Construction Manual for the CyanoStat

Author: Stephanie Conley
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Equipment and Pricing

- Six (6) solenoid pinch valves.

60-30015-01 Pinch Valve

Source: http://www.cytekdev.com/products/Pinch-Valve-Normally-Open.html
Price: $140 new, consider buying used on Ebay.

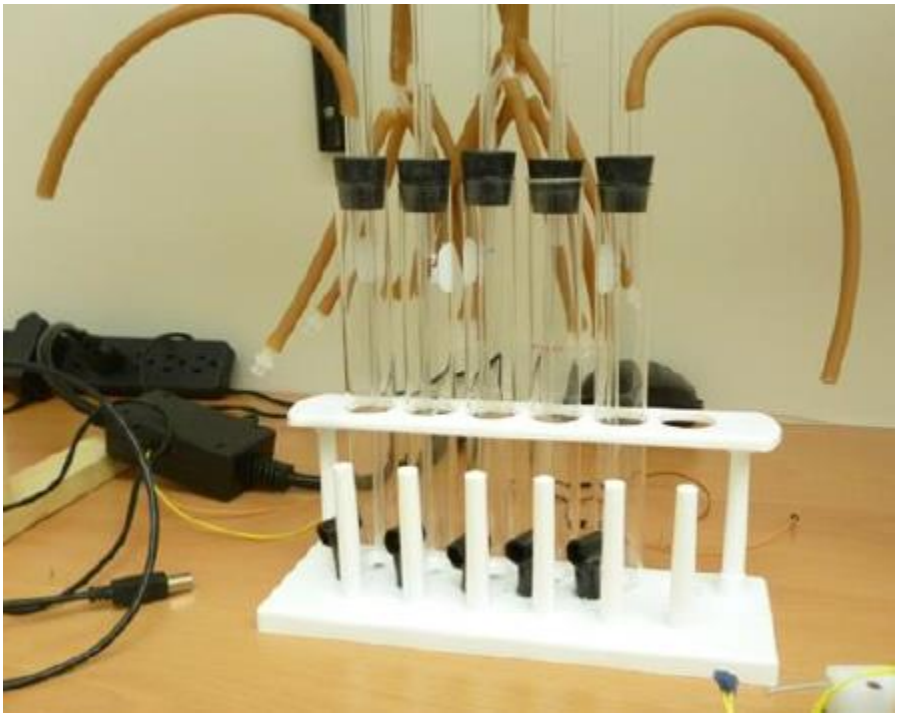
This is the model and type I use. There are other types of pinch valves that may be purchased at a lower price. Their quality may differ.

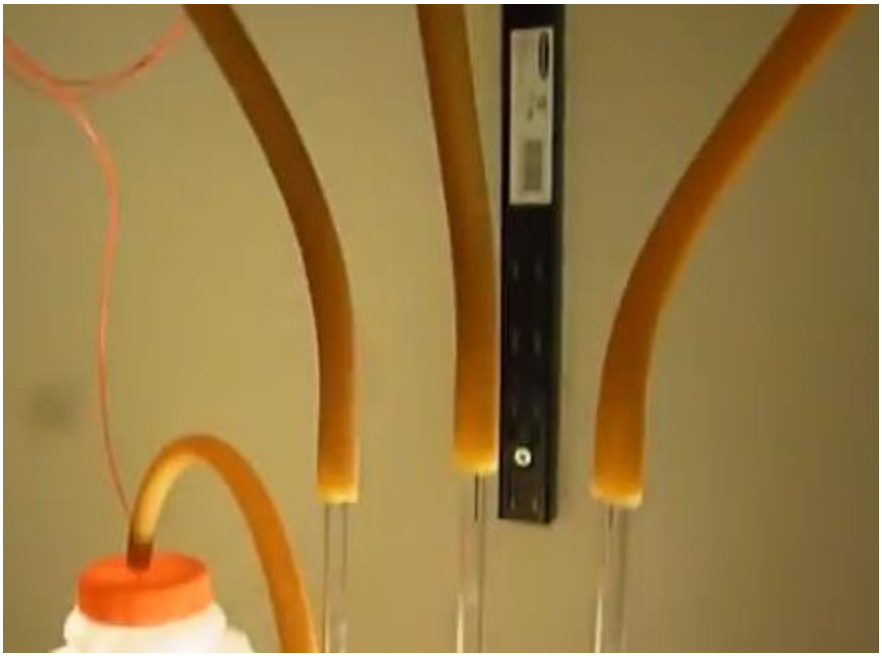
- Six (6) test tubes of medium size.
  This website provides a good resource of sizes, quantities, and prices. Test tubes can be bought in bulk.

