Halloween Pi!

Fun with GPIO on the Pi

Rob McKennon

- I've been a JAXLUG member since the late '90s
- Retired Navy (Submarine Service ‘87-’07)
- Unix Admin at Idea/Modis/Astadia
- Network Engineer at MainStreet Softworks
- Currently working at BOA as a Business Analyst.
- Slackware is my distro of choice!
- I've given presentations on: Squid proxy server,Tripwire, vi, “Samba and AD”, ThumbDrive RAIDs, DNS, bash scripting, public key cryptography, Python on the Pi, Amanda backup, Mail servers, rsyslog, Audio/Video Editing, Cacti, Nagios, Splunk, “Juniper and linux”, Slackware14, Slackware on the Pi, “LAMP 2.0, getting it all working”, “Fun with NOAA, cron and wget”, “Poor man’s animation with GIMP”,and “PuppyCam with Motion”.

Background

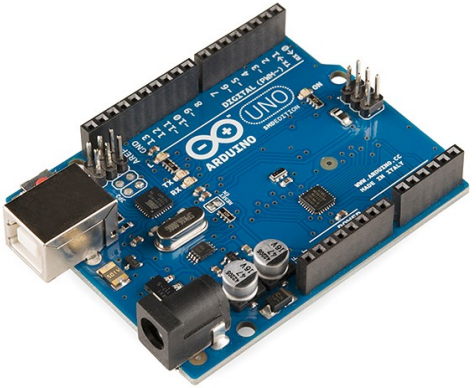
- This started out as a project for my Arduino several years ago (BC). But then life got in the way, many Halloweens passed and I lost interest.
- But then Keith kind of resurrected my interest in the Pi and robotics and I thought I would try it again, this time on the Pi vs. on the Arduino

Arduino project

- On the original project, I got a simple photo-resistor circuit working which would detect a loss of light source (from a laser).
- The next challenge was to have it stream an mp3 to a speaker. But that required a bluetooth module since it didn’t have audio out.

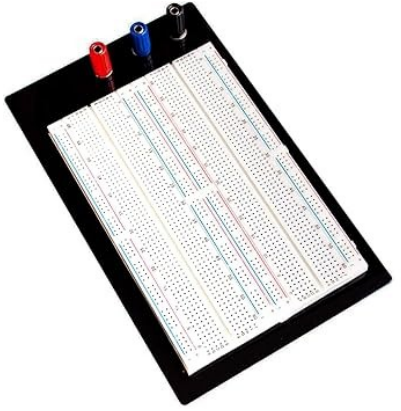
Pi vs. Arduino (according to Rob)

- Arduino has Analog GPIO pins!!! Pi does not.
- Pi has Ethernet and/or Wireless, my Arduino... Nope.
- Pi has Audio out! My Arduino..not so much.
- Pi has A LOT more memory to hold songs.



On to the Pi

- I’m using an old Raspberry Pi 2B (thanx to Gene Cronk)
- Large breadboard and Pi connector thanx to Ramon!
- I’m going to demo a few simple circuits and then put them all together.



Demo 1 and 2

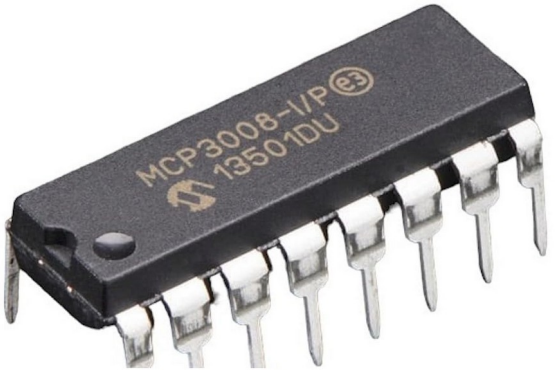
- Controlling GPIO pins requires sudo.

- For 1 and 2, those were strictly digital!
- Now for the analog!

Digital to Analog

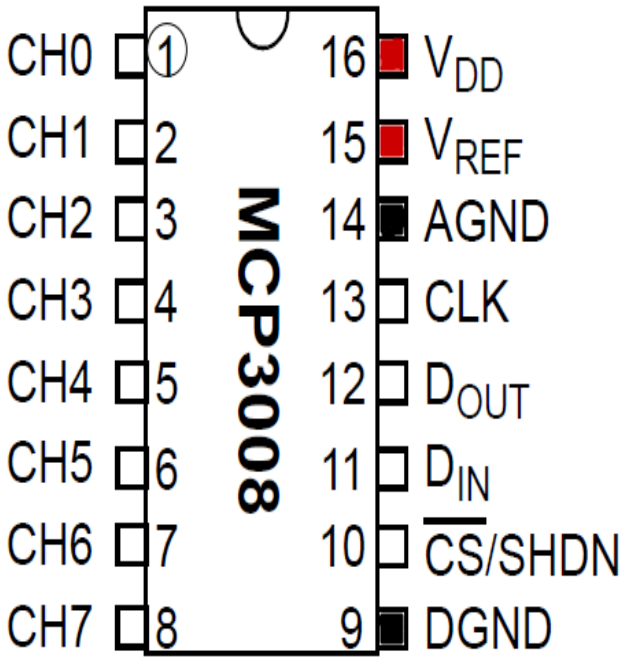
- We need an ADC chip! A what???
- An **A**nalog to **D**igital **C**onverter (of course).

