

Project Proposal: Wearable Signals for Motorcycling

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Proposed Project

- Animated LED traffic signals to be embedded in a riding vest and wired directly to the motorcycle
 - Left and right turn and brake lamps provide signals
 - Requires voltage regulation and attention to available current
 - Bike's 12V alternator provides power via battery
 - 9V power to Arduino
 - 4V input signals
 - 12V power to LED pixels
 - Arduino Nano responds to signals
 - Produces partial animation frames in response to signals
 - Assembles partials into frame, sends to array



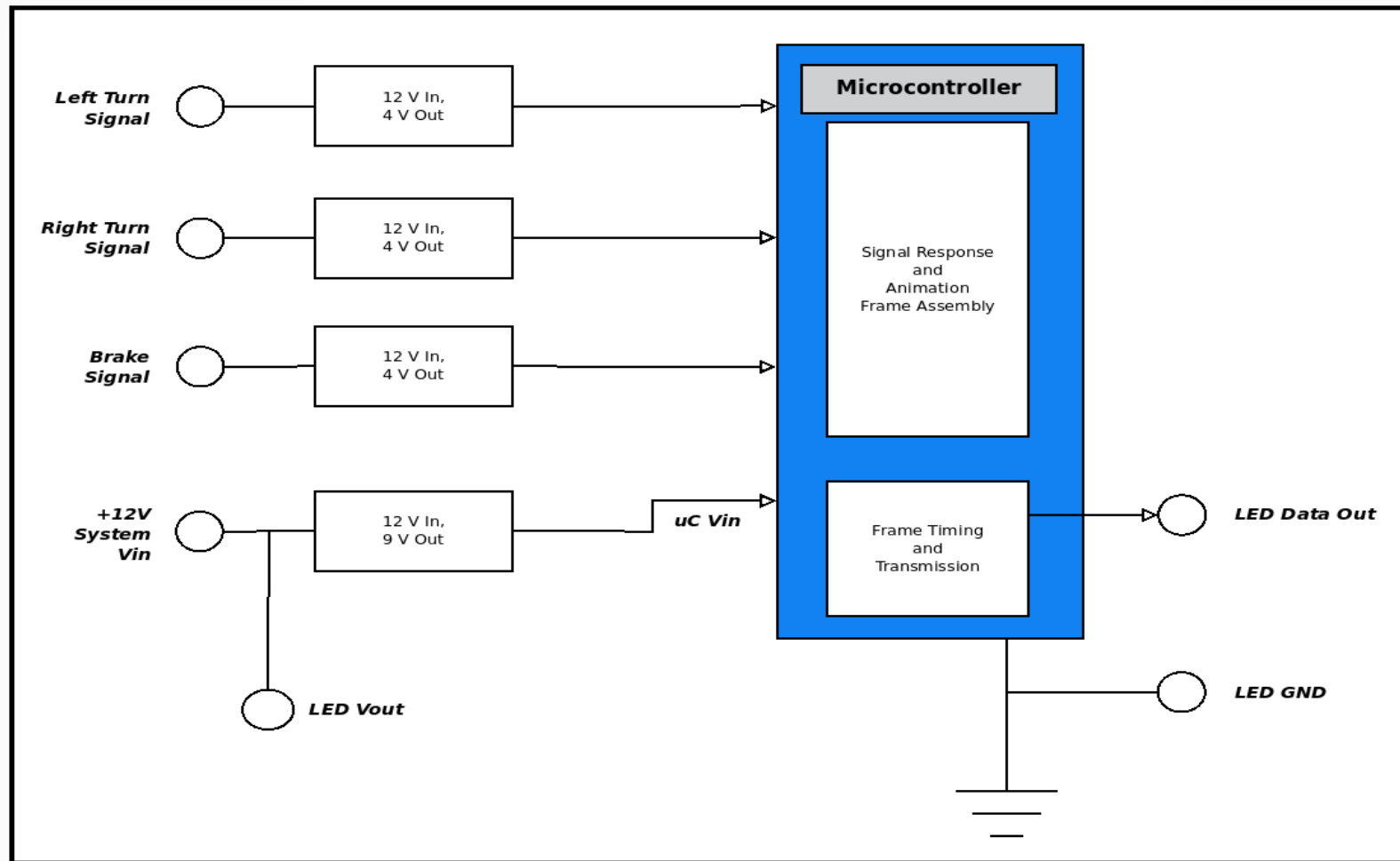
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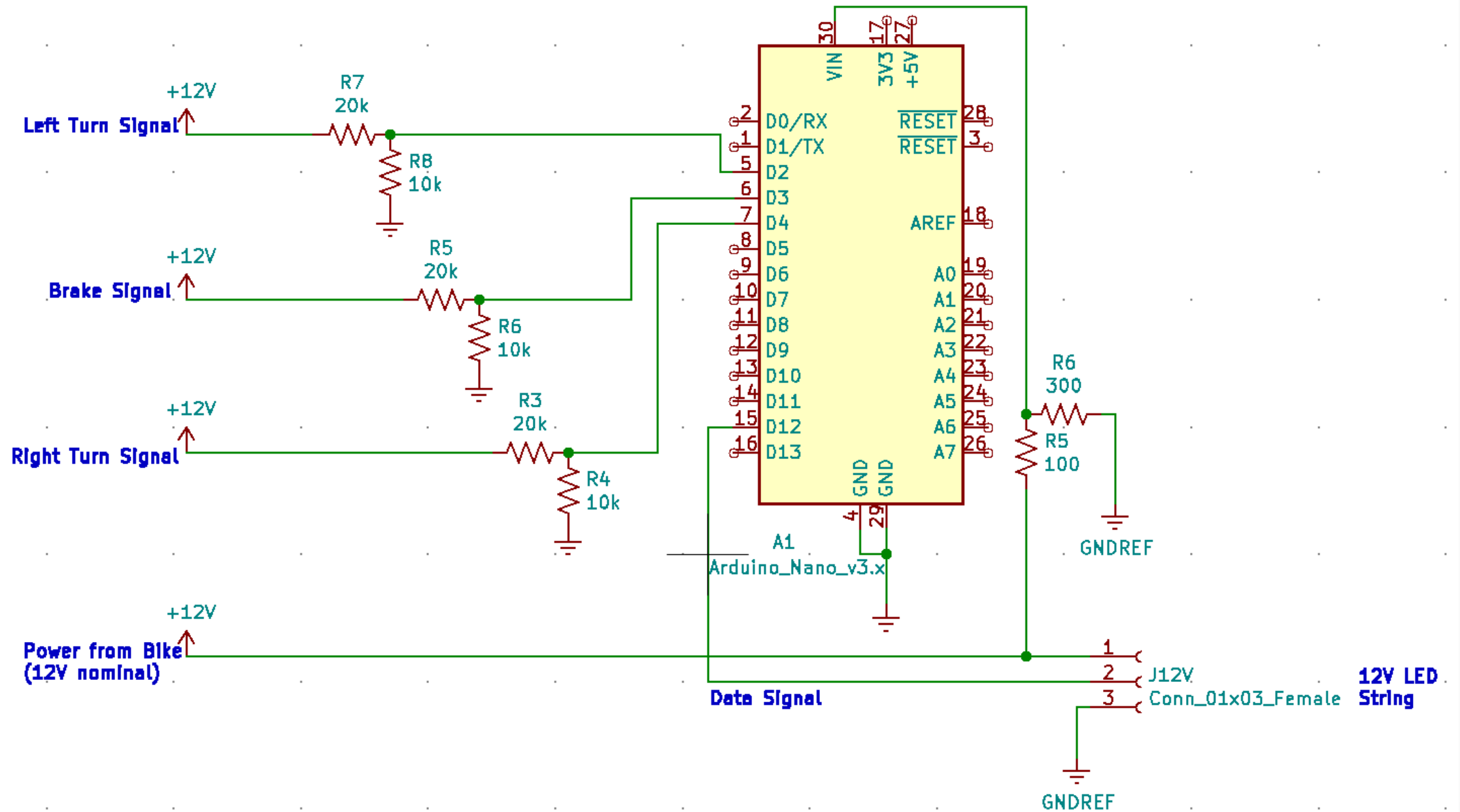
Combine these inspirations with the
addressable LED software and protocol from
ELT-2050

