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A Novel Approach for Blind Turn Detection to Avoid Accident

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Abstract

In India, the number of road accidents and deaths due to sharp turns and blind turns has steadily increased over the years. Visibility is greatly reduced due to sharp turns. Also, on a blind bend, approaching vehicles tend to crash into each other due to lack of visibility over other vehicles. Such a situation increases the demand for wide availability of various information and communication technologies in road networks to prevent vehicle accidents. In this paper, we designed a system based on the integration of various modules such as Zigbee module, long-range ultrasonic distance sensor, PIC microcontroller, LED lamp, etc. to avoid vehicle collision due to fog and blind corner. The purpose of the system is to give a signal in confusing corners when vehicles are approaching each other and to warn the driver in the event of a turn. This system includes a set of sensors, a control unit and a monitoring platform. This system uses ultrasonic sensor communication, which results in providing alerts with minimal latency. System performance may vary depending on operating conditions, so it should be calibrated accordingly.

Keywords

MPLAB, Zigbee module, heavy vehicle safety, road safety.

I. Introduction

i) Introduction

Abstract Traffic accidents claim the lives of around 1.3 million people every year. The main reason for Abstract Road traffic accidents is poor visibility in sharp turns. An economical and reliable system is required to alert the driver to the presence of an object or other vehicle on the other side of a curve to avoid an accident. Similar is the case with SVPCET gates. In this project, a system based on ultrasonic sensor, MPLAB, PIC microcontroller and LED is presented which can be easily implemented for accident prevention. Traffic congestion, as one of the main problems affecting modern societies, is receiving more and more attention. In addition, college buses, which have more blind spots than cars and other road users in these environments, are at higher risk of collisions. Many countries have started to improve the

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safety of heavy vehicles and buses by installing additional mirrors.

Nevertheless, there are still blind spot areas where drivers cannot see other road users. Additionally, college buses have many passengers on board. A significant number of accidents involving passengers have been reported as a result of sudden braking or stopping. These challenges may require different collision detection requirements for college buses than for automobiles. A blind turn detection system can be designed for buses to anticipate impending collisions in their vicinity and reduce service disruption. This could give the driver enough time to apply the brakes smoothly or take any other precautionary measures to avoid such imminent threats of collision and also avoid injury and trauma inside the bus.

ii). Objective:

1. To monitor the traffic.
2. To avoid accidents at sharp turns.
3. To alert the driver against traffic

iii). THEME OF PROJECT

Application Based

II. Literature Survey

1] From the survey conducted, it was found that there is insufficient awareness of the blind spot zone in heavy goods vehicles. Most respondents were only able to identify the rear of heavy trucks as a blind spot zone, while forgetting the other three critical areas. This finding indicates a worrying level of knowledge related to blind spots. So this study recommends the government to retroactively reconstruct the driving school system and pay more attention to the blind spot area of heavy trucks. This step can help road users to realize and know a lot about the blind spot area for heavy trucks when driving near a heavy truck. In addition, an awareness campaign on the blind spot for heavy goods vehicles needs to be carried out to remind road users again about the blind spot area. Finally, it is recommended that the government may introduce a line of sight standard for HGVs, as there are currently no minimum requirements for how much of the field of vision a HGV driver must be able to see.

2] There are conical pillar-shaped parts that obstruct the view of the drivers referred to as A-pillars, B-pillars and C-pillars. These pillars create an obstacle to the drivers' visibility, which depends on the vehicle design and the characteristics of the driver. By properly adjusting the side mirrors and additionally attaching the side mirrors, the problems arising from the blind spot can be eliminated to some extent. Scientific studies on blind spots can lead to changes in vehicle manufacturing, efficient pillar placement and reduced pillar area can lead to a reduction in blind spot accidents. Drivers' blind spot awareness varies by age, gender and driving experience. A prototype model has been developed that senses the driver's blind spot and warns the driver, helping the driver to understand his blind spot driving behavior and act accordingly. Educational tools such as videos and other driver training methods can help increase the importance of this concept and make the necessary changes in driver behaviour.

