

Vehicle Safety system for Blind Spot and Hilly Areas

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Abstract— A blind spot for a car, also known as a vehicle blind spot, is a space around the car that, when the driver is behind the wheel, cannot be seen clearly. The maximum distance a driver of a vehicle can see and recognise conspicuous items around the vehicle is known as driver visibility in the transportation industry. Vision is mostly influenced by the environment (see visibility) and the construction of a vehicle. The dashboard, pillars, and windscreen are among the car's components that affect visibility. Safe road traffic requires drivers to have good visibility. This is a project which has been crafted as an actual prototype that detects vehicles from a sufficient distance and alerts other vehicles on the other opposite side with the help of LED indicator boards and LiDAR sensors. This prototype is most useful at sharp turns and "T" turns which turns out most accidental areas. This project has been sponsored by a road safety Non-government Organization namely TRAX NGO. Which works on various stages related to road safety all over India. This is a innovational project is one of its type made till date and will be first ever such prototype to be installed and implemented on road. This project is under process of permissions to be implemented on road under one of road safety incharge at Nagpur city.

Keywords— Road Traffic., Blind Spot, Sensor, Microcontroller.

I. INTRODUCTION

Street car crashes and passing's brought about by them are most basic issues now a days. It is additionally affecting tentation's economy. A blind spot for a car, also known as a vehicle blind spot, is a space around the car that, when the driver is behind the wheel, cannot be seen clearly. The maximum distance a driver of a vehicle can see and recognise conspicuous items around the vehicle is known as driver visibility in the transportation industry. Vision is mostly influenced by the environment (see visibility) and the construction of a vehicle. The dashboard, pillars, and

windscreen are among the car's components that affect visibility. Safe road traffic requires drivers to have good visibility. The areas that are too low to see behind, in front of, or to the sides of a vehicle, particularly those with a high seating point, are also commonly referred to as blind spots. Measures taken to slow the rate of accidents include roadway planning, street lights, and compensation for damaged automobiles.

Fig. 1 describes the driver's restricted view in a horizontal plane. This can lead to front-end blind spots, which can be problematic in congested areas like roundabouts, intersections, and road crossings. Several design factors have an impact on front-end blind spots:

- The pillar's thickness, angle on a vertical plane, and distance between the driver and it are all factors.
- The pillar's inclination in a front perspective of a vertical plane.
- The pillar angle of the in a vertical plane side view
- The pillar angle of the in a vertical plane front view
- The windshield's angle, the driver's height in relation to the dashboard
- The shape of the pillar (straight or arc-shaped), and the speed of the vehicle in front of you

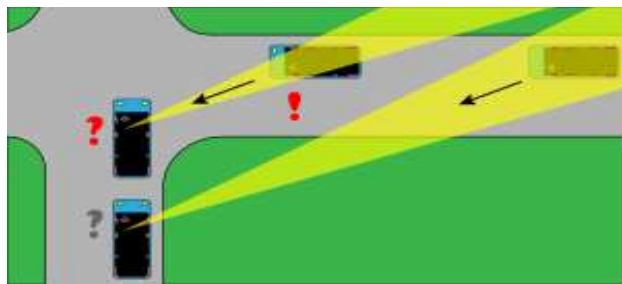


Fig. 1 Graphical representation of blind spot in a crossroad

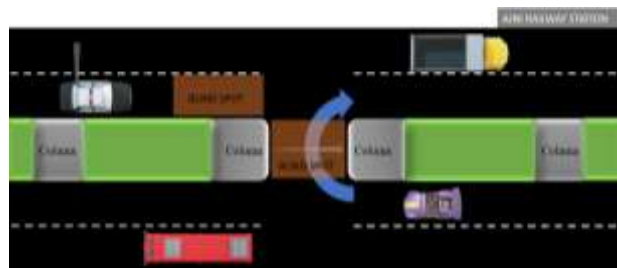


Fig. 2 Graphical representation of blind spot at Nagpur

A panoramic windshield's curved sides allow for the creation of vertical A-pillars that maximise the driver's forward view. However, a vertical A-pillar prevents the creation of an aerodynamic tiny automobile since it reduces the space available for the door opening and increases the vehicle's frontal area and coefficient of drag. The benefits of a flatter pillar include a lower overall drag coefficient and a stronger automobile body in the event of a frontal collision, but at the cost of decreased driver visibility in a 180° field of vision from