  http://www.lcmlab.com/18x150mm_Pyrex_Glass_Test_Tubes_p/206-0007w.htm

- Rubber tubing to facilitate nutrient transport into the test tubes.
  Price: 10 for $1.10
  This website is a good resource for tubing. Cheaper options may be found elsewhere.
  http://www.hometrainingtools.com/tubing-4-8-mm-vinyl-2-long/p/CE-TUBEPLS

Picture of how the set-up would look like:





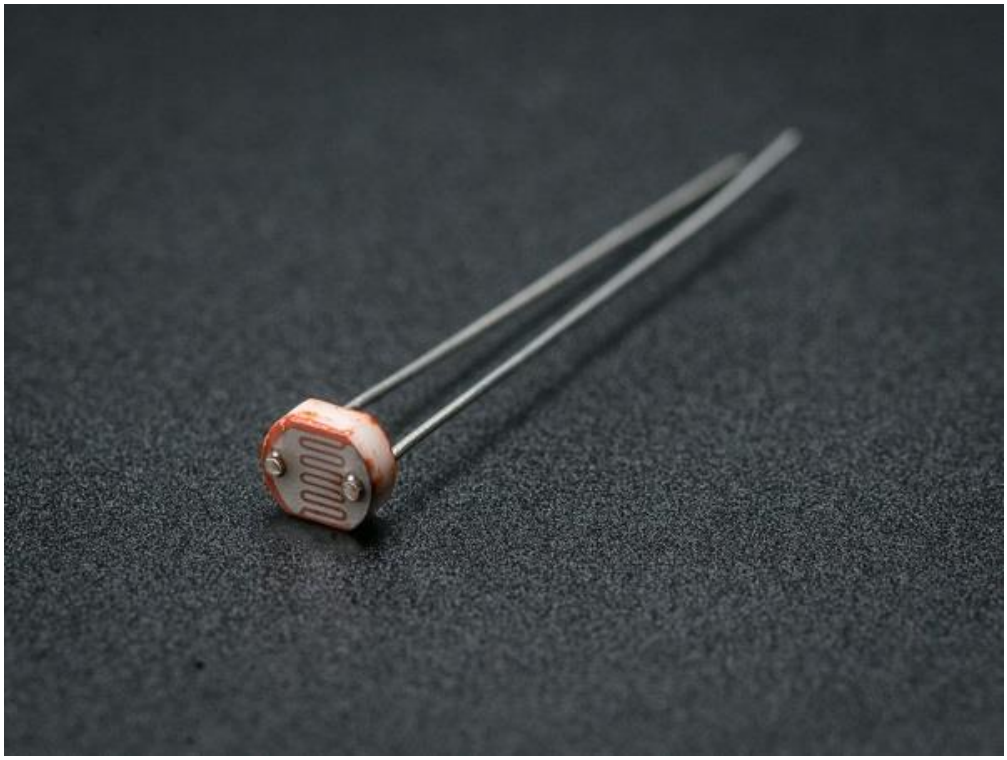
- Six (6) Y connectors

Price: 10 for $2.20
http://www.hometrainingtools.com/tubing-y-connector-plastic/p/CE-TUBEY/?gclid=CMa9o4rH-r4CFZFufgodZFsAKw

- Nine (9) long glass tubes. Keep six long and cut the other three in half. Distribute those among the six test tubes. They serve as an outlet point for extra fluid.
Price: 40 for $0.40

