP RESISTORS

Keeps the input pin from “floating” when the switch is off  
Arduino has internal pull-ups you can enable in software



Floating input (bad)



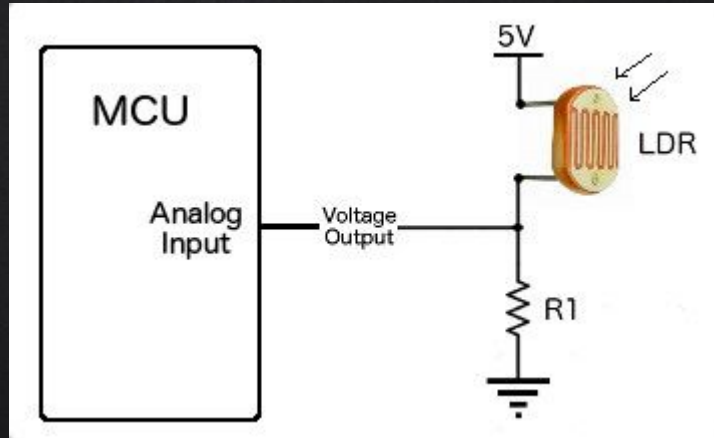
Pull up resistor

# LDR – LIGHT DEPENDENT RESISTOR

LDR changes resistance based on the amount of light

Create a voltage divider using a fixed value resistor

Read voltage using an ADC (analog to digital converter)



# UVARC ARDUINO PRESENTATION

Files at <https://github.com/jbrown123/UVARC-arduino-presentation>

Contact me for help

James Brown W7JHB

w7jhb@hmpg.net

## QUESTIONS?