Original Contributions

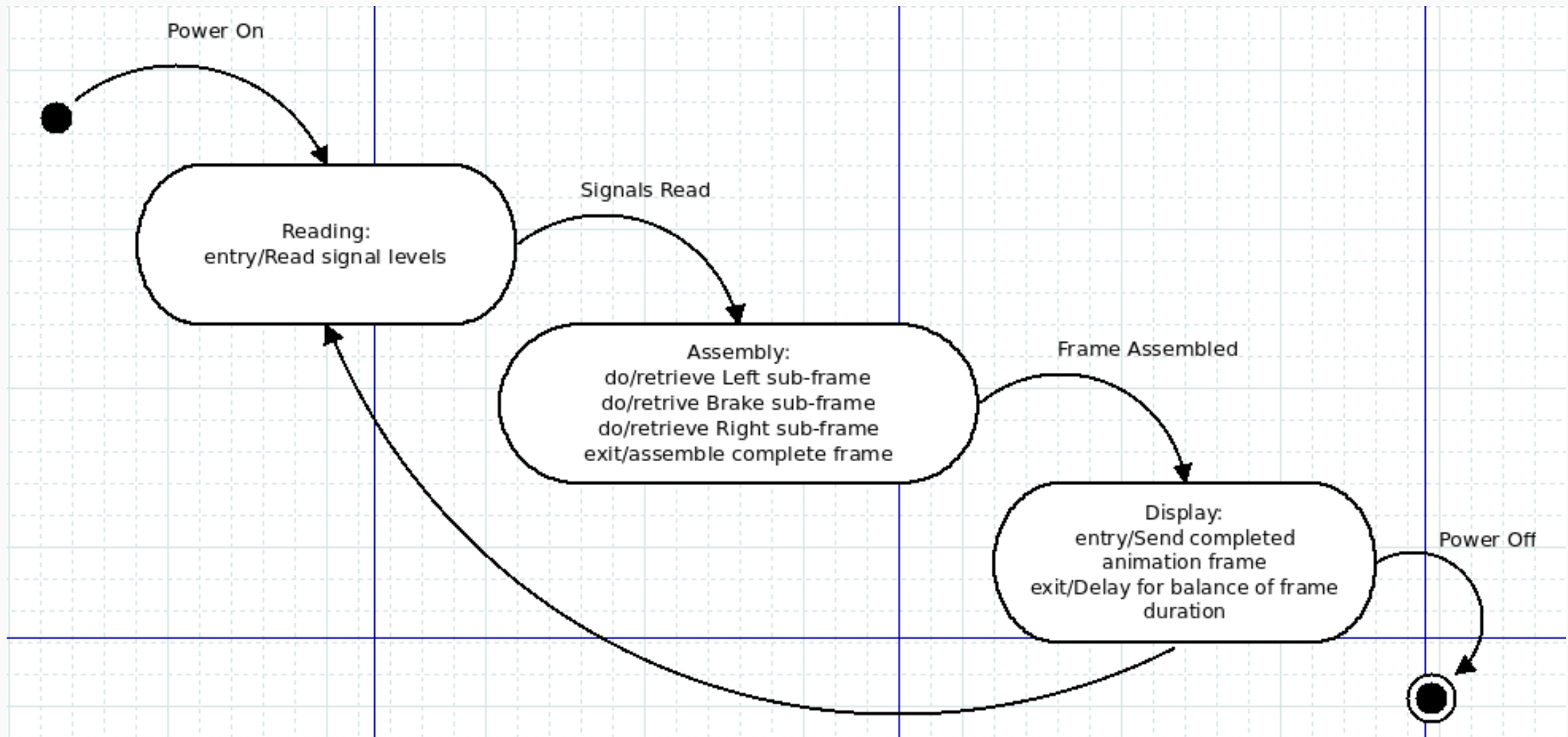
- Input signals:
 - Voltage regulation
 - Pull-down resistors
- Firmware:
 - Partial frames in response to inputs
 - Synthesis of complete frame from partials
 - Stream timing for output of frame to array
 - Handled by FastLED library