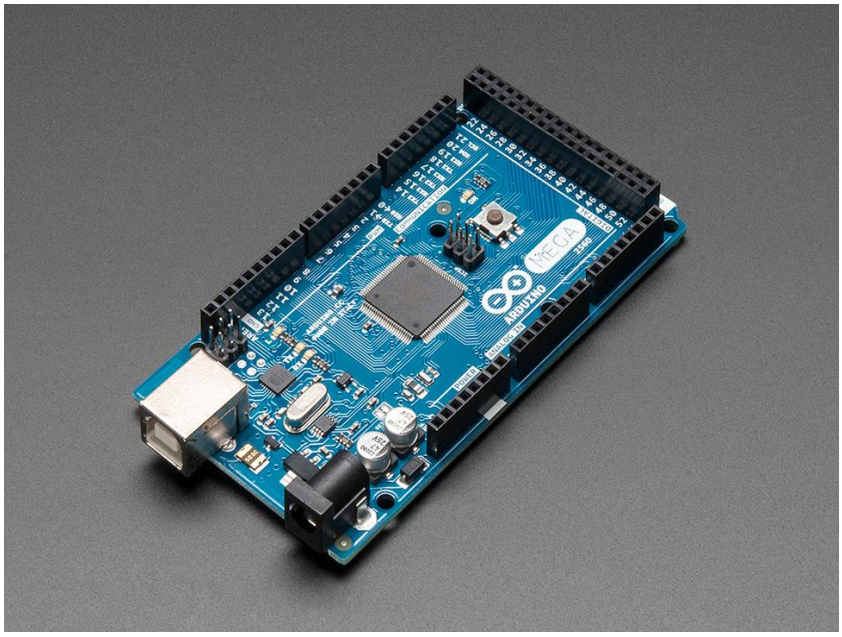
- Six (6) rubber stoppers with tube entry
  Price: 10 for $0.25

- Six (6) photoresistor sensors
  Price: 10-49 for $0.86
  http://www.adafruit.com/products/161



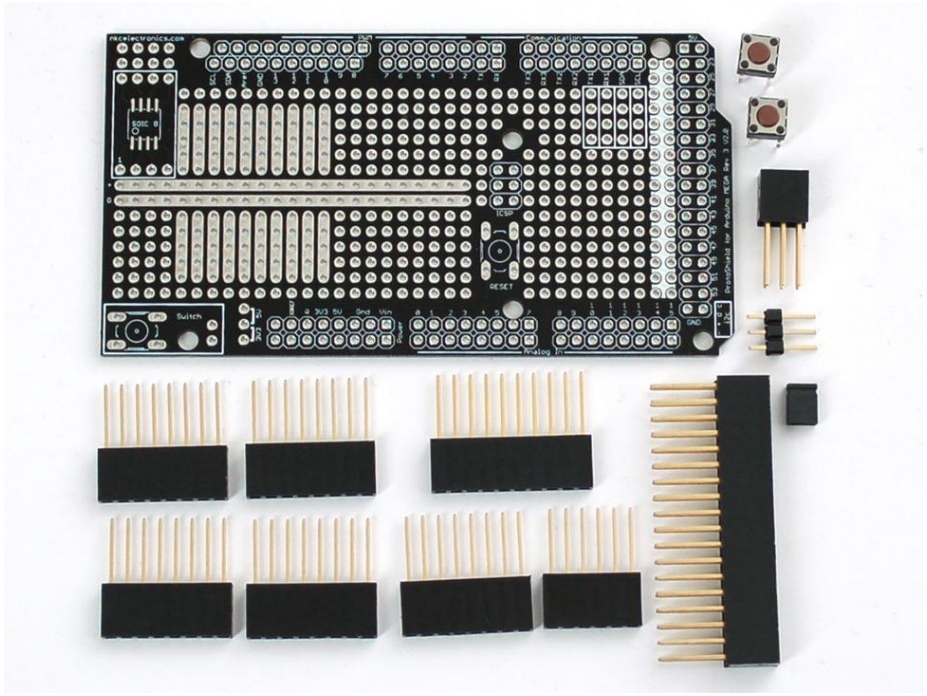
- Wiring (different colors are the best option)
  Price: 1-9 for $15.95
  https://www.adafruit.com/products/1311

