Proximity-Based Hazard Detection System for Older Vehicles

Sebastien St Hilaire, Patrik Regan, Michael Nelson, Jonathan Joslin, Allison Oehmann

Dept. of Electrical Engineering and Computer Science and CREOL College of Optics and Photonics, University of Central Florida, Orlando, Florida 32816-2450

***Abstract* — The Proximity-Based Hazard Detection System for Older Vehicles (P.B.H.D.S.O.V) enhances vehicle safety by integrating modern hazard alert technology into older cars. Using distance sensors, cameras, GPS, and AI-driven computer vision, it gathers real-time road data to generate alerts via a Head-Up Display projected on the windshield and an audible speaker system. A front bumper camera enables stereovision for depth analysis, monitoring the distance to vehicles ahead, as well as lane detection. By providing an affordable retrofit solution, P.B.H.D.S.O.V bridges the safety gap between older and newer vehicles. This report covers the system's motivation, design, implementation, and impact on accessibility and road safety.**

Index Terms — Automotive applications, Vehicle safety, Lane departure warning systems, Vehicle detection, Object detection

I. Introduction

With over 40,000 fatalities due to traffic accidents in just the year 2023 alone ([1] National Highway Traffic Safety Administration), the United States has a serious and often ignored or dismissed issue affecting countless families. The loss of a loved one from a tragic car crash may have been avoided if both parties had the most recent safety technology. But the potential life-saving technologies are kept out of reach of the average consumer because of the expensive cost. These technologies are a massive step up in safety for the average consumer and driver. They offer a serious change in the disturbing and tragically too common crash injury or fatality. If the majority of drivers on the road had access to these safety technologies, then maybe there would be a significant change to total crashes occurring and also the staggering number of traffic accident fatalities.

The goal of this project is to design a system that can be added to an older vehicle in order to upgrade its safety features to resemble those of newer vehicles on the market, at a lower cost than purchasing a new vehicle. The project design involves a modular system of printed circuit boards (PCBs) mounted on the vehicle's exterior and interior. A PCB mounted on the front bumper will collect and process visual data using a stereovision two-camera system to calculate distances to vehicles ahead and a camera system to be used for lane detection. Up to four additional PCBs will be mounted on the quarter panels of the vehicle, each containing radar devices designed to detect objects in hazardous proximity, particularly to aid the driver when merging or changing lanes. This multi-sensor approach provides extensive coverage of the vehicle's surroundings, ensuring that the driver is aware of potential hazards on multiple sides.

The sixth PCB, located inside the vehicle, will interface with the sensor modules and provide feedback to the driver via a user interface (UI). This UI includes audio alerts through a speaker or buzzer, and visual data through a head-up display projected onto the windshield. The head up display allows the driver to maintain focus on the road by displaying important alerts directly within their line of sight, eliminating the need to glance down at a screen or dashboard. The front bumper, quarter panels, and interior PCBs are all powered by the vehicle's 12-volt battery, utilizing proper power regulation and management to ensure efficient and reliable performance. The interior PCB is powered by the car's 12-volt battery via a 12-volt adapter to step down to 5 volts. The front and quarter panels are also powered by the car's 12-volt battery but more directly via a fuse box installed in the engine bay that delivers power to each of the five total PCBs through sufficient sized wiring along the exterior of the car.

The goal is to develop a minimum viable product (MVP) that includes distance sensing modules, lane detection capabilities, and audio and visual feedback. By offering a system that can be easily installed in older vehicles, this project seeks to make advanced safety features more accessible to the average driver and those unable to invest in a new vehicle, ultimately reducing the number of traffic accidents and fatalities on the road. If more drivers are equipped with these powerful tools, the result could be a significant decline in traffic accidents, injuries, and fatalities, helping to keep drivers more well informed, making roads safer for everyone.

II. System Components

The overall system is made up of multiple components, which interface with each other to provide the full functionality of the system. This section will provide a description of each major component and their role in the larger system.

A. Stereovision

The stereo vision camera design is derived from the concept of stereopsis, the method by which the human mind perceives depth from visual input gathered from our two eyes. In stereopsis, our eyes are separated, which leads to slightly different views of the same scene. The brain overlays these images to perceive depth. Similarly, in a stereo vision system, two imaging sensors are mounted on the same backplane, either horizontally or vertically aligned, with a fixed distance—known as the baseline—between their focal points. This separation causes objects to appear shifted between the two cameras' fields of view. By calculating pixel disparity (the difference in pixel positions of the same object in both images) and using known values like pixel size, focal length, and baseline, the system can compute the object's distance from the cameras.

