LED Car Proximity Sensor: A Safety Device

ECE 401: Senior Design

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Abstract:

In this project, we designed a car safety device. As Electrical, Computer Engineering, and Computer Science majors, these helps us with circuit theory, car components, and electrical simulations. In this report, we were able to formulate a blueprint that will help drivers-alike to have safer journeys with LEDs.

Introduction:

Motor vehicle crashes are to be the eighth leading cause of death. Technologies in cars continue to advance to combat this problem, older cars have limited access to these. We will create/design a LED Car Proximity Sensor that will allow users to access safety measures of a new car.

By creating an easy to implement proximity system, our product could potentially save thousands of lives. According to the CDC, approximately thirty thousand Americans die every year from car accidents with an additional two million injured. Using proximity sensors, the detection system will use an LED lighting system to warn people. Our product will hopefully lower the aforementioned statistic by preventing extraneous fatalities and casualties. This could be something as nondramatic as backing out of the driveway with a blind spot, to losing focus on the highway; the light from the system could provide the extra second needed to prevent disaster. As nice as this sounds, it is going to take more than words and an idea to make this product come to fruition. The constraints to be dealt with include both the technical and figuring out what needs to be fixed from the eventual testing phase.

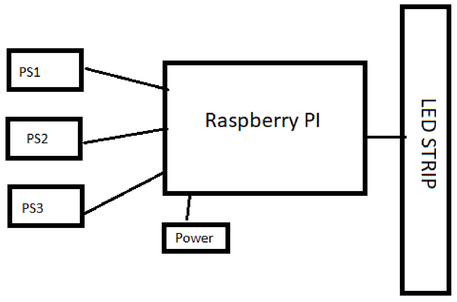

Figure 1: Diagram of Parts connected

Materials and Methods/Methodology:

The designed system will consist of electric parts to serve 3 basic Categories: Power, Input, and Output. All of these parts will be controlled through a raspberry pi.

Power:
- The raspberry pi will be powered via USB by power bank charged through the vehicle's cig lighter

This type of charging as a vehicle's cig lighter is fairly accessible to older cars.

Inputs:
- Proximity will be determined by signals received from sensor mounted to the rear of the vehicle
- These signals will be handled and interpreted by the raspberry pi

A proximity sensor, mimic the warning devices that new car features. Also, light sensors will not work in certain settings.

Outputs:
- An Led strip will be mounted to the rear of the vehicle and function similarly to a brake light.
- The LEDs will receive a signal to turn on from the Raspberry pi when a certain proximity threshold is met.

We choose an LED strip/behavior that mimics a brake light to connote, well of course, braking.

Our research of how car accidents occur and how older cars operate/what older cars do not have that the new cars have. Help us formulate this design

Conclusion:

At the end of the day, we aspire to provide something that can save lives; nothing is more precious. If it even saves one, this project will be worth it.

Item	Cost
CNC Rent	$200
Sheet metal	$40
Wood	$20
Drill	$150
PCB soldering	$20
KF2510	$5
Nuts/Clamp	$20
Cam programmer	$12
Thermal camera	$80
RGB LED lights	$25
Power Supply	$30
Ping pong balls for diffusing the light	$10
Total	**$612**

Result:

We are planning to create a project and/or formulate a simulation that mimics the physical device in action of the LED Proximity device.

The LEDs should be bright/big enough to alert the drivers and the customer (we are tentatively looking at between 2000 and 4000 lumens).

Our LED might not be too bright as a prototype for our project, but can be scaled up. Sensors will be used in our design to detect when nearby vehicles are dangerously close (about less than half of a car's length).

Raspberry Pi will be delivered in this project. The program will take in sensor data and use that to determine if the lights needs to activate. An installation kit for our device will be delivered at the end of the project. Raspberry Pi will be used and connected to the display to govern the main operation. Our product will include codes to test if breadboard wiring has been done properly and pi is able to generate images as it's supposed to.

The indoor LED screen device is budgeted at $612. Expenses include:
- tools
- software
- materials
- custom machining

For our project management, we utilized the Gantt chart, as designing to simulation and simulation to prototyping overlaps on the timeline of this project.

For example:
- the prototyping stage overlaps with prototyping testing

Literature Cited:
Motor Vehicle Crash Deaths. (2016, July 06). Retrieved November 20, 2020, from https://www.cdc.gov/vitalsigns/motor-vehicle-safety/index.html

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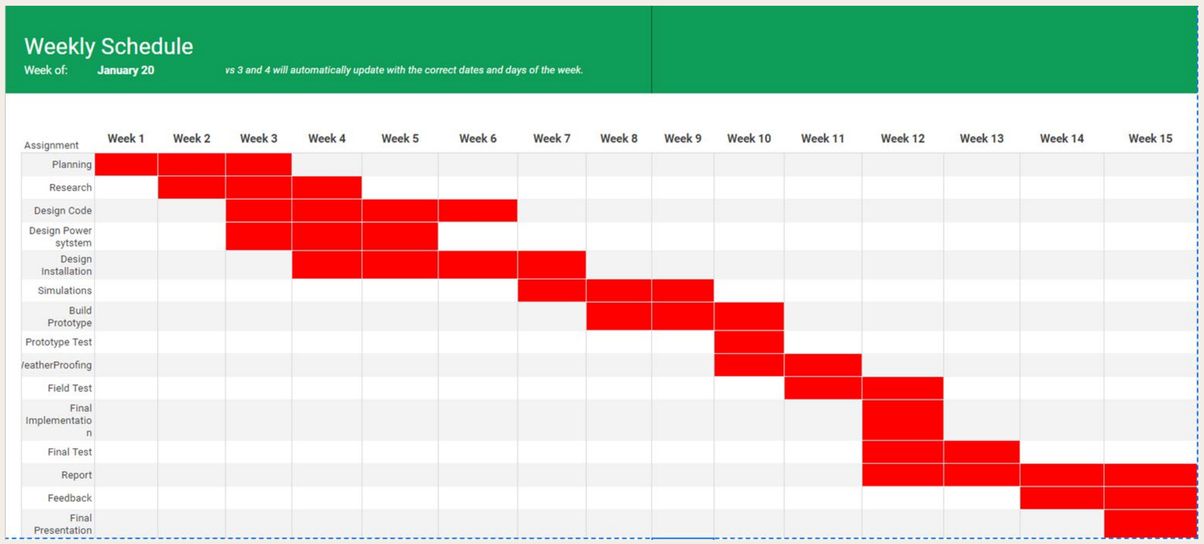

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