Block diagram of Wearable Signal Vest controller



Circuit Diagram for Control Board



State Machine Diagram of uC Firmware


```
// A simple sketch to proof the use of FastLED and my power supply circuit
// to drive a single WS2811 led pixel
//
// The base for this sketch is signalDetect.ino.

#include "FastLED.h"

#define PIN_LED 13
#define PIN_SIGNAL 5
#define PIN_DATA 12

#define NUM_PIXELS 1

int signal_high;

CRGB leds[NUM_PIXELS];

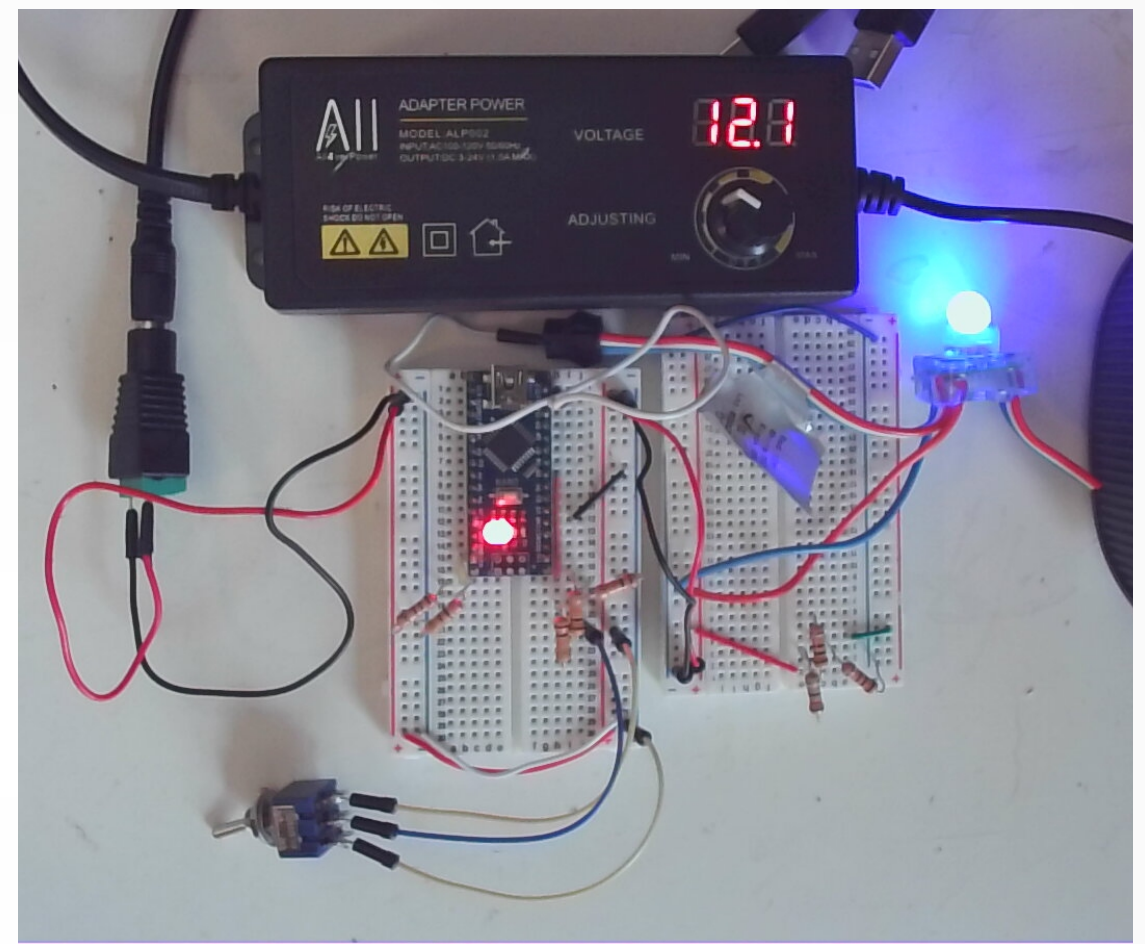
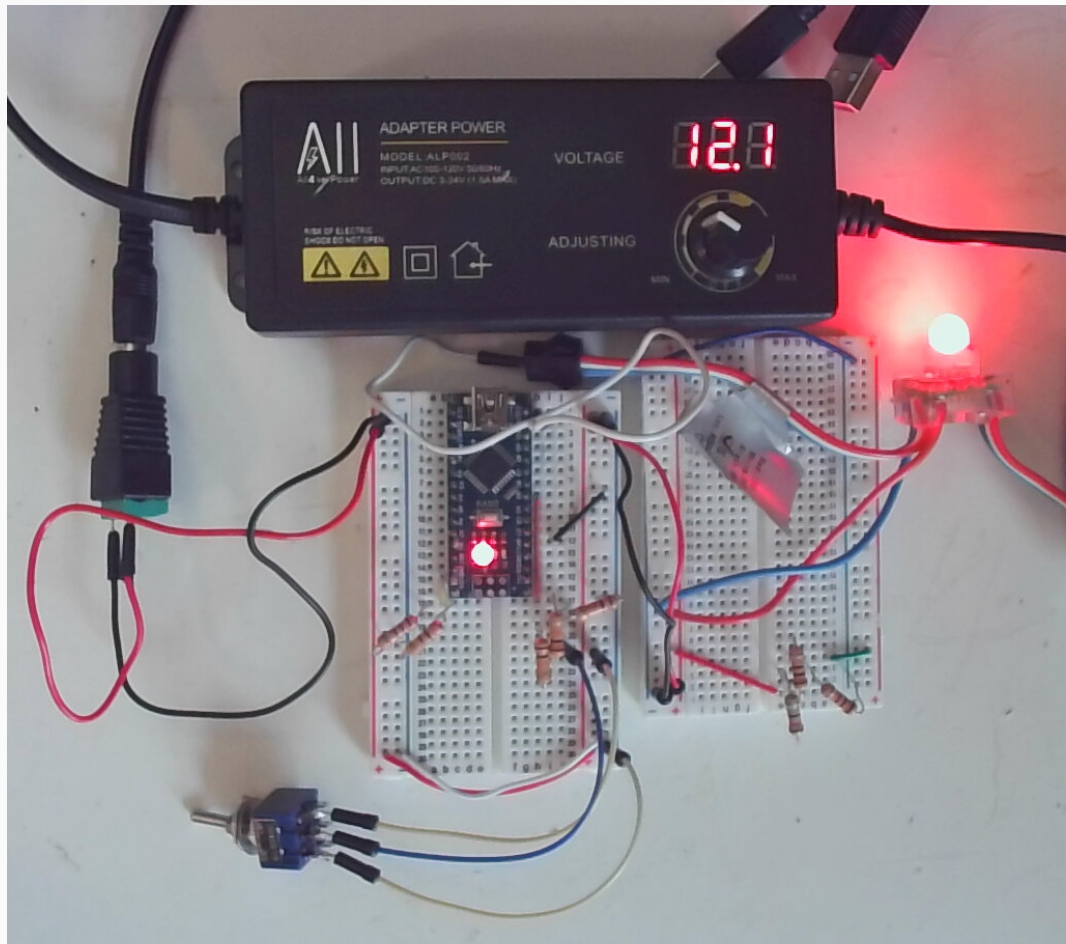
void setup() {
    signal_high = 0;
    pinMode(PIN_LED,OUTPUT);
    pinMode(PIN_SIGNAL,INPUT);
    digitalWrite(PIN_LED,LOW);

    FastLED.addLeds<WS2811, PIN_DATA>(leds, NUM_PIXELS);
}

void loop() {
    signal = digitalRead(PIN_SIGNAL);

    if (signal) {
        leds[0] = CRGB::Blue;
    }
    else {
        leds[0] = CRGB::Red;
    }
    digitalWrite(PIN_LED,signal);
    FastLED.show();
}
```

Arduino sketch for the prototype build



Working breadboard prototype. Red indicates 0V input signal. Blue indicates 3 – 5V input signal.

Bill of Materials:

Component	Qty	Availability	Price
Resistors			
100	1	On-hand	—
130	1	On-hand	—
330	1	On-hand	—
10k	4	On-hand	—
20k	4	On-hand	—
Connectors			
3-pin JST connector (In)	6	On-hand/Readily available	*
3-pin JST connector (Out)	6	On-hand/Readily available	\$9.99 ¹
Microcontroller			
Arduino Nano	1	On-hand/Readily available	\$17.99 ²
LED Pixels			
12v WS2811 RGB LED and driver	50	On-hand; I will supply	\$27.70 ³
5V WS2811 RGB LED and driver	50	On-hand; I will supply	\$30.00 ⁴
Total			\$85.68
My Contribution			\$57.70
Balance to VT Tech			\$27.98

Proposed Project Timeline