To maintain accurate depth calculations, the cameras must remain a fixed distance apart and use identical lens systems. This ensures that differences in the images arise solely from the cameras' separation, not lens distortion. The optical design used to determine the ideal set of lenses to be used with the selected imaging sensors for this purpose will be discussed in a later section of this paper.

B. GPS

The GPS is used to calculate the speed of the vehicle in order to send feedback to the driver about their tailing distance. That is the distance between their front bumper and the rear bumper of the car immediately in front of them. As precise location is not integral to the use here, as error in the GPS reading is generally consistent, there error is displaced in the same manner in each consecutive reading after the initial satellite lock, meaning that speed calculation can be accurate despite the accuracy of exact location lacking.

C. Lane Detection

Lane detection uses the Jeston Nano and one of the stereo vision cameras on an isolated thread. As discussed later in the V. methods such as edged detection, Sobel filters and the Hough Transform are used to identify lane markings on the road.

D. Ultrasonic Detection

Our hazard detection will be implemented with the use of the HC SR04 ultrasonic sensor. These sensors will be placed on each of the quarter panels, three per PCB, resulting in a total of 12 ultrasonic sensors on our system. This ultrasonic sensor allows for detection of up to 4 meters, but in our system use case we will only need 0.5 meters, and with our multiple sensors per board it allows us to have an increased field of view to ensure a higher detection range.

E. Audio Alert

The audio alert is a simple system involving a class D audio amplifier and a basic low power PCB mounted speaker capable of outputting a significant SPL (sound pressure level) audio alert to give the driver the information necessary to drive in a safer manner. The audio amplifier takes a DC power signal and converts it into an AC signal that can power the speaker at our desired frequency to alert a potential driver. The signal is triggered by the ESP32 receiving a notice that there is an object/hazard in the FOV of our detection range. This signal triggers the ESP32 to provide the power to trigger the amplifier to receive the signal and send it to the speaker to produce the desired audio alert that will be used to inform the driver of potential hazards.

F. Visual Alert

The visual method of alerting the driver to a hazard that has been detected either on the road in front of the car or in the blind spot of the driver is the use of a head up display. A head up display is a method by which an image is projected onto the windshield of a car in the driver's field of view, so that information can be displayed to the driver without them having to look away from the road. Head-up displays are becoming a more prominent feature in newer cars, as they increase the level of safety when driving.

For the purposes of this project, the head up display consists of a laser diode, directed through a series of lenses to output a hazard symbol, which will be visible to the driver on the windshield. An important factor that was considered in the design of this system is the volume constraints. The entire system must fit within the distance between the steering wheel and the windshield of the vehicle, while also remaining compact enough in height to not interfere with the driver's field of view. The diode properties and the optical design of the lens system will be discussed in a later section of this paper.

G. Voltage Regulator

Being that the power supply unit is going to be a 12-volt car battery, we need to have multiple voltage regulators on all of the exterior boards to power the necessary components. To ensure the Jetson nano receives the specified power requirement, it will have its own voltage regulator module. Having multiple regulators on the board allows us to implement a power selection feature, giving us the opportunity to test and power the system via USB.

H. WiFi

Wi-Fi is used within our system to be able to transmit the data being picked up by the sensors wirelessly to our main PCB. The Wi-Fi has been implemented through a system of networks of ESP32s with the use of ESP-NOW, allowing us to optimize the performance of the wireless communications, resulting in one receiver and multiple transmitters. With the use of Wi-Fi, it has allowed us to reduce the number of wires that would be running throughout the vehicle, such as from each one of the quarter panels into the main unit, to only having wires run throughout for powering the PCBs.

III. System Concept

To further simplify the understanding of the system, the components can be grouped into subsystems by physical location on the vehicle.

A. Front Bumper

The front bumper is equipped with the Jetson Nano for stereovision and lane departure detection, Ultrasonic sensors for near range more fine distance sensing when the objects are too close to the camera to be accurately detected, and GPS used to calculate speed of the vehicle.

