AUTO CONTROLLING VEHICLE DESIGN TO AVOID ACCIDENTS

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ABSTRACT

The main purpose of our report is to build a structure to keep vehicles safe, protected and guard it from intruders. A system which controls the speed of a vehicle and avoids accidents is to be designed using an eye blink sensor and ultrasonic sensor. The top cause for any car accident is human error. If a running vehicle comes across any obstacle it automatically controls its speed. Also if the driver is in drowsy or sleeping position the eye blink sensor unceasingly tracks the blinking of the eye and if eyes are closed for more than 30 seconds then the vehicle stops automatically by giving alarm to attentive the driver. The ultrasonic sensor system unceasingly sends signals and displays whether any vehicles or obstacles are there in front of a car. The ultrasonic sensor senses upto a distance of upto 4meters. This sensor detects any vehicle or obstacle within its vicinity and sends a signal to the motor to reduce the speed of the vehicle automatically. Any short circuit if occurs in the engine will be detected by smoke sensor and gives attentive to the driver to stopover the vehicle. Hence to avoid these kind of accidents prones, we have a cautioning system, which contains display system and alarm which are arranged at back side of each and every vehicle.

I.INTRODUCTION

In order to prevent accidents, an accident avoidance system is intended to reduce the severity of an accident by using an automobile safety system. It detects an impending collision using radar, laser, and camera sensors. It is also called as precrash system, forward collision warning system or collision mitigating system. It is built in such a way that these systems either notify the driver when a collision is impending or take action independently without the driver's participation.

The GPS sensors can detect stationary risks such as approaching stop signs. Pedestrian detection is another characteristic that these systems can have. Now a days most of the driving is getting worse because of traffic jams, rough and rash drivers. The designed system where automatic control in the speed of the vehicle is implanted which is the need of the hour. Also this system helps the drivers in overcoming accidents and to prevent various hazards of driving. Fatigue driving, especially among long-distance drivers, overspeeding, overtaking, overloading, and non-maintenance of vehicles are all factors that contribute to road traffic accidents.

Now a days most of the driving is getting worse because of traffic jams, rough and rash drivers. The designed system where automatic control in the speed of the vehicle is implanted which is the need of the hour. According to UN ECE rule 131, a system must be able to detect a probable forward collision and activate the vehicle braking system to decelerate the vehicle in order to avoid or mitigate the impact. Deceleration can be up to 5 metres per second squared, according to UN ECE rule 152. When these systems notice an coming crash, they issue a warning to the driver. They can operate automatically without the need for driver input when a collision is imminent (by braking or steering or both). may be available in cars with collision avoidance. AEB is not the same as forward collision warning (FCW), which

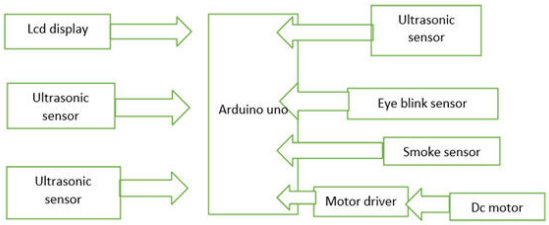
automatically stop the car without warning the driver. Time-to-collision may be a useful metric for determining which stoppage approach (braking or steering) is best. A steering-based collision avoidance system is a novel concept. Some research efforts take it into account. The steering-based collision avoidance system has some drawbacks, including an over-reliance on lane markings, sensor limitations, and driver-system interaction. Drowsiness, loss of focus, and an inability to gauge distances and reaction times are all side consequences of driving while inebriated. According to available figures, over 10,000 vehicles are involved in road traffic accidents, resulting in over 10,000 individuals being injured as a result of these accidents.

