Jan 17, 2017 - Photodiode

Tuesday, January 17, 2017 11:14 AM

Goal for today: Get a signal from the photodiode into the Arduino
Long-term Goal: Be able to read PD signals on computers

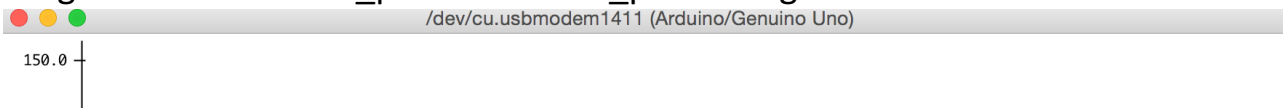
Problem with the 741 op amp is that it is bi-polar so it requires a positive and negative voltage. The Arduino only gives a positive voltage (+5V or +3.3V). It looks like there are ways to use a charge pump(?) to create a negative voltage, assuming the op amp doesn't pull much current, but finding a unipolar op amp seems easier.

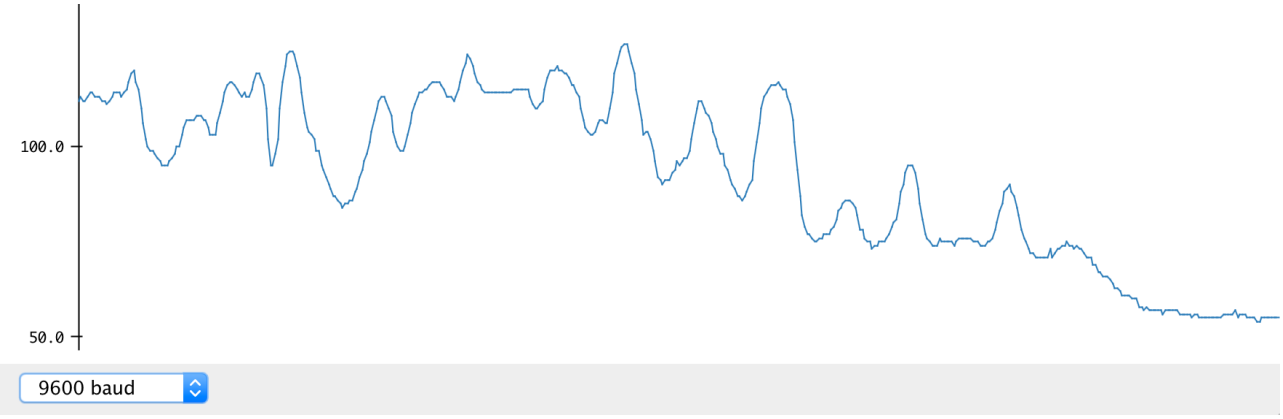
I also seem to get a pretty good signal with just the photodiode itself. Shining the green laser pointer gives me 0.5V to 0.7V on the MRD500 PD (MRD500/510 Photodiode Datasheet) so I might not need too much amplification, although I don't know how sensitive this PD is at 780 nm

I used the following code to take this data:

```
void setup() {
  // initialize the serial communication:
  Serial.begin(9600);
}

void loop() {
  // send the value of analog input 0:
  Serial.println(analogRead(A0));
  // wait a bit for the analog-to-digital converter
  // to stabilize after the last reading:
  delay(2);
}
```

Program is called read_potentiometer_processing.ino





Output from Arduino Serial Plotter

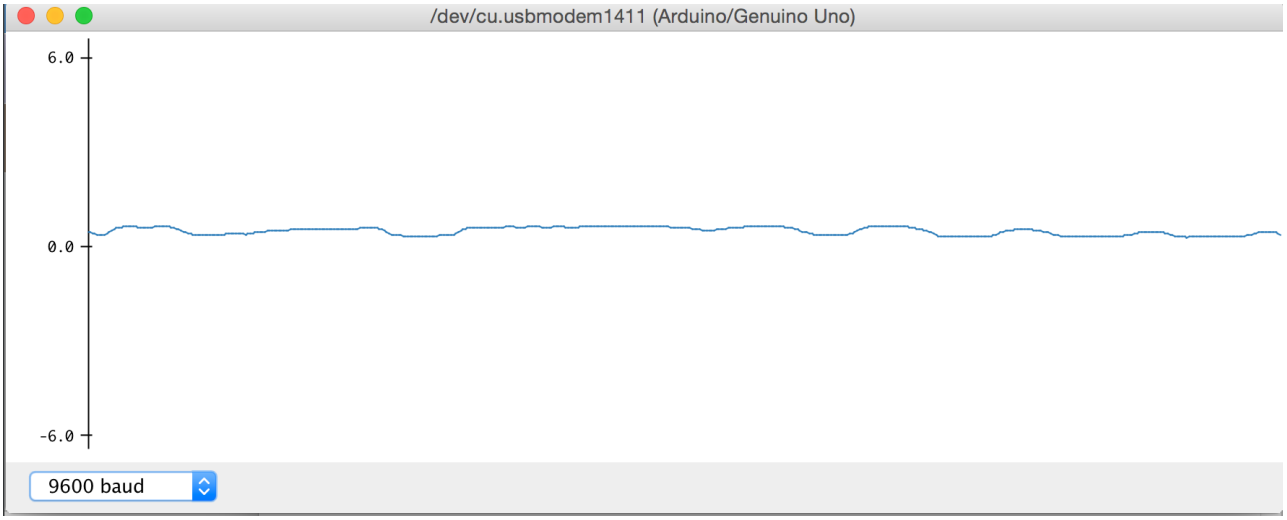
- [x] Need to figure out calibration between units on this as PD voltage