The Jetson Nano has 2 imx219 cameras that are mounted on a flat back plait with a baseline of 10cm (the horizontal distance between the center of each lens). The cameras are streamed via OpenCV and processed with the yolov5s object detection model. The camera stream is also sent to have the lane detection processed. When each process senses what is classified as a *Hazard* it sends a flag via UART to the ESP32 module on pi ns 10 and 8.

The ultrasonic sensor is connected to the esp32 via I2C as the 2 UART buses are used by the USB and Jetson Nano. The Hazardous distance is defined as the relationship between speed and the tailing distance in this case.

$$D = 2v + \frac{v^2}{2a}$$

Where D is distance, v is the current speed of the vehicle. When this threshold is reached or exceeded, the Jetson Nano will send a flag over UART to the esp32.

B. Quarter Panel

The quarter panel will be responsible for measuring the distance between the car it is mounted on and any nearby vehicles. There will be an additional daughter board on the quarter panel responsible for stepping down the 12-volt car battery to 5 volts. There will be four PCB placed on the car, each mounted at the quarter panel of the car. Each board will be carrying three ultrasonic sensors, programmed to send a signal to the interior cab PCB whenever the flag is raised. The multiple sensors will give us a broad field of view helping the driver avoid crashes.

Each PCB will have its own 3D printed model that will be designed to position the ultrasonic sensors to achieve the required angle to avoid cross talk. We will be using double automate-grade adhesive pads to hold the 3D model without damaging the paint of the vehicle

C. Cab Interior

The interior cab PCB is the main hub of our entire system. It is essentially the brain that processes all signals received by the four quarter panels and the front panel. The interior cab not only receives all signals from the rest of the system, but it also takes those signals and processes them into audio and visual alerts for the driver in a timely manner. The ESP32 incorporated into the interior cab PCB simultaneously sends signals to both the audio amplifier/speaker setup, and the HUD display portion of the design.

The audio amplifier and speaker are powered by the initial USB power input supply but will not activate unless receiving the correct signal from the main ESP32 only when the ESP32 receives the corresponding signal from one of the peripheral components in our design.

The HUD portion of the interior design involves the main ESP32 sending a signal that will allow the USB power input to power a breakout board that involves multiple voltage regulators in a design that will regulate current and voltage to power the laser diode properly and in a safe range. This will only occur when the ESP32 receives the correct signal indicating a hazard in range.

The laser diode of the head up display relies on a signal transmitted from this interior cab PCB. The default operational mode of the head up display is off, wherein a visual image will not be displayed. When a signal is transmitted that indicates the presence of a hazard as detected from one of the other subsystems, the proper voltage and current required to turn on the diode will be applied, therefore allowing the hazard alert image to be cast onto the windshield. This alert is intended to be simultaneous with the audio alert, such that the driver will receive multiple indicators that our system has registered a hazardous situation.

This image provides a visual demonstration of the subsystem interaction described in the sections above.

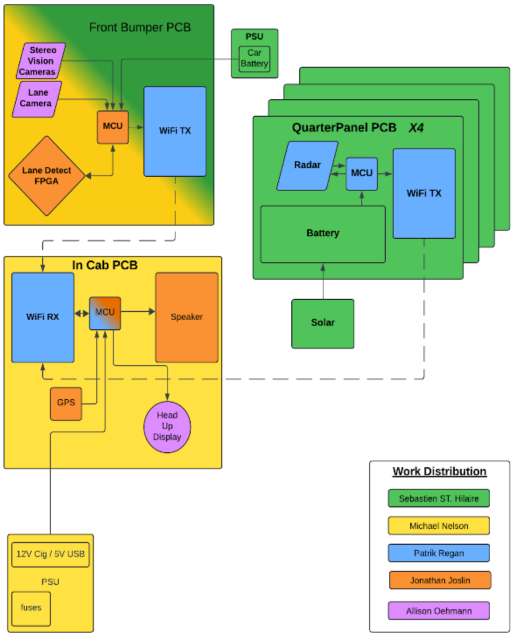


Figure 1. Hardware diagram.

IV. Hardware Detail

This section will dive deeper into the technical details of the major components of the system as outlined in Section II, System Components, as well as some of the factors influencing the parts selection process.