According to statistics, around six (6) people every day are killed in road traffic accidents, with 1/4th of the victims being under the age of 16 and another 1/4th being between the ages of 25 and 35. It is also discovered that speed is a contributing factor in 60 out of 100 road traffic accident cases, with 70 out of 100 road traffic accidents occurring on straight and flat roads with male as the road traffic accident victim. Despite the existence of advanced technologies, data reveal that automobile accidents are extremely depressing. For example, every year, at least 12 crore people are killed in road accidents around the world, with another 2–5 crore suffering from non-fatal injuries; over 90 out of 100 road traffic accidents occur in underdeveloped and developing countries; in the current situation.

The majority of accident instances are reported on major roads on a regular basis in most sections of emerging and developed countries; therefore, further investigation into the creation of an efficient car driving helping system is needed. As a result, we believed that if such a scheme is built and integrated into our vehicles as a road secured device, it will decrease the number of accidents on our roads, sidewalks, dividers, and other public spaces, resulting in fewer deaths and property losses. Furthermore, an engineer's primary concern ought to be secure, as it pertains to the use of our innovations and the associated hazards owing to human limits. When we utilize a motor vehicle, accidents that have occurred throughout time show us how, from an engineering standpoint, something needs to be done about them. A total of 6,023 individuals were murdered in 1999, with the number rising to 5,286 in 2005, from accident cases reported in almost 250,429 and 341,252 cases, respectively. Until recently, the results reveal that an increasing number of accidents are stated. This is safe to assume that installation of some highway security measures, like speed limits and rules, has helped to reduce the frequency of these accidents significantly. Because of this problem, policies of safe driving alone will not solve it; engineers must play a part, the main matter is an engineering invention (the motor vehicle). Most areas with limited light while also being tired, yet have been forced to do so out of need. However, it is not necessarily irresponsible to do so. The majority of the occurrences documented are because of drivers dozing off while they are in driving, and when they finally awaken, a head-on collision may have occurred. The majority of them were fortunate enough to be able to avoid this. As a result, it is critical to assess the benefits of an primary cautioning system, in which the driver is notified of a potential crash a significant period of time before it occurs. Even now, the government uses CCTV evidence to track down the person responsible for the accident. This approach was effective in finding the criminal, but there was a real loss of life, and the loss could not

be recovered. However, the system we are building eliminates all of the above-mentioned method's drawbacks by preventing loss through the avoidance of accidents.

1.1 Architecture



The above block diagram indicates the system designed for automatic vehicle control using sensors along with the above circuitry.

The model was analyzed using programming and simulation to predict the effectiveness of the design under consideration. The circuit design and simulation of the model of the car accidents prevention system employing wireless technology, automatic braking system, and eye blink sensor were done using computer software (proteus).

II.HARDWARE

2.1 The Arduino uno

The Arduino UNO is finest for learners who actually have zeal to learn programming and concepts of electronics. This is the right platform for anyone if they are working for the first time. The Arduino UNO is the most widespread and well-recognized board in the Arduino family.

Main Features:

This is a microcontroller board which uses the ATmega328P microcontroller. On the board, there are 16 digital input/output pins, six analogue inputs, a 18 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. This Arduino includes everything we will need to get started with the microcontroller, you can play about with your UNO without perturbing about making a fault; if something goes erroneous, you can swap the chip for a few dollars and start over.

2.2 Liquid Crystal Display

A LCD is an electronically manipulated optical flat-panel display device that uses liquid crystals and polarizers to modulate light. LCD use a reflector or backlight to create monochrome or color images instead of directly illuminating light. White and blue LCDs have unique appearances thanks to optical filters.

LCD uses include televisions, aviation cockpit displays, computer monitors, instrument panels, and interior and exterior signs, to name a few.

In all practical applications, Liquid Crystal Display screens have substituted heavy, bulky CRT displays. LCD panels come in a larger range of sizes than CRT and plasma displays, ranging from small digital watches to enormous television receivers. Because LCD panels do not include phosphors, image burn-in is unusual when a static image is presented on a screen for an extended period of time, such as a table frame for an airline flight schedule on an indoor sign. Image persistence is, however, a problem with LCDs.