- One (1) Arduino Mega 2560
  Price: $45.95



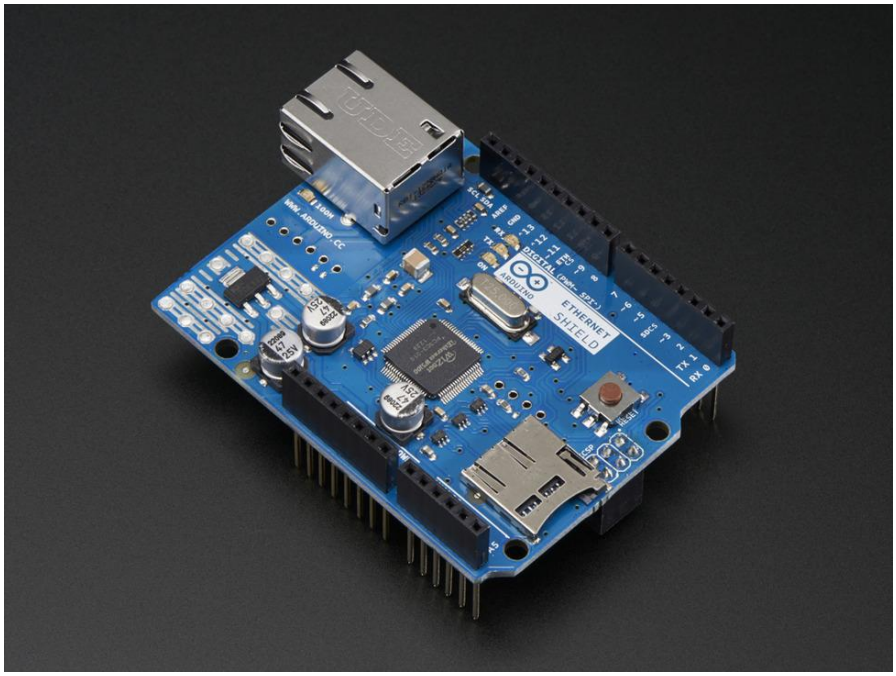
https://www.adafruit.com/products/191

- One (1) Arduino Mega protoshield
  Price: 1-9 for $14.95



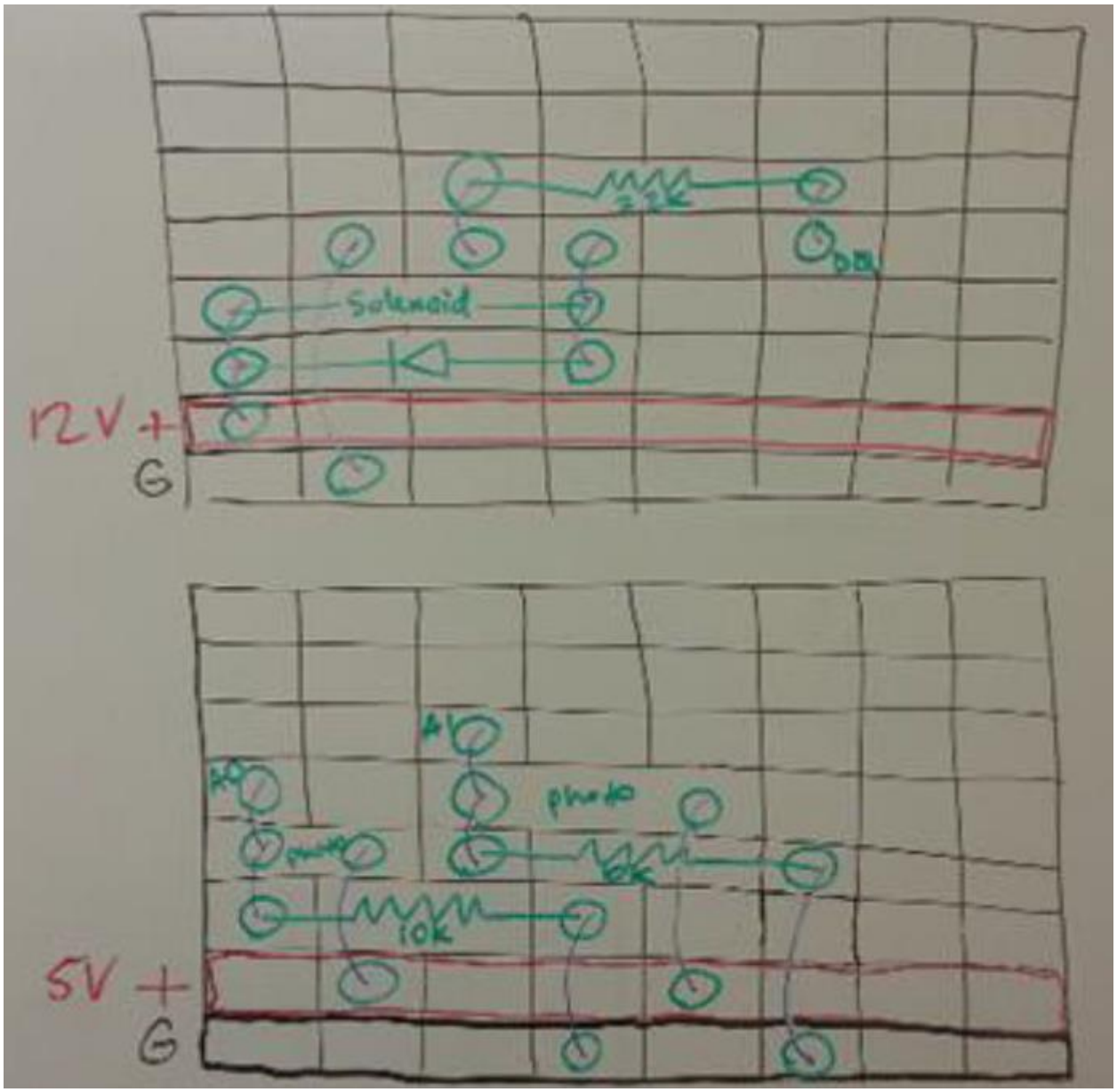
https://www.adafruit.com/products/192