- In this case I’m using the MCP3008 chip.



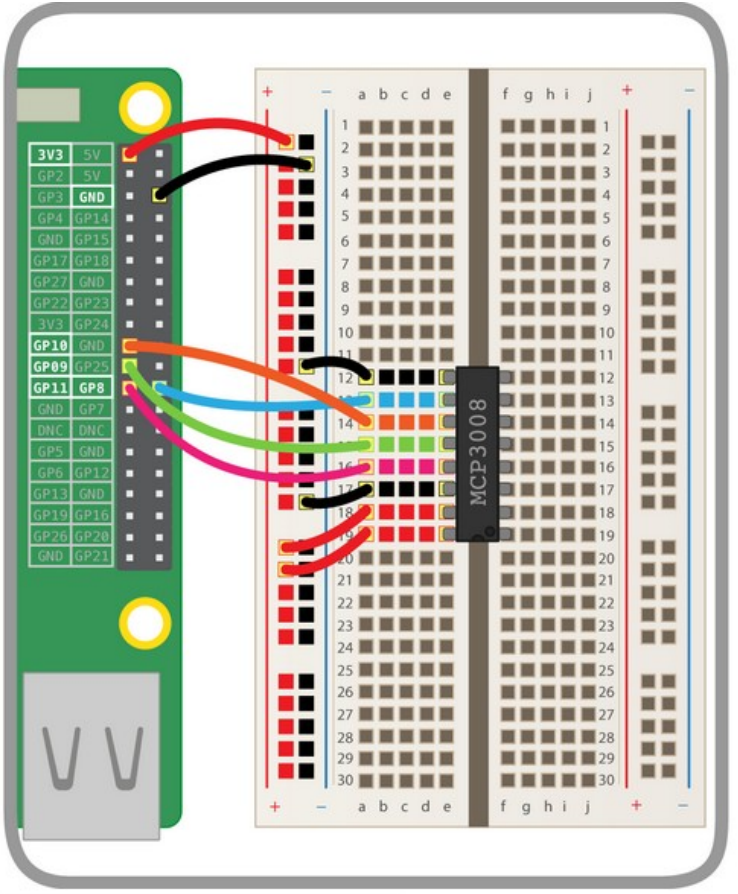
MCP3008 pinout

- Has 16 pins, 8 on each side.
- The left side are input pins… you could have up to 8 different inputs (I'm only using 2).
- The right side are the output pins and they are all used to do the magic behind the scenes!



Connecting the ADC

- MCP3008 VDD to Raspberry Pi 3.3V
- MCP3008 VREF to Raspberry Pi 3.3V
- MCP3008 AGND to Raspberry Pi GND
- MCP3008 DGND to Raspberry Pi GND
- MCP3008 CLK to Raspberry Pi SCLK
- MCP3008 DOUT to Raspberry Pi MISO
- MCP3008 DIN to Raspberry Pi MOSI
- MCP3008 CS/SHDN to Raspberry Pi CE0

