Final project proposal

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1 Introduction:

Analyzing the spectrum of objects is a common practice in many fields of science. As a result, we are interested in a comprehensive understanding behind spectrometers however, sophisticated spectrometers can be expensive. For our project we want to design and construct a spectrometer. We will use a photo-diode to detect light.

2 Objective:

In particular the spectrometer we want to construct involves a circuit which uses a photo-diode to detect light and a combination filters and amps to extract spectrum. Once we extract a spectra we want to use that information and drive a series of color diodes to produce a colorful visual effect.

3 Theory

The photo-diode works similar to the 1N4448 diode we been using in lab. The photo-diode is a PN junction semiconductor which operates in reverse biased condition. As a result the light incident on the glass lens in the PN junction causes electron pairs to form and a current to flow.

we plan to use the an op-amp to convert the current to a voltage using the following circuit.

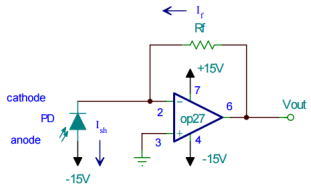

Figure 1: we learn from lab6 that the circuit above is a perfect voltage converter because no current flows through the op-amp

since the light in the surrounding environment will create noise in our measurement we will use a high pass filter in order to eliminate low frequency signals.

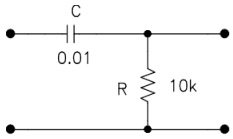

Figure 2: in lab 1 and 2 we learned that the circuit above is a high pass filter.

Finally we plan to use an amplifier to more precise measurements. the final result would look similar to the circuit below.

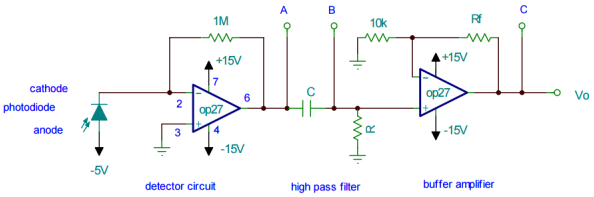

Figure 3: The image was obtained from:
https://www.chem.wisc.edu/content/chemistry-524

Next, we plan to extract data using lab view. That informaiton will then be used to drive a series of color LED's. we will then arange them in that shape of a flower. The final result will be a flower mades from color LED's that changes colors depending on the spectrum which is extracted.