- One (1) Arduino Ethernet Shield R3 with Micro SD Connector
  Price: $45.00

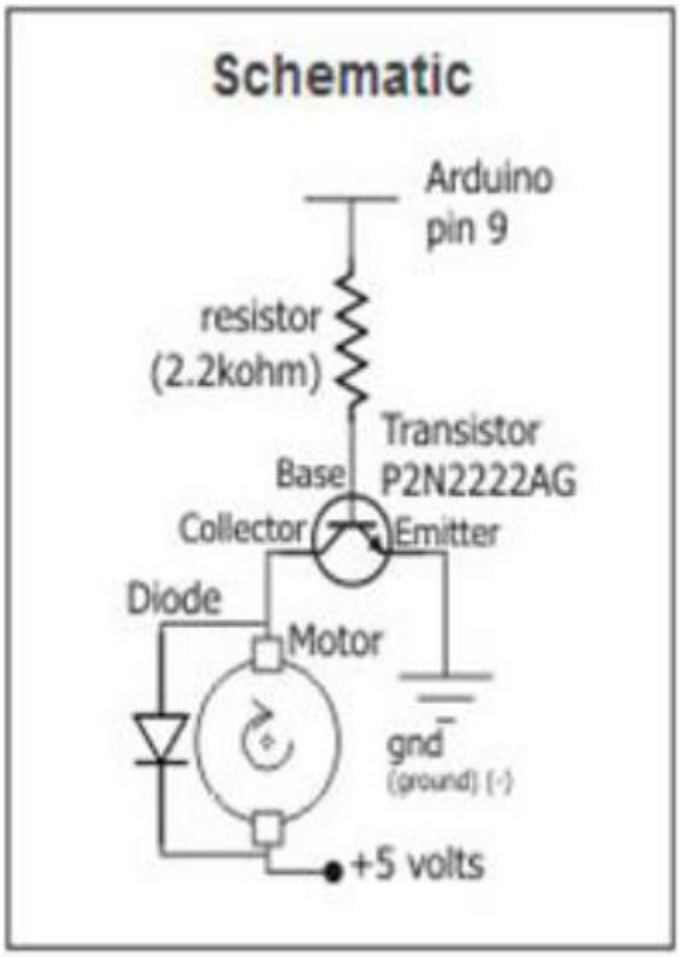


https://www.adafruit.com/products/201

Printed Circuit Board (PCB) and Wiring



Solenoid pinch valve schematic for pinning.