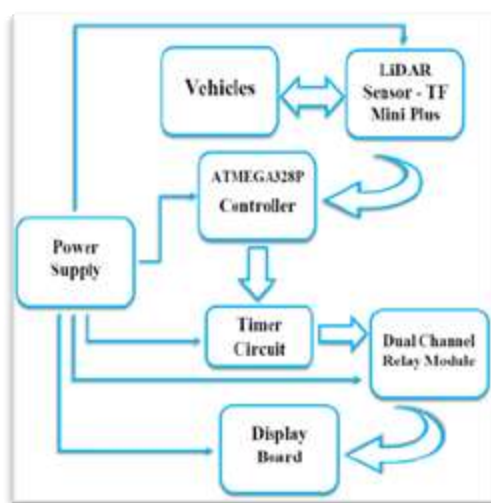


Fig 3. Overall flow of working

left to right. When estimating the consequences of a collision with a pedestrian, a flatter pillar (and consequently windscreen) is also taken into consideration. A flatter angle will typically result in a milder hit, sending the pedestrian "up and over" as opposed to into the windscreen. This is especially true for vehicles like the Mercedes-Benz A-Class, which has an engine cover that is low and tilted.

II. WORKFLOW

In this Block Diagram, when the Power Supply is supplied to all the components the LIDAR Sensor – TF Mini Plus senses [2] the Vehicle and sends the signals to ATMEGA328P U which consumes lower power. Then ATMEGA328P U sends signals to timer circuit that is 555 timer IC which is used to generate an accurate timing pulse. Which when Timer Circuit sends signals to Dual Channel Relay Module of 5V 10A DC for controlling a circuit. The Relay Module thus sends the signals to the Display Board.[3] Sensors and a microcontroller board are included with the system. The information gathered from the sensors will help identify whether or not the object poses a high risk.

As they must detect and transmit data to the CPU, the sensors play a crucial role in the system. In order to handle data in real time, the microprocessor also needs to have a high processing speed. The data cannot be regarded as credible if real-time data processing is not possible.

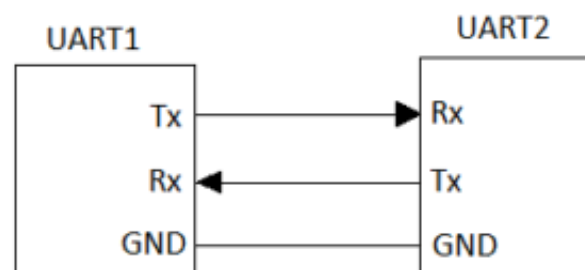


Fig 4. UART Protocol Transmission

In comparison to traditional CISC microcontrollers, the resulting design is quicker and more code-efficient. We used the UART protocol for serial transmission in this prototype. A computer's interface with its connected serial peripherals is managed by an integrated circuit known as a universal asynchronous receiver and transmitter (UART). Imagine that a microcontroller's data and address bus is connected to the UART so that the CPU can read and write to the registers.[2] A serial bit stream with a start bit (logic '0'), 8 data bits, and a stop bit (logic '1') is created by the UART using eight bits of parallel data. Upon receiving, the UART first detects a start bit, then a stream of 8 data bits, and finally, when it detects a stop bit, converts the data into parallel. The UART must synchronise the incoming stream of bits with the local clock because no clock is transmitted.

ACRYLIC LED Printing sign boards are frequently referred to as banners. They function as a type of outdoor marketing. Large format inkjet printers that print digitally are now able to produce an outdoor billboard in full colour on a single piece of material. It served as a demonstration for the next cars in this project.[4]



Fig 5. LED Direction Indicator 1

Fig 5. LED Direction Indicator 2

- This is the Prototype of Vehicle Safety System for Blind Spot and Hilly Areas.
- The region near the back of the car on both sides that is most frequently referred to be a blind spot is the rear quarter blind spot.
- To reduce the rate of accidents at blind spots and blind turnings. To use this prototype in real life applications.
- To help the drivers for driving stress-free in hilly areas



