A-Team: Illumi-not-i Breadboard Prototype Progress Report

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Bad bitches for life

Breadboard Progress

RFID

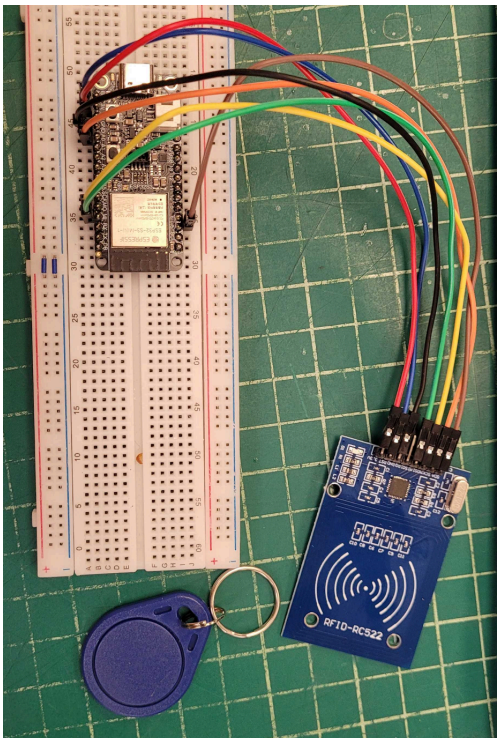

Figure 1: Wiring of RFID breakout board to ESP32 microcontroller

Current progress on the RFID portion of our project includes testing signal reception starting with a raw data test script courtesy of this tutorial. Connection was successfully established, and next steps are to implement read/write logic for blue tag functionality. We want to be able to tap the tag against the RFID scanner once to “arm” the bike, and twice to “disarm” the bike. These conditional actions would then prompt the next logic loops associated with the accelerometer and Neopixel LED strips that would fulfill our project prototype deliverables.

We’ve recently secured sponsorship from the EPL to support component purchases, which will allow for a hardware rich environment. This helps our team to focus on getting our projects to work successfully, and to be able to achieve asynchronous tasks as needed.

Accelerometer

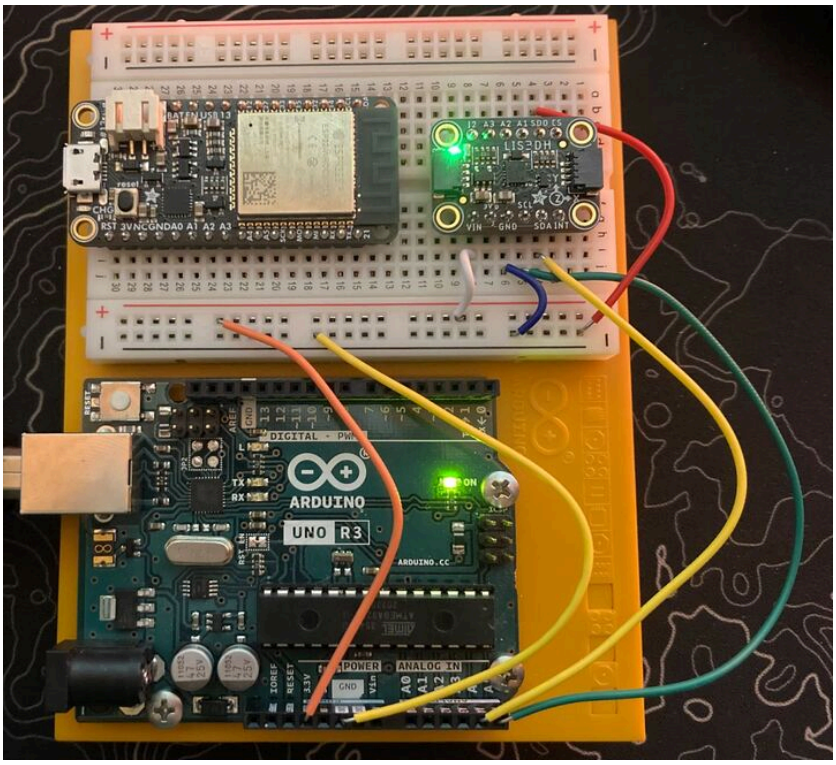

Figure 2: LIS3DH accelerometer connected to Arduino Uno, ESP32 shown but not used yet!