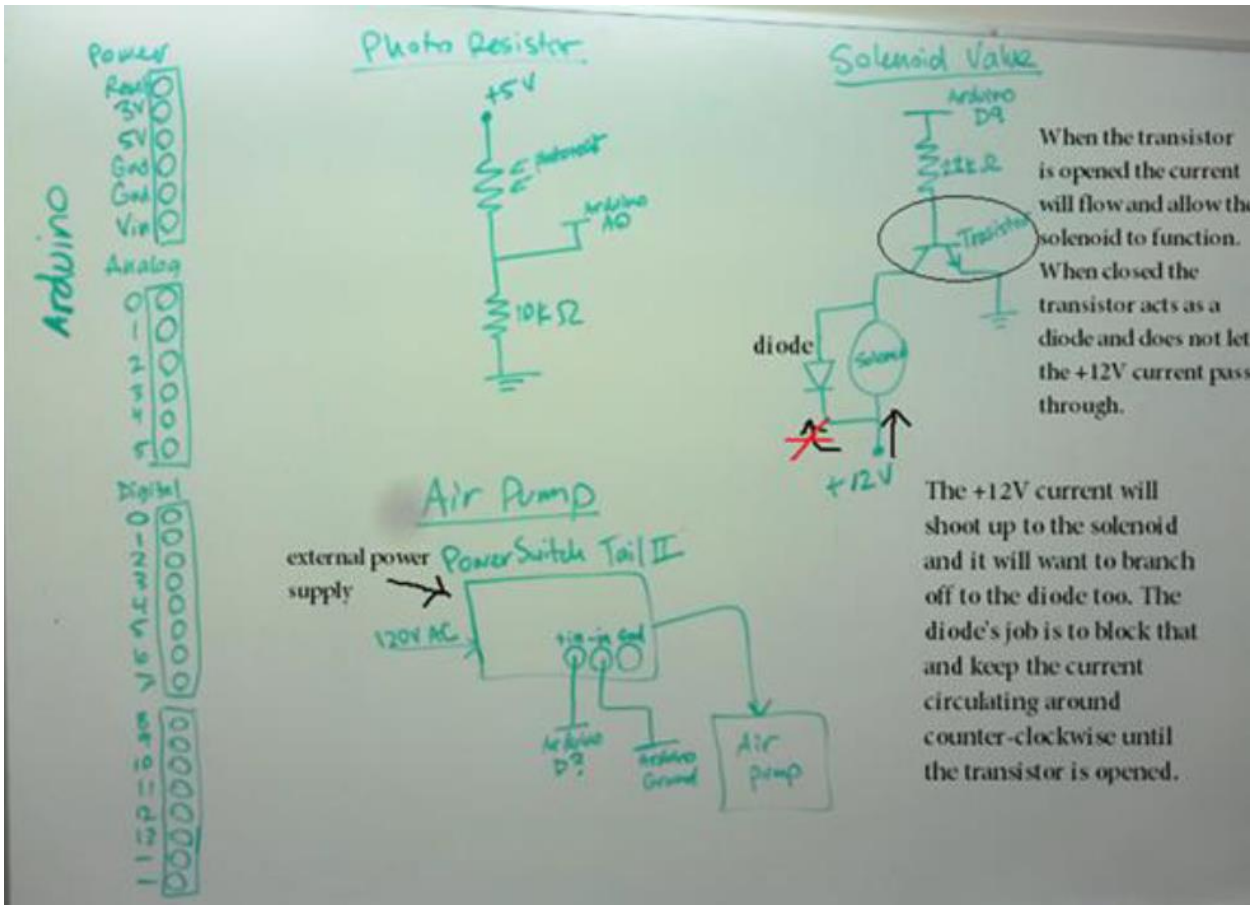

Arduino
Power
Analog
Digital
Photo Resistor
+5V
Arduino A0
10kΩ
Solenoid Valve
Arduino D9
220Ω
Transistor
diode
Solenoid
+12V
When the transistor is opened the current will flow and allow the solenoid to function. When closed the transistor acts as a diode and does not let the +12V current pass through.
Air Pump
external power supply
Power Switch Tail II
120V AC
Arduino D7
Arduino Ground
Air pump
The +12V current will shoot up to the solenoid and it will want to branch off to the diode too. The diode's job is to block that and keep the current circulating around counter-clockwise until the transistor is opened.

Figure 3 is a schematic for the photoresistor sensors and figure 4 is the schematic for solenoid pinch valve.

