Boston University

Electrical & Computer Engineering

EC463 Senior Design Project

First Prototype Testing Plan

OptiSync

by

Team 9

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1.0 Required Materials

Hardware:

- LED light
- Arduino microcontroller + cable connector
- Oscilloscope
- Probes/Wires
- Resistor (depending on which light)
- Laptop computer
- Buttons

Software:

- Arduino IDE
    - Arduino script to generate 40Hz light frequency.
    - Take buttons as input to write into LED output, adjusting its brightness.

2.0 Set Up

The laptop computer serves as a power source for the moment since, in the end, we will want to be using a smartphone as the power source. The laptop also serves as the code generator for the Arduino and currently our brightness and frequency for the LED are determined by the code. The Arduino Nano serves as the power source for the LED and gives an output voltage of 5V. The oscilloscope allows us to measure the output frequency since 40Hz is very difficult to observe with the naked eye. The light that we are planning on using for this project is a white LED.

3.0 Pre-Testing Setup Procedure

Have a laptop connected to Arduino Nano using a USB cable. Attach the positive and negative probes on either side of the LED (in parallel), and then plug in the BNC end of the cable to the oscilloscope. Finally, have two buttons connected to any digital pins of the Arduino.
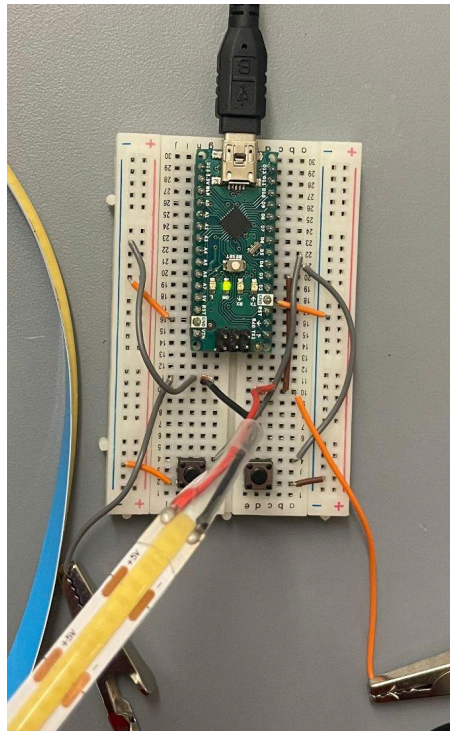
Figure 1: Illustration of Circuit Setup

4.0 Testing Procedure

1. Ensure Arduino is connected to a computer that has access to the code that generates PWM.
2. Compile and upload the script via the Arduino IDE.
3. Observe the oscilloscope and verify that the LED flickers within our desired time period.
4. Press the buttons to verify brightness is getting higher and lower corresponding to its own designated button, while maintaining the correct flicker frequency.

5.0 Measurable Criteria

The criteria for having a successful running prototype are as follows:

I.   The LED strip should be able to connect to the breadboard and Arduino.
II. Our output LED should flash at a rate of 40 flashes per second, or 40Hz.
III. One button should increase the brightness of the LED, whilst maintaining the 40Hz flicker frequency.
IV. Another button should decrease the brightness of the LED, also maintaining the 40Hz flicker frequency.

V.   When the LED is turned off, the increase brightness button should turn it back on.

6.0   **Hardware Pinout**

Pin Number	Usage/Description
3	White LED Output
4	Increase Brightness Button Input
5	Decrease Brightness Button Input