A. Stereovision

As discussed earlier in this paper, the concept of stereovision relies on two identical imaging systems. For this reason, the lens systems applied to the two imaging sensors must be the same. An optimal lens design to be applied to these sensors is shown below.

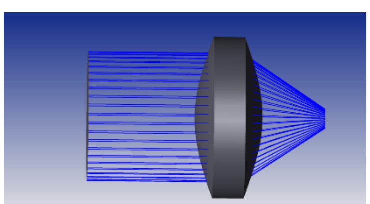


Figure 2. The figure shows the design of the ideal lens to be utilized in the stereovision imaging systems. The final prototype uses a lens with similar functionality to the ideal design.

However, a custom lens system can be very expensive. Because this is a student funded project, compromises on quality had to be made in favor of budget concerns. For this reason, a similar, less expensive lens is being utilized for the stereovision imaging systems. The lens being used in the final prototype of this project has an effective focal length of 2.8mm, and an F-number of 2.8. This, in conjunction with the imaging sensor selected, allows for a 75 degree field of view in the horizontal direction, which is good enough for use in our design. Because this lens is off the shelf and not custom-made, it has about a 3% distortion level, which is even better than could be achieved with the custom design. For these reasons, as well as the lower impact to our overall budget, this lens was selected for use in our system.

B. GPS

The GPS, located on the front bumper, is the Teseo-Tesseo LIV4F using the ASGPDF254.A antenna. Both the antenna and the GPS module contain an LNA amplifier aimed to support signal in tunnels and other restrictive environments. Unfortunately, in testing it was found that stable signal was still limited to outdoor low cloud use. Despite this limitation, this GPS can still be effectively used to calculate the speed of the vehicle in most environments.

The speed calculation can then, in turn, be used to adjust the alert parameters for the camera stereoscopic distance system. That is, that as roadway speed increases, so should the threshold of the alert distance.

C. Lane Departure Detection

As mentioned in part A. of this section, The Jetson Nano and two cameras are being used in the stereo vision distance sensing system. To implement the lane departure system one of these cameras will also be streaming to an additional thread where the lane detection image processing will occur. The selection of the Jetson Nano and its CUDA cores made this parallelism much more accessible,

The Jetson Nano won out over other options such as Raspberry Pi due to its parallelism, and GPU acceleration. The Jetson nano also has dual camera operation built in without any additional multiplexing devices for our stereovision goals.

The Jetson Nano at the time of implementation is a deprecated device past end-of-life support. This added some complexity to its use as much of the softwares necessary for the end goal has moved past the version support that is compatible with the Nano's architecture. That is the arm64 CPU on the Jetson Nano only supports Jetpack 4.6 EOL in 2017, Jetpack 4.6 supports up to python 3.6.9 which is not supported by tools such as OpenCV 4.5 which is required for object detection models such as yolov5. Despite these dependency issues a functioning implementation was attainable with custom compiled wheels and git repository back searching.

The older Jetson Nano was maintained as our choice of Jetson models due to its accessibility. It was generally easy to find Nano models under $200. The next model that fits our price range and power profile, is priced well above its original retail price. The Orin Nano which supports the new SDK and should be offered around $250 was not found for less than $500. Other models like the AGX are priced closer to $2000 and use closer to 60 W, which is well above our 20W target.

D. Distance Sensing and Blind Spot Detection

Our system will take use of HC SR04 ultrasonic sensors for our distance sensing and blind spot detections. This will be determined when something is within the field of view for the ultrasonic sensors, they will begin to send readings to the MCU on what the distance is from the obstacle. Depending on what the distance is from the obstacle, in our current setting 0.5 m, this will then be sent wirelessly to the internal PCB, where it will then create an alert to the user of the hazard within the range.

To maximize the efficiency of our system and to cover a higher field of view, we will have three ultrasonic sensors on each quarter panel, each being angled in a different direction. With our ESP32, this allows us to be able to set up multiple ultrasonic sensors on one board, causing the efficiency of our system to be greatly increased, rather than having one sensor per PCB.