★ Aha, the numbers are from 0 to 1024 where 1024 represents a signal of 5.0 V

The following code gives me a voltage. Code is in photodiode_simple.ino:

```
/* Here is a bare-bones Arduino sketch to read the
   outputs of the photodiode detectors described
   in Figure 1 and Figure 2. The output pin of the
   circuit's opamp is connected to analog pin 0
   of the Arduino. The data are read every 0.1 second
   in this example. However, you can change the
sampling
   rate by simply changing the argument of the
   delay() statement. */

#define inPin0 0

void setup(void) {

  Serial.begin(9600);
  Serial.println();

}

void loop(void) {

  int pinRead0 = analogRead(inPin0);
```

```
  float pVolt0 = pinRead0 / 1024.0 * 5.0;
  Serial.print(pVolt0);
  Serial.println();

  delay(2);

}
```

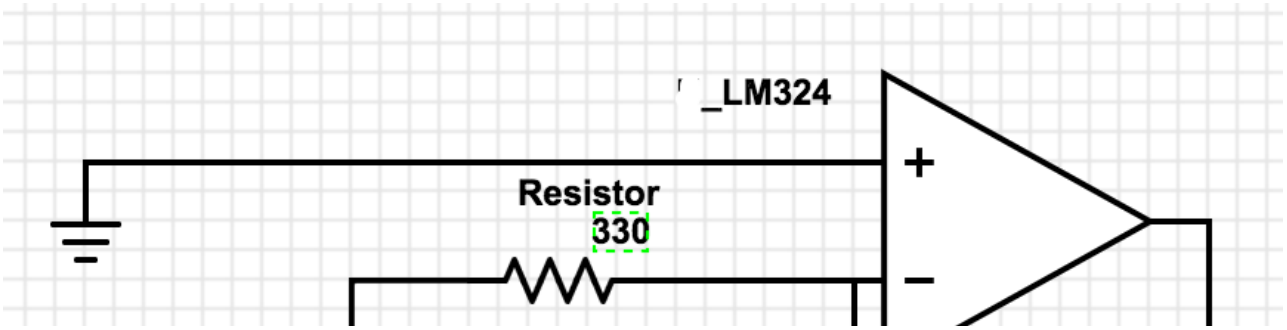


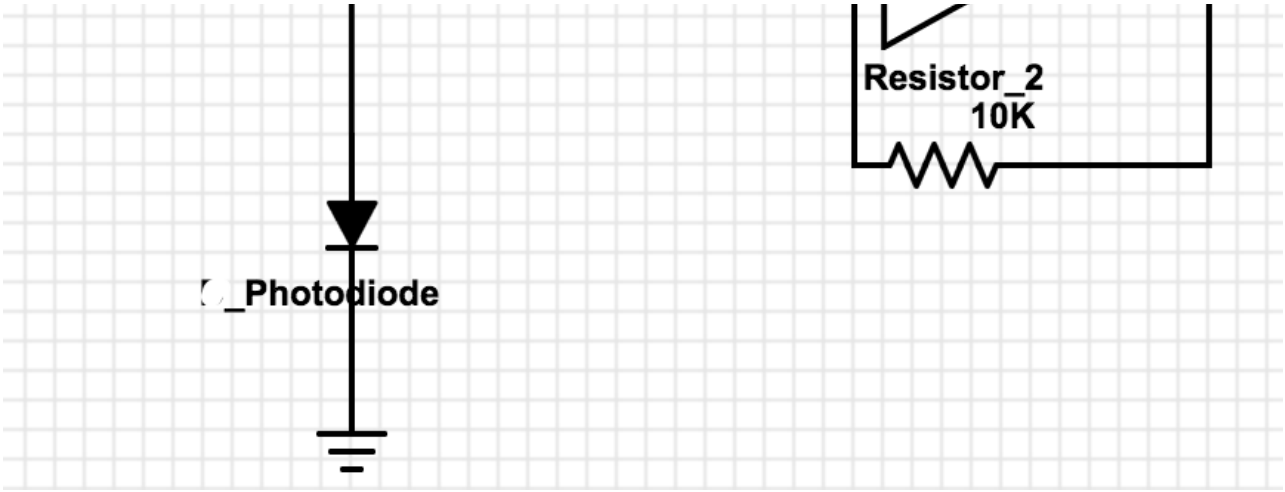
Output from Arduino Serial Plotter

- [ ] I'll need to write a python script to plot this result and be able to scale it (as well as get numerical values)

I do have a 324 op amp (LM324 Op Amp Datasheet) which is unipolar and I will try that out.

Circuit shown below. Does seem to give me a signal that is roughly 3x larger than the PD output




Resistor_2
10K
_Photodiode