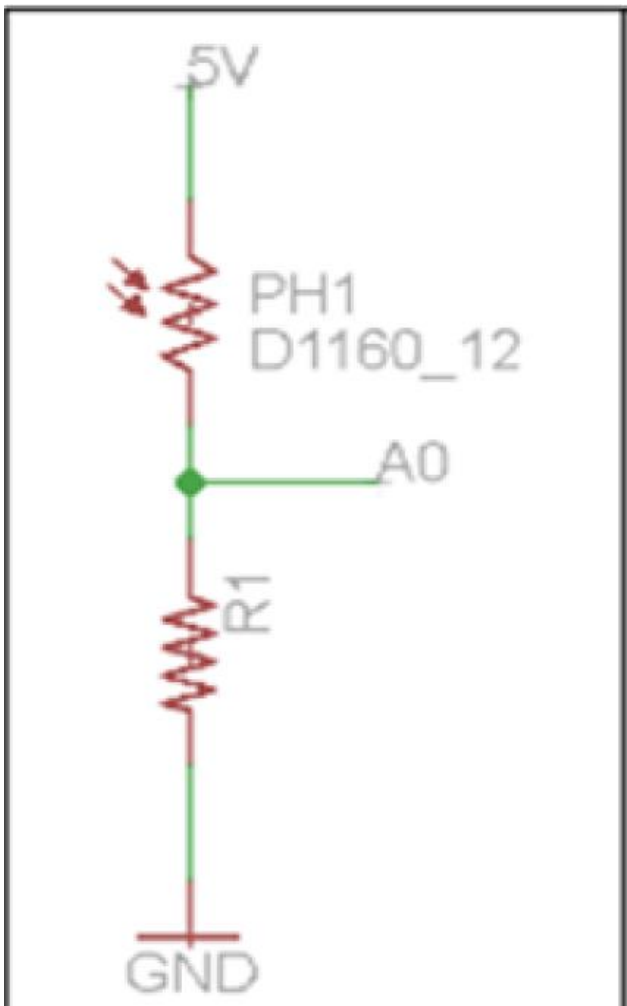


Figure 3

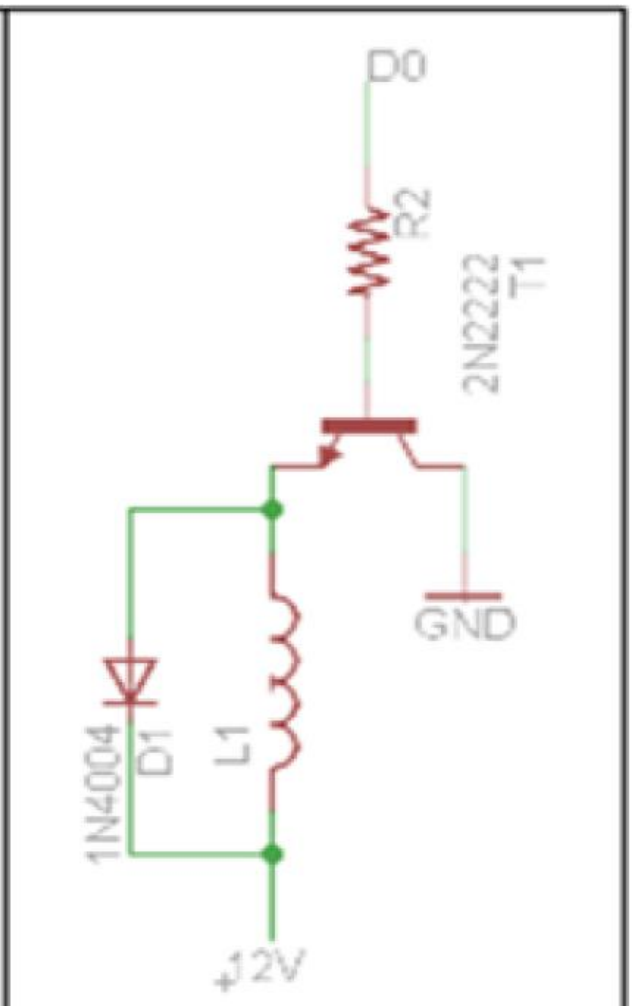