E. Audio Alert

The decision on our hardware for the audio alert component was limited by the amount of power available to the interior cab PCB. The interior cab PCB not only receives all peripheral signals from the system but also powers a crucial visual component as well. So when choosing the hardware to accomplish our desired tasks, I chose a simple low power class D audio amplifier. The MAX98357 in specific was able to power the speakers in our power range. When choosing a speaker, we wanted to go as loud as possible, but with power constrictions and limitations we ended up choosing a CVS1708 speaker model that only needs 0.5 watts of power to produce up to 80dB of output at the range of 3 feet. This is about the distance from the PCB to the driver in the interior cab. This SPL (sound pressure level) should accomplish the task of alerting the driver in most cases.

F. Visual Alert

The first main component of the head up display system is the laser diode. The diode being utilized in this project is the 1528-2100-ND laser diode produced by Adafruit Industries. It transmits 650 nm light, with an output intensity of 5 mW. This classifies the diode as a Class IIIa laser. To minimize safety concerns with the use of this intensity laser, the beam will be adequately expanded within the head up display system, such that the output image is in no way harmful to the viewer. The entire system will also be fully encapsulated, save for the output. This means that the unexpanded beam will be inaccessible to the user, so that they are not at risk of any laser light induced damages.

The next main components of the head up display system are the lenses. The optical design concept is displayed below.

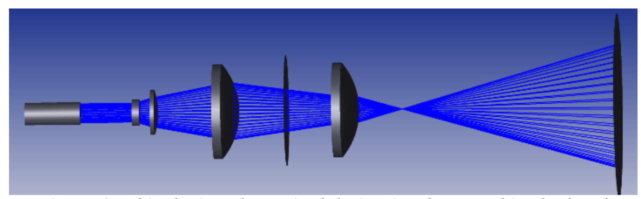


Figure 3. This depicts the optical design implemented in the head up display system, as designed in Zemax.

The first lens system that the laser beam will encounter is a microscope objective lens, with a 20x magnification to expand the input to the desired size. The objective lens selected for use in this system is the A20X-YX2-V460 objective, produced by AmScope. This design allows for optimal expansion in a compact volume, which is necessary due to the size constraints put on this system.

The next lens in the beam path is used to collimate the beam at its new larger diameter, before passing through a mask used to create the image at the end of the system. This lens was also designed for compatibility in the system and to meet the size constraints imposed by the location of the head up display on the dashboard of the vehicle. The lens design was optimized with the use of a 1 inch diameter lens, with a corresponding effective focal length of 1 inch.

After the collimated beam encounters the mask, it then passes through a second lens, which is identical to the previous. This lens flips the image produced by the mask and expands the image to direct it to the final image pane, the windshield. Because of this lens, the final image can be adjusted in size to best accommodate the driver, depending on the system's placement on the dashboard.

The final design component of the head up display system is a 3D printed housing, which is custom designed to fit the needs of our project. This housing allows for the specific lens placement required to optimize this design, as well as to incorporate the safety shielding required to protect the end-user from any risk induced by the laser diode.

G. Voltage Regulator

The voltage regulator we selected to step down the 12-volt car battery to 5 volts is the ADP2303. Being able to handle a maximum load current of 3 amps is more than enough to power the respective boards. Since all the main external PCB will draw less than 1 amp, we expect to have an efficiency of about 93%. To meet this efficiency and help with thermal management, we decided to put the voltage regulator on a daughter board while following the recommended layout and component to use.

To power the Jetson nano and meet the required 5V/ 4A DC power, we selected the D36V50F5 voltage regulator from Pololu. This voltage regulator will step down the 12V Car battery to 5V while giving us a typical maximum continuous output current between 3.5A to 8A. Considering that we will need to only deliver 4A we can expect an efficiency of 95% at 12V input. The connection to the jetson nano will be made using the barrel jack using the required cable of 2.1 mm inner diameter and 5.5 mm outer diameter plug.

After selecting to power the board using 5V from the USB or an external power supply we need to step down the 5V to 3.3V to power any components requiring a 3.3V power supply.

H. Wi-Fi

In order to send our data across the system from the external PCBs to the internal PCB, we would rely on Wi-Fi for sending our data. The Wi-Fi was able to be implemented from the ESP32 we were using, as they allow for wireless communication to take place. With the ESP32, we were able to choose between different options for our wireless communications, where we eventually determined to use Wi-Fi. With this, we ended up choosing a variation of Wi-Fi, being the ESP-NOW network, a form of Wi-Fi that is designed specifically for ESP32 devices.