3] The automotive system was developed to monitor the blind spot around the rear of the vehicle using ultrasonic sensors. A normal mirror suitable for automotive measurements is used and the blind spot area is estimated and an ultrasonic sensor is set to monitor the area. The system uses HC-SR04 ultrasonic sensors for blind spot monitoring and obstacle or incoming system detection. An LCD display was also available to warn of an approaching obstacle. The sensors are programmed with a predefined distance of 20 cm for a detection range with a field of view of 30 degrees. Therefore, when there is an oncoming vehicle at the end of the rear corner, the ultrasonic sensor detects the oncoming vehicle, and the vehicle deviates from the obstacle with the help of DC motors, which are controlled by different speed processed by Arduino Mega 2560. After the vehicle leaves the direction, if the vehicle covers the 2:1 steering gear, that is, if the steering wheel is turned 20 degrees, then the wheel turns 10 degrees, while the hall effect sensor is directed proportionally to the magnet in place to create a hall voltage and therefore the voltage is used as data to further process the motors to bring the vehicle back to the normal steering position.

4] This article proposes an idea that would primarily increase safety and improvise driving conditions. It is also cost-effective and highly efficient and has minimal drawbacks. A possible alternative would be satellite communication or GPS to determine the location of the oncoming vehicle. The proposed design is cost effective and the GPS modules are very expensive. This design is very effective at night. Because the sharp turns prove to be deadly at night.

III. Implementation

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A. Block Diagram

12 V power is supplied and connected to the regulated power block. This is because the microcontroller operates on 5V. Here the driver is used to convert 5V to 12V because relays operate at 12V. The driver sends its input to the relay so that the relay can control the circuit with an independent low power signal or where it needs to be multiple circuits controlled by one signal. The relay gives input to light 1 and light 2. The sensor is directly connected to the microcontroller, where the sensor is a device that detects and responds to some type of input from the physical environment. Here, the role of the microcontroller is the main one, as it is used in a wide range of systems and devices. It has already been explained that the main role is played by the microcontroller and therefore it is involved in all the 7 blocks of the above diagram. Sends all input signals to the LCD. Later, the LCD will display the output from the microcontroller, such as a symbol, sound or vibration, and notify with an indicator. Two such circuits are used in this project, so the ZigBee module is used for the communication of these two circuits. Zigbee, which is a wireless method of communication, sends information to the antenna and returns it back to the microcontroller.

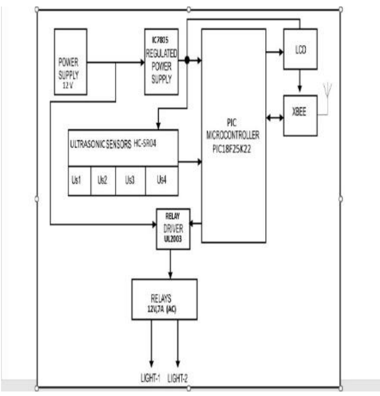

Fig (a): Block Diagram

B. Circuit Diagram:

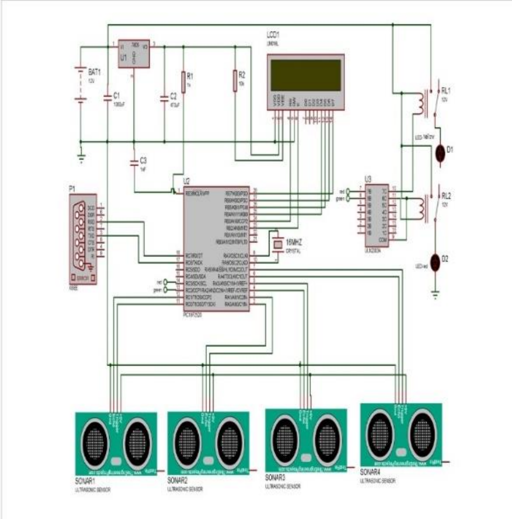

Fig (b): Circuit Diagram

The main component used in the blind turn detection system is a pic microcontroller to which multiple sensors and interfaces are connected. A 12V battery is used for constant power supply. Since the regulator works on 5V supply, we convert 12V to 5V using regulator IC. The LCD is connected for monitoring purposes. We directly interface 4 sensors with a pic microcontroller to measure distance between objects and sensors. Two such circuits are used in this project, so the ZigBee module is used for the communication of these two circuits. Zigbee modules are intended for wireless communication. Used to convert digital data into bidirectional mode. A 12V LED is connected at the end to display the output signal, which is controlled by a relay. A relay driver is used for this, which converts the operating 5 V to 12 V for the LED.