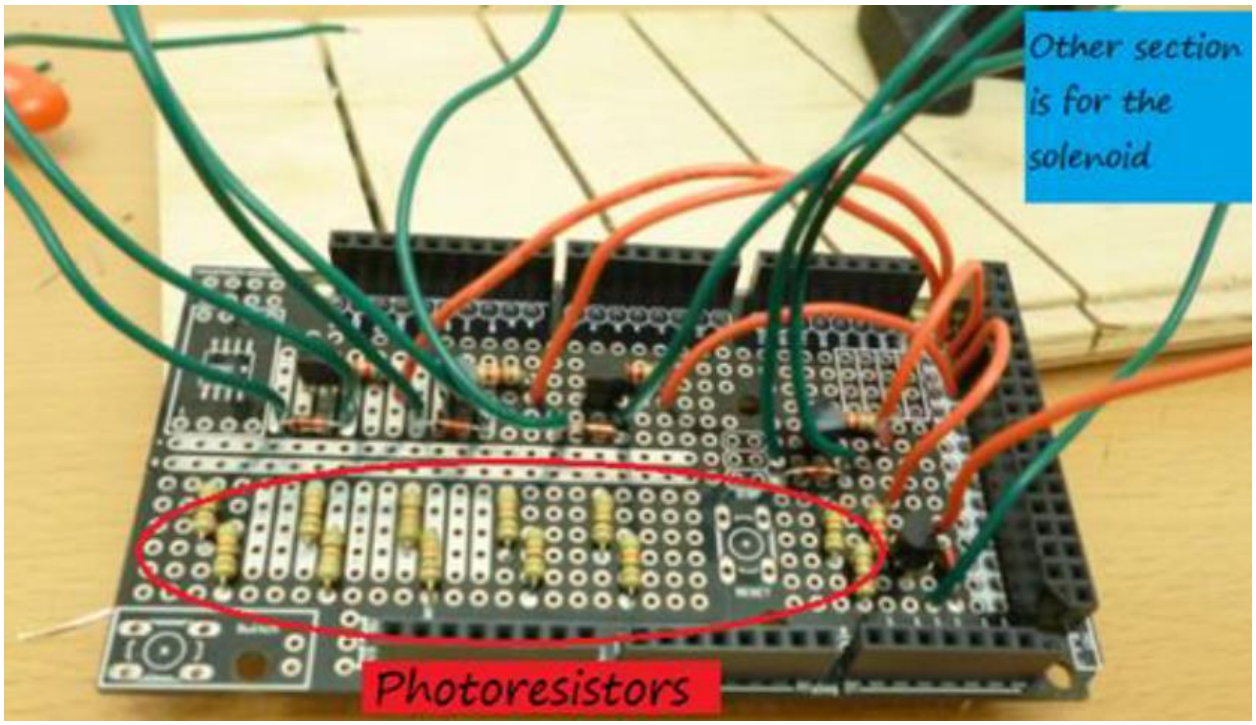


Figure 4


Other section is for the solenoid
Photoresistors