While a standard Wi-Fi OSI model has seven layers, ESP-NOW reduces five layers into only one layer, causing there to only be three layers for ESP-NOW, the ESP-NOW layer, data link layer, and physical layer. This reduction of layers allows for there to be an even quicker response and send time between the devices, due to the reduced overhead from the devices compared to the standard Wi-Fi model setup. Along with having a lower latency and response time, ESP-NOW allows for significantly reduced power consumption of the system.

With ESP-NOW, we were able to create a system of networks using our PCBs, resulting in there being multiple master devices, the devices doing the transmitting, and one slave device, being the receiver. The usage of ESP-NOW has allowed for a smoother and better implementation of a wireless communication network, allowing us to optimize our system to a fuller extent in all aspects.

V. Software Detail

The software of P.B.H.D.S.O.V is best understood by breaking it into key objectives of. That is:

A. System Interfacing

Our system uses the ESP32-wroom as its MCU to control all the sensors over both I2C interface and UART. The use of the ESP 32 greatly reduces the complexity of these communication protocols as the Arduino header reduces use to one or two function calls to define the pin for RX and TX. The ESP32 also uses a mux for its I2C busses allowing use of the protocol on any pins on the ship sans power and ground, with the only drawback being naive use of a pin dedicated to some other isolated task or protocol.

Communication that is communicated between boards is also limited to a set of defined flags or bit masks limited to a single 8-bit message in order to maintain real time system times. Exact communication protocols are covered below in section *C*.

B. Real Time Image Processing

The image processing is confined to the Jetson Nano SoC development board to take advantage of its Maxwell CUDA cores. Utilizing OpenCV 4.5, PyTorch 1.10.02, NumPy 1.19.4, the NanoCamera CSI repository, and the YOLOv5s model, a system was implemented to detect objects on both cameras.

To process the images simultaneously, the cameras are instantiated within a wrapper class that includes a processed_frame attribute for thread-safe sharing with the main process. Each camera class is then instantiated on a separate thread for simultaneous capture.

For object detection, the YOLOv5s.pt model is employed to identify an array of detectable objects. The detected objects return bounding box information, which is then used to determine the center point of each object.

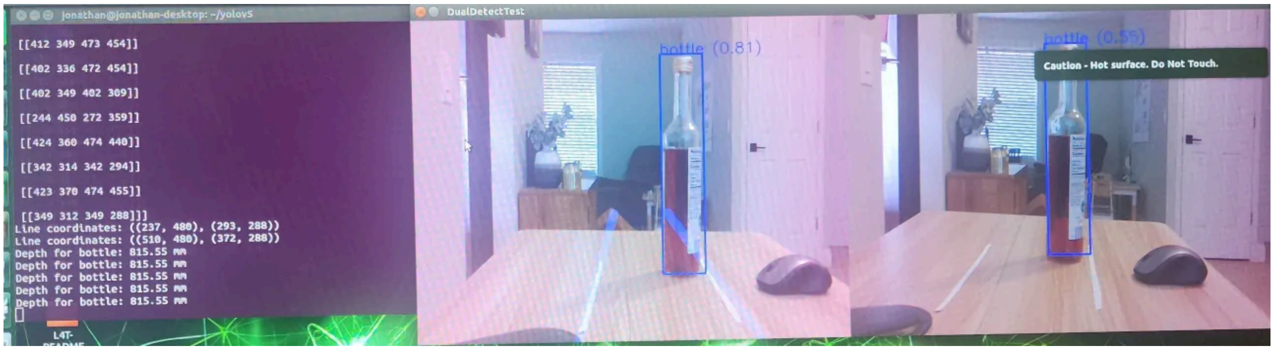


Figure 4. Jetson Nano output when drawing detections to screen. The right two frames the detection of a bottle. the center point of each bounding box is found and used to calculate the depth based on the baseline (space between the cameras) and the camera parameters; focal length, pixel size.

This center point is subject to disparity caused by the 10 cm separation of the cameras on the backplane. This disparity is leveraged to calculate the distance to the object, as described in Section IV-A.

Lane detection is processed using OpenCV's Sobel filter and Hough Transform. The system ignores any lines that are outside of a region of interest mask. otherwise, other superfluous lines are detected such as the horizon. The mask limits the lines to the bottom half of the image.