C. Flow Chart

First, we initialize the USART (Universal Asynchronous Synchronous Receiver and Transmitter), the reason for initializing the USART is serial data transfer. When initializing the LCD, we initialized the LCD to check whether we are using it in 4 bits or 8 bits. Here we used it in 4 bits. Now we need to inform the microcontroller connection about the pins. For this we used port pin ident. In the direction of the port, it is explained what will be the input of the microcontroller and what will be the output of the microcontroller. In the variable declaration block, we declared the variables needed for execution. All values for the sensors are checked by comparing them in if

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statement. 4 sensors are used here, so we have a set distance of 25 cm. Next, he heads to the case. If the distance of the object from the serial port is less than 25 cm, the yellow LED will light up. If the distance is greater than 25 cm, the red LED lights up.

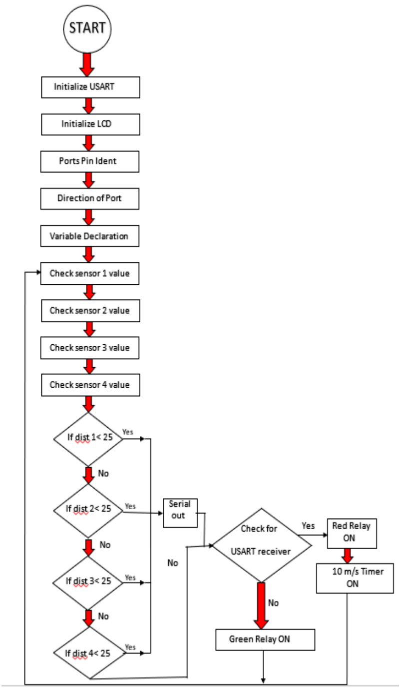

Fig (c): Flow Chart

IV. Working

The system consists of an ultrasonic sensor, a PIC microcontroller, a Zigbee module and LEDs. MPLAB IDE is used to program the PIC microcontroller IC. Ultrasonic sensors are placed at the gate near the sharp turn to detect the presence of an object. Continuously monitors incoming vehicles in the vicinity of the sections. This ultrasonic sensor will continuously emit echo signals. Once it detects, it sends a signal to the microcontroller. The ultrasonic sensor measures the distance of the object using the formula:

Speed = distance / time

∴ Time = Distance / Speed

and it will show signal by LED using microcontroller. LEDs of different colors light up according to the distance between the curve and the object to alert the driver. Then both circuits on the gateways follow via wireless communication using Zigbee modules.

V. Future Scope

1. This system can be used to keep count of numbers of vehicles.
2. Future add on this system can be used to scan the number plates.
3. Entries can be monitored by scanning ID cards in schools, colleges, offices, hospitals, and other corporate sectors.
4. As is it convenient to install it can be used in urban as well as rural area where small lanes have sharp turns.

VI. Result

Data:

Distance of sensors from ground level = 25 cm = 25 x 10^{-2} m

Speed of sound = 345 m/s

(Speed of sound is kept as a constant quantity)

Formula used:

Speed = Distance / Time

Calculation:

∴ Time = Distance / Speed

∴ Time = 25 x 10^{-2} / 345

∴ Time = 0.000725 sec = 0.725 ms

Result:

Thus, the system gives output signal in 0.725 ms.

VII. Conclusions

The purpose of this report is to decrease the number of accidents in curve roads. This is doneby alerting the driver by means of lights which glows when vehicle comes from the other side of the curve. The vehicle is detected by the help of Ultrasonic sensor which is interfaced to the PIC microcontroller. By this we can save thousands of lives in the curve roads.

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