

PID Control - Photocell

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1 Introduction

This HW we tracked the photoresistance value based of a flashing LED to control the brightness of the LED.

2 Materials and Methods

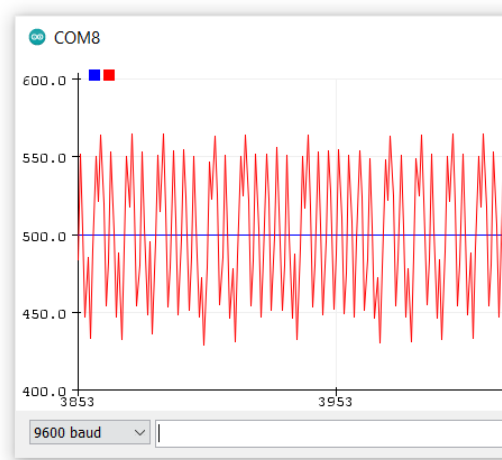
The tutorial this DC regulator is based on is found: http://www.yilectronics.com/Tutorials/Arduino_Basics/Tutorial_5_PID_PhotoCell/PIDPhotoCell.html

3 Results

3.1 Task 1

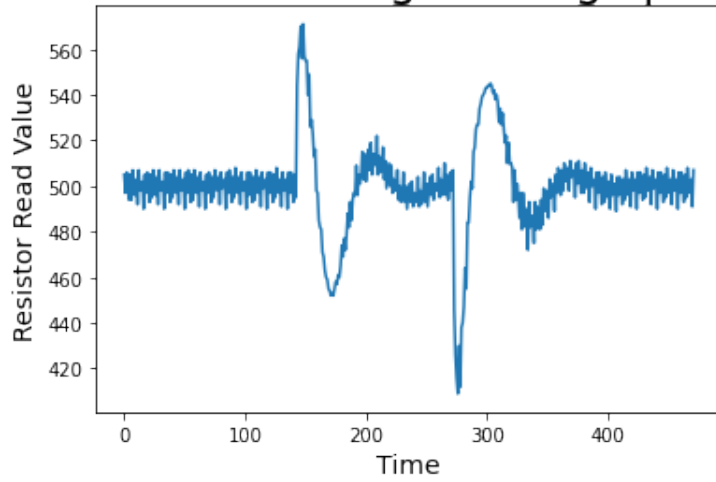
Tracking Value 500 Code and Graph

```
float Kp=.01, Ki=0.01, Kd=.005;
float error=0, previous_error=0;
float P=0, I=0, D=0;
float PID_value=0;
int setPoint=500;
float initialValue=10;
void setup() {
  pinMode(3,OUTPUT);
  analogWrite(3,initialValue);
  Serial.begin(9600);
}
void loop() {
  int photoSignal=analogRead(A0);
  error=setPoint-photoSignal;
  P=error;
  I+=error;
  D=error-previous_error;
  previous_error=error;
  PID_value=-PID_value+Kp*P+Ki*I+Kd*D;
  analogWrite(3,PID_value);
  Serial.print(setPoint);
  Serial.print(" ");
  Serial.println(photoSignal);
}
```



3.2 Task 2

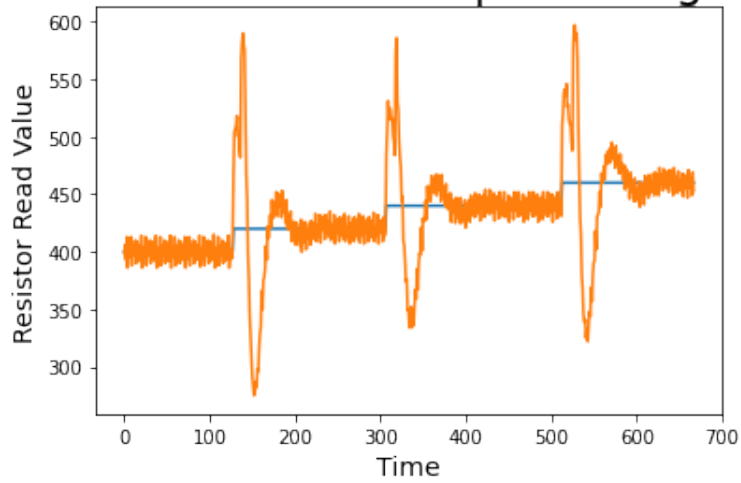
Push Button Light Using $k_p = .1$



3.3 Task 3

Incrementing by 20 Every Button Press

Push Button Step Tracking



4 Discussion

It took a little bit of experimentation, but the values for k_p , k_i , and k_d worked best as .1, .01 , and .005. A smaller k_p would have been reasonable since there was some overshoot in certain cases, but I felt that it all worked rather well. I also used 500 instead of 400 because the light couldn't reach 400 with the ambient light and resistor values I used. The other `setPointChange` function didn't work because it would think the button was pushed again every 10ms if you held the button.