III. DISCUSSION ON PRE-EXISTING SAFETY SYSTEMS

As per the concern on safety of roads in hilly areas we have already elaborated the dangers and precautionary actions necessary to undertake. Even with current technology advancements there are not many precautionary systems have been developed or implemented due to the unforeseen circumstances and the overall cost to gain ratio in implementing these systems on site which far surpasses the original limit that we can accommodate with our system. In that regards we have studied below pre-existing systems with

there advantages and disadvantages, as it is known every system have its own field to excel into so we can't be biased towards any specific system but our main focus is cost effectiveness, easy implementation and low maintenance system:

1. CCTV Based Vehicle Safety System:

Advantages

- Easily Serviceable
- Miscellaneous parts are easily available
- Easily understandable by people

Disadvantages

- High Cost
- High maintenance cost
- Low Security (Risk of damage)
- Less safe with compare to our prototype (Rain)
- Difficult to implement

2. Smart Poles System:

Advantages

- Easy Implementation
- Easy to Handle
- Currently in Development

Disadvantages

- High Cost
- High maintenance cost
- Reliability and accuracy issues

The hilly areas are more prone to mishaps and accidents due to the vulnerability of unintentional turns and bends with the newness of pathway also the overall environment and the conditions are not fit to travel leisurely as it becomes hard to drive. There also some ideas about utilization of Wireless Sensor Network and Internet of Things. Discussing there reliability the wireless sensor grid usually depends on multiple sensors working together with each other the nodes acting as main of head node may or may not be able to accommodate whole data provided by the mini grid due to its small size it is compact but the backlash comes in the form of its limited storage capacity and the noise carried by the sensors. In general the nodes consist of the sensor or actuator, storage, transmitter, receiver and battery. The overall judgement is that in harsh environmental conditions replacing or maintaining the grid becomes impossible which can be argued in some sense or other as the development is still in progress but it is certain that it will open up new horizons for future scope.

IV. FURTHER DISCUSSING ABOUT THE APPLICATION OF PROTOTYPE PRESENTED HERE IS AS FOLLOWS:

This prototype is user-friendly, readily available, and has several pieces that are simple to understand. By comparing the number of cars spotted within the blind spot zone with ground truth data, the system's accuracy is evaluated. [5] To improve driver security and lower the risk of a traffic accident, this system will automatically inform the driver.

Thus, if you're unsure if you should get a blind spot indicator, there are two key reasons why you should. Of course, only you can decide whether to do so. You are presumably the kind of driver who will pay attention to the indications it emits if you are conscientious enough to purchase a blind spot indicator. In any event, it can't harm to have one, and with all the distractions on the road and in the car—kids screeching and playing video games—one will probably only be beneficial. routes with narrow curves, Ghats parts, mountains, and T roads. This research has applications in real-time traffic monitoring and could be a useful tool for road traveler's.

V. FUTURE SCOPE

The limitations are being studied considering harsh circumstances in hilly areas such as the most basic limitation is power supply as we know in avalanches, floods and rainfall most of the times power supply is cut off also the reliability of sensors are obstructed due to the bad conditions noise in environment there are some enhancements which can be implemented with future scope as follows:

Power supply: With through implementation of solar based power supply with customized lithium-ion based batteries will provide constant power supply to the sensor[6].

Parking slots: The utilization of this system is limited to the its users ideas as the implementation at parking plot is much greater in its own sense as it will provide with easy to understand system for the users so that it can reduce the hassle.

VI. CONCLUSION

Due to the excessive growth in the number of vehicles on the road, it is now more vital than ever that we abide by traffic regulations and laws to protect our family and ourselves from accidents. Our roads may become safer if more people are aware of the regulations of the road. Using this device the accidents may not stop but rate of accidents will definitely

decrease. Hence the prototype will be of low maintains and will be cost effective as compared other security units for ex. CCTV To reduce accidents caused by blind turns or poor visibility, a road accident safety system has been proposed. Accidents have increased steadily as a result of quick advancements in automobiles and transportation. Accidents frequently occur as a result of carelessness, disregard for traffic laws, and poor street conditions. Bended roadway segments, which make up a sizeable amount of the street mathematical plan, are often more prone to car accidents than other street mathematical components because of their arrangement characteristics. So, with the development of such a system, the number of accidents resulting from driver irresponsibility can be somewhat reduced.

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