Bicycle Safety Module

CALIFORNIA STATE UNIVERSITY BAKERSFIELD

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INTRODUCTION

The development of this Safety Module will involve various sensors and components interconnecting and working efficiently over a couple of hours. We are developing this Module for the average commute rider. The performance of this module will hinge on the interpretation of data at a timed efficient manner. This time dependency however should not sacrifice the accuracy of sensor readings due to interrupts, any other timing or power issues etc. All these issues will have to be addressed to create a reliable, dependable universal safety module. Encouragement and assistance in taking alternative forms of transportation is the main reason behind this project. As roads become more and more congested with the rise in population, in particular the growing dense cities alternative forms of transportation should be encouraged and accommodated for. The creation of safer alternative of transportation is a pivotal part of this solution to develop confidence for the new or experienced. Lastly, another issue that is tackled indirectly through alternative forms of transportation are a variety of health issues, as the U.S. for example has obesities levels nationally at 41.9%.

METHODS CONTROLLING PROGRAM-SAFETY PRECAUTION PROTOCOL

The Raspberry Pi contains all the major sensors and modules:

- Lux Sensor:
- Accelerometer:
- Sixfab 3G/4G Module:
- Transmitter:
- Buttons:
- Signals:
- Relay:

The Arduino contains:

- Signals
- Receiver
- Lasers

METHODS ASSEMBLY SETUP

The main box, which is located at the front has the transmitter. The signal is activated with the push of a button which then transmits a specific binary protocol to the receiver located in the second box located in the rear. This allows for synchronization of signals in from the front and back modules.

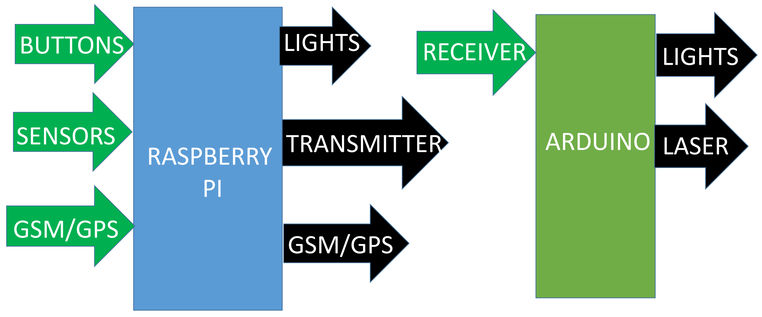
METHODS ASSEMBLY SETUP

The GSM/GPS Modules were the most troublesome of the modules/sensors that we dealt with. In picking our items we failed to recognize that the 2G network was no longer available and our first module was not usable. We then had to upgrade to a Sixfab 3G/4G module. The GPS module itself was working although with difficulties when it came to reading a signal indoor or with any other similar interferences. This was indirectly fixed with the Sixfab Module as it could deliver GNSS coordinates with better antenna for a stronger reception.

When we worked on the transmitter and receiver, we had a hard time because we were trying to find libraries that were supported by the Arduino and Raspberry Pi. These platforms operated differently, and we had a lot of troubleshooting to do as we were considering at the time utilizing a Raspberry Pico which presented even further problems. We opted to stay with the Arduino/Raspberry set-up and got it to finally work.

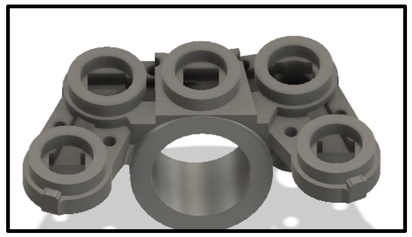
We decided to build our signals for customizability. There is two separate power sources for the front box. There is one source exclusively for the lights and the Raspberry Pi. This was done with the intention that if the lights themselves were to run out of battery the GSM Module would still be active and tracking GPS coordinates. Now we have a lux sensor so that it will detect the light from day and night. So, when the lux sensor detects that the light of the day is starting to turn dark then the laser and headlights will automatically turn on. The lux sensor will help the driver to focus on riding the bike instead of the worrying about turning the lights on/off their bike.

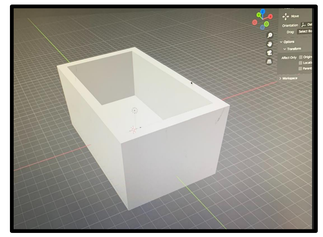
SETUP

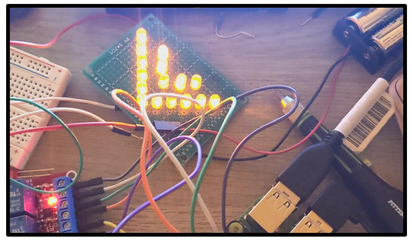


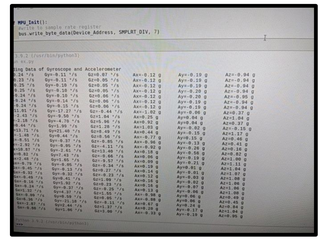
BLOCK DIAGRAMS

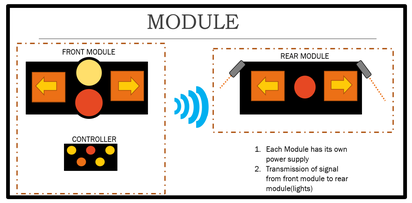
RESULTS

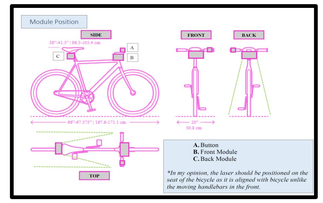












OBJECTIVES

- Safety
- Tracking
- Alerts
- Communication
- Visibility
- Easy Set-up

REFERENCES

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