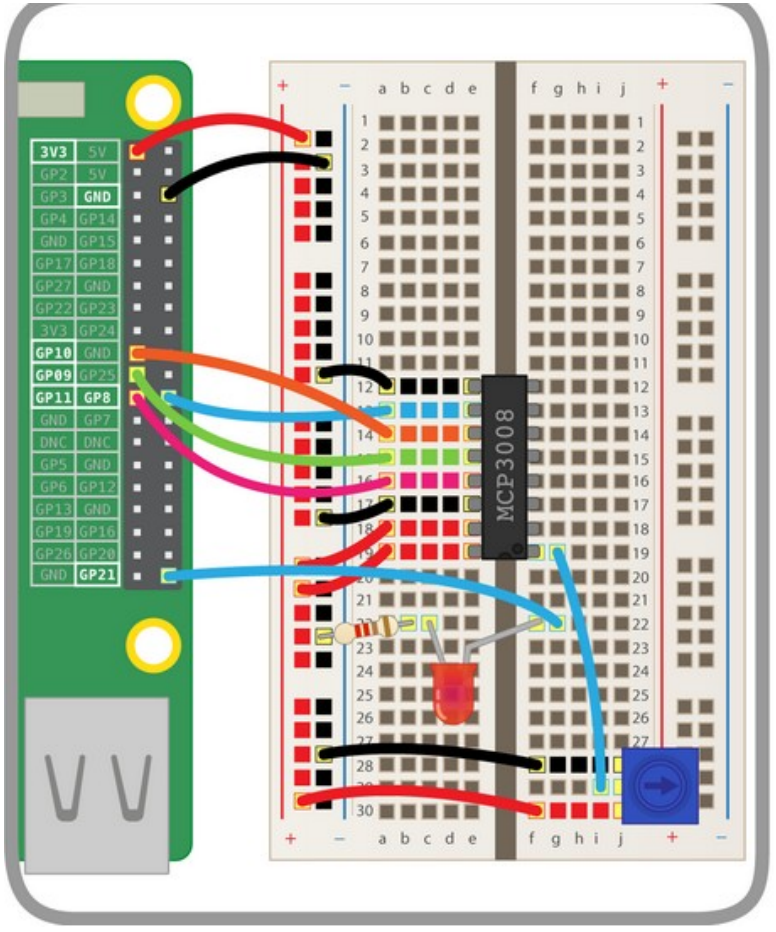


Test it out with a rheostat!

- Connect up a rheostat

  as shown:
- Power, ground, and the

  middle lead going to channel1
- Run program 3 and vary the rheostat by moving the top dial on the rheostat!

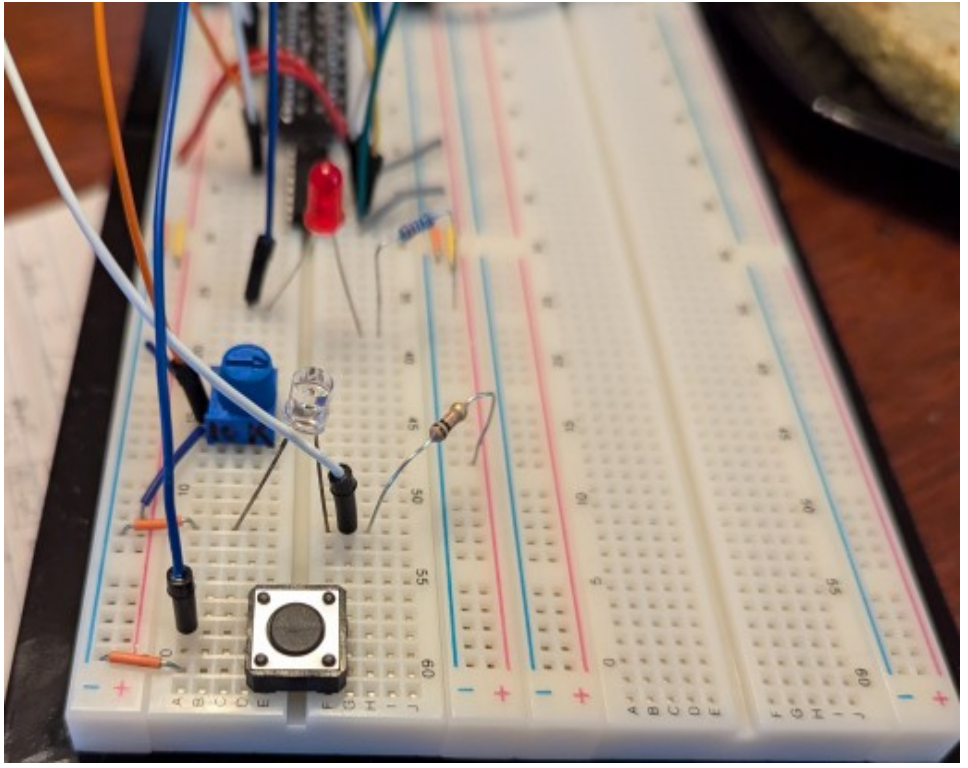


Next is the photo-resistor

- This photo-resistor is a little like a reverse LED. It detects light instead of emitting light.
- It has a positive and negative lead (positive is longer) and the LED head is shaped with the negative side being flat beveled.

Photo-resistor setup

- Here you see:
- The sensor connected with the positive side to the 3volt rail.
- Negative side is connected to ta resistor, then to the ground rail.
- Before the resistor, there is a White cable connected to channel-2 on the ADC chip. This will read the voltage received by the Photo-resistor.



Run program 4

- First we point the laser strait to the photo-resistor to make sure is working. We show the variance in terminal screen.
- Then we bounce the laser of two mirrors back to the sensor.
- Also note the LED will varying intensity depending on the readout.

Next is sound

- I tried it using the play sound library, but for some reason it didn’t work for me.
- So, I ended up using the pydub library.
- Show the code for 5:

Then finally...

- Putting it all together…(the light sensor and the sound)
- Pre-test the sensor to activate the sound once a 10 seconds uninterrupted light is achieved!
- Then play the mp3 when the laser beam is broken.
- Show the code for 6:

And run it!

- Start the program
- Turn on the laser
- Adjust the mirrors until value > .2 for 10 seconds.

ATAQ?

- Rousing applause!!!!