Our accelerometer will be responsible for multiple functions in our system - it will tell the ESP32 if the bicycle is slowing down or at a stop, cueing the LEDs to glow brighter, and it will determine whether the bike is in motion when it should not be, which will cue the alarm buzzer.

Test code was written and run on an Arduino Uno, with good success! Outputs to the serial monitor showed that the accelerometer measures small motions like shaking, which is enough for us to use it as an anti-theft device.

Further functionality will be included - next we will develop code that triggers a buzzer when the accelerometer is shaken. Additionally, some troubleshooting will need to be done - this needs to run on the ESP32, not an Arduino!

LEDs

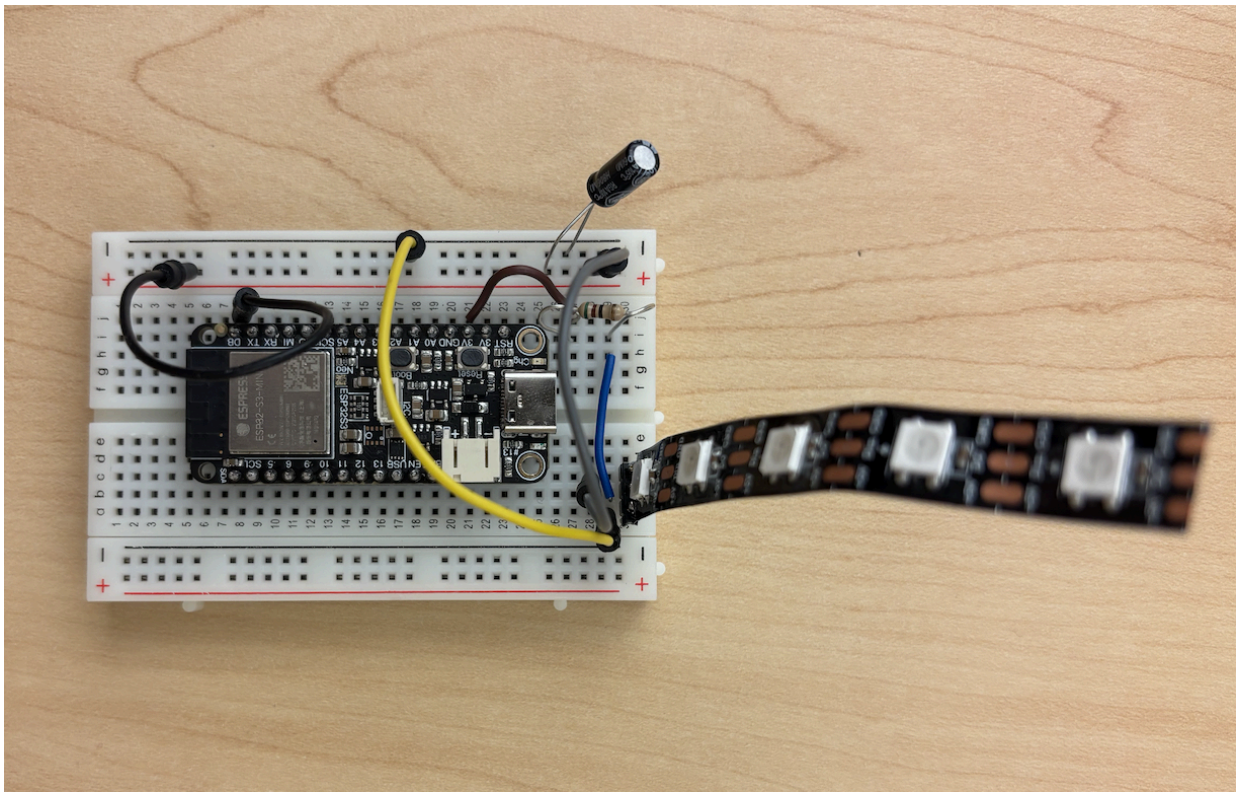

Figure 3: LED strip breadboard testing

LED’s have been soldered to the pins and confirmed to work with the EPL test module. A preliminary breadboard prototype has been created and testing will begin shortly. Many designs suggest using a switching power supply so we are discussing and researching how to best incorporate that given the space limitations on a bike.