Since the camera is mounted at the center of the front bumper, the system ensures that the detected lane center remains within a predefined threshold relative to the center of the image. If the detected lane center deviates beyond this threshold, the program sends an alert signal to the ESP32.

The combination of object detection and lane monitoring enables a real-time assessment of both obstacles and lane positioning, contributing to a more robust driver assistance system.

C. Communication over wireless system

The wireless communication through our system is assisted through the wireless capabilities on our MCU, being the ESP32. With the ESP32, we were able to create a network of systems that will have multiple devices transmitting to a singular device in a very efficient manner. This was achieved through the use of ESP-NOW, which was discussed in a previous section.

Implementing this design, we would first obtain the MAC address from our dedicated receiver, which will have the address stored in the different transmitters, allowing for a swift connection when the system, is other turned on or disconnects briefly. When initialized, the receiver will communicate with the transmitter every 100 ms, sending over the current reading of distance between an obstacle if it is within the distance of the specified range we set.

In the receiver, it will be waiting until a signal is received from the transmitter, in which it will then send out signals to alert the user of obstacles nearby, both visual and audibly. The waiting process is not set in the standard loop function of the program, but rather in its own specified function that will only activate when a signal is recived, as a way to reduce the power consumption of the PCB.

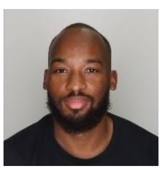
VI. Board Design

Our PCB design involves 6 total PCB boards. One front panel PCB placed at front of vehicle. Four quarter panels placed at four sections of the car, two on each side. And one interior cab PCB board placed near the driver at the front of the interior cab. The four quarter panels job is to project a significant FOV detection range. Then when detecting objects or hazards, send a signal to the interior cab PCB to provide audio and visual alerts to the driver. The front PCB utilizes cameras and lane detection along with a significant FOV detection range for hazards in the front of the vehicle. This PCB also sends signals to the interior cab PCB to trigger those same alerts to the driver. The final piece to the design is the interior cab PCB, which processes all signals and alerts the driver with audio and visual alerts upon receiving and processing a signal from the peripheral PCBs. This design is split up into 6 PCBs, but they work hand in hand as one fluid system to provide essential alerts and a true upgrade in driver safety.

VII. Conclusion

In conclusion, the Proximity-Based Hazard Detection System for Older Vehicles (P.B.H.D.S.O.V.) had the goal of developing an integral part of modern day vehicles and being able to apply it to aftermarket vehicles, with the primary goal being able to greatly enhance the vehicle driver's safety from getting into an accident with their surroundings. This project represents the culmination of hard work by five students of the University of Central Florida, coming from three different areas of engineering, being electrical, computer, and optical, who all shared an interest in this idea of wanting to apply the modern safety features that the new vehicles have and make it accessible for all vehicles.

The Engineers



Sebastien St Hilaire is an electrical engineering student graduating from the college of electrical and computer Engineering at UCF with a focus on power and renewable energy. During his academics he has joined clubs like power engineering society He has accepted a job working at McCarthy as an Electrical Designer.

Patrik Regan is a Computer Engineering student graduating from the College of Electrical and Computer Engineering here at UCF, having his degree specialized in Digital Circuits and VLSI. During his degree he has taken interest in verification of digital systems with UVM, embedded systems programming, and FPGA design software. Patrik has accepted an offer from UCF to come back for graduate school and get his M.S. in Computer Engineering, specializing in Computer Systems and VLSI.

Michael Nelson is an electrical engineering student graduating from the College of Electrical and Computer Engineering at UCF. He is very interested in power production and distribution along with incorporating power systems with instrumentation and device technology. Michael has been working in this field already and will continue working with his current employer in wastewater electrical system design and implementation.

Jonathan Joslin, a Computer Engineering student graduating from the College of Electrical and Computer Engineering at UCF. He is passionate about advanced computer architecture, specializing in RISC ISA design, GPU architecture, and AI acceleration using FPGA. He also has experience with controlled random verification in UVM. Jonathan is seeking a career in these fields, aiming to contribute to cutting-edge processor and hardware acceleration technologies.

Allison Oehmann is a 22-year-old Photonic Science and Engineering student, graduating from the CREOL college at UCF. She has accepted a job working at Northrop Grumman laser systems as an Optical Engineer.

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