

Physics 37100 Advanced Physics Laboratory I

Lab #4

(PART II: Simple oscilloscope)

- 1) Using the code and circuit from part I and lab 3-II, create a sketch to:
 - a. establish communication with matlab using '?' and 'K';
 - b. wait to receive the character 'g' (for go);
 - c. take 512 points of time series data from photoresistor on A0 measuring the PWM pin 9 LED set to 128;
 - d. send the data to matlab using Serial.println();
 - e. send the total acquisition time;
 - f. loop to b.
- 2) Modify to matlab script to:
 - a. establish communication with arduino using '?' and 'K';
 - b. send the character 'g' (for go);
 - c. loop over the serial data using fgetc() and str2double() to store the data in an array;
 - d. read the acquisition time using fgetc() and str2double();
 - e. plot the data using a time axis in μ s;
 - f. drawnow;
 - g. Loop to b.
- 3) Move the wire connected to A0 to other points in the circuit while the script is running to see the data update.
- 4) Change the plotting to display the FFT of the data.
 - a. The horizontal axis should be in Hz. Include a nice plot of the FFT with x and y axis labels in the report.
 - b. What is the frequency of the PWM light?
 - c. Is it consistent with the value in the description of analogWrite on the arduino site: <https://www.arduino.cc/en/Reference/AnalogWrite>.
 - d. Measure the frequency directly using the time series data to measure the time from one peak to the next. Is it consistent?
- 5) (Extra credit) modify to allow matlab to set the value of the LED output on each loop.