Updated Schematic

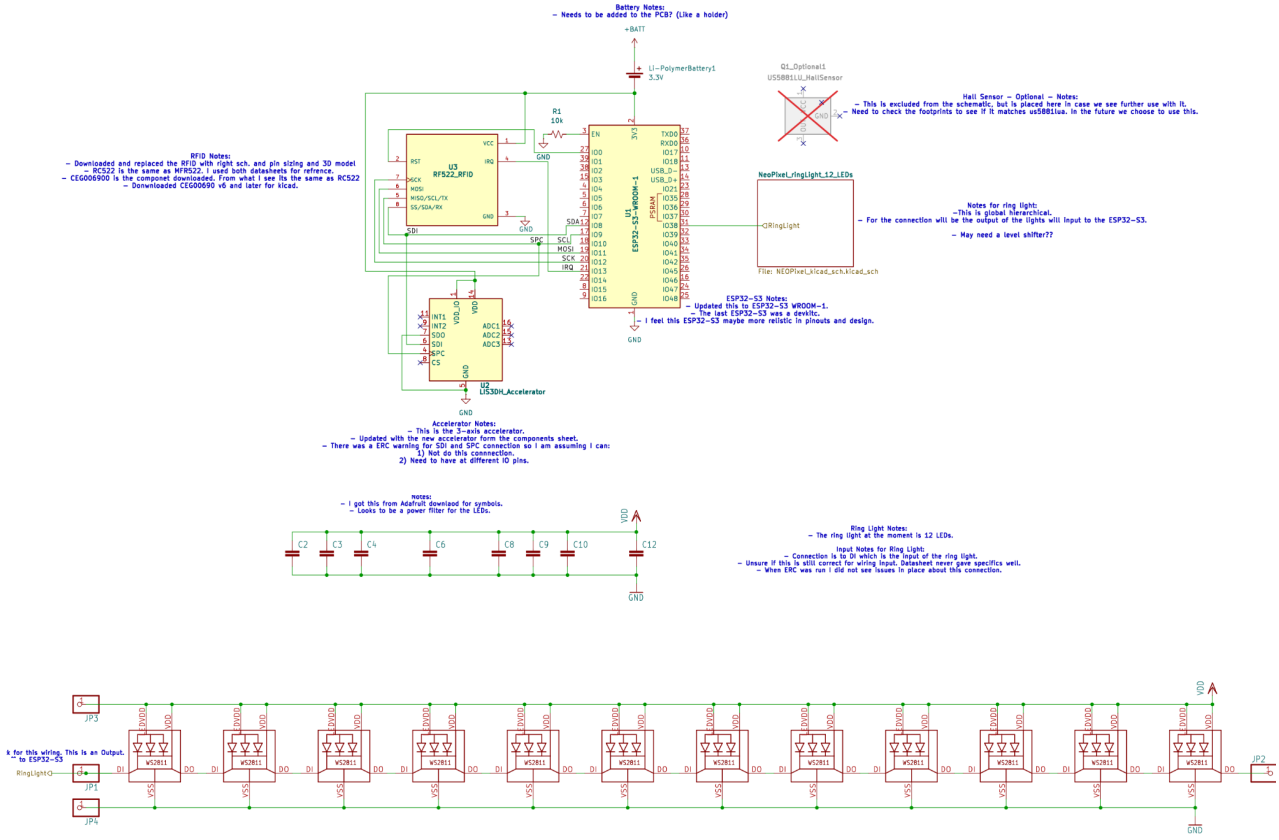

Figure 4. Schematic designed for the Illumi-not-i bike safety system in KiCad.

The above schematic (Figure 4) features the ESP32-S3 WROOM-1 as our microcontroller, the RF522 as our RFID, a LIS3DH as our 3-axis accelerometer, and a hierarchy page for the design of our ring light, which features 12 LEDs, as shown in the schematic below.

Progress on the schematic includes rewriting of components for the ESP32 to be clearer. Secondly, the components were double-checked to ensure the correct models were placed on the schematic. Another thing to note in Figure 4, the above image has the hall sensors commented out. This is because we are deciding on the use, and we aim to use the 3-axis accelerometer for the positioning of the bike. Next steps are making sure the clarity and concept of the schematic are correct, working on designing the PCB, and making revisions for the specification of the hall sensors and ring light.