OLEDs also suffer from screen burn-in due to the usage of phosphors, and there is presently no means to recycle OLED displays, but LCD panels can be recycled, albeit the technology required for recycling LCDs is not yet widely available.

Because LCD panels do not include phosphors, image burn-in is unusual when a static image is presented on a screen for an extended period of time, such as a table frame for an airline flight schedule on an indoor sign. Image persistence is, however, a problem with LCDs. The Liquid Crystal Display panel consumes less energy and may be rejected more safely than a CRT. It can be utilised in battery-powered electronic devices more efficiently than a CRT because of its minimal electrical power consumption. By 2008, annual sales of LCD televisions had surpassed sales of CRT televisions around the world, rendering the CRT obsolete for most purposes.

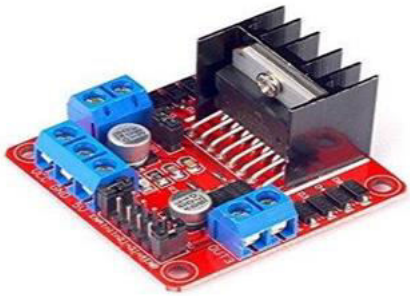
2.3. Ultrasonic sensor

It is an electronic device that detects the .distance between a target item and converts the redirected sound into an electrical signal using ultrasonic sound waves. Ultrasonic waves travel ,faster than audible sound waves (i.e. the sound that humans can hear). The distance between the sensor and the item is determined by the time it takes to emit and receive waves. It is mostly dependent on sound waves using "non-contact" technology in this case. The target object is measured without damage from the desired distance, providing you with exact and specific details. With a range of 0.02m to 4m, this sensor is employed in a variety of applications, including speed and direction measurement, wireless charging, humidifiers, medical ultrasonography, sonar, burglar alarms, and non-destructive testing.

The HC-SR04 is used to determine the distance between the target object and the sensor. While it uses non-contact technology, which means there is no physical contact between the sensor and the item, it calculates exact distance. Here are the results: The transmitter and receiver are the two main components of the sensor, with the transmitter converting electrical impulses into ultrasonic waves and the receiver converting ultrasonic waves into electrical signals.

2.4. Motor driver (L293D)

A motor driver is a type of integrated circuit chip that is intended to activate motors in self-driving robots. The motor driver serves as a connection between the Arduino and the motors. The L293 series of motor driver ICs, such as the L293D, L293NE, and others, are the most often employed. The H-bridge is the most basic circuit for controlling a motor with a low current rating. The motor driver IC shall be referred to as L293D alone. There are 16 pins on the L293D.



2.5. Eye blink sensor

This sensor is based on infrared technology which is made up of an infrared transmitter and a receiver. It makes use of infrared light to emit from the eye and processes changes in the reflected light. The results are manipulated using infrared light replicated from the eye. For the Eye when it is close, the sensor output is active high and can be sent directly to the microcontroller for interfacing (e.g. buzzer). The driver is considered drowsy when this output remains high for an extended amount of time (threshold). As a result, a buzzer can be activated to rouse the driver up.

2.6. Smoke sensor

This is a device that detects smoke, usually as a fire indicator. Marketable smoke detectors provide an indication to a fire alarm control panel as part of a fire alarm system. Smoke detectors, produce an visual or audible signal from the detector itself, or numerous detectors if various devices are linked.

The project is powered by an Arduino Pro Mini, and it uses a MQ-06 gas sensor to notice smoke. The MQ6 gas sensor notices gas concentrations in ppm and results an analogue value that can be transformed to a digital value using the Arduino's inherent Analog to Digital Convertor. The digital measure will have a 10-bit value that ranges from 0 to 2^{10}-1. Based on the same digital measure, the scheme lets the user to specify the unsafe level for seepage. The alert is triggered when the value set by the user equals the value noticed by the sensor. The MQ6 sensor can be rectified by connecting it to a load resistance of a known value.

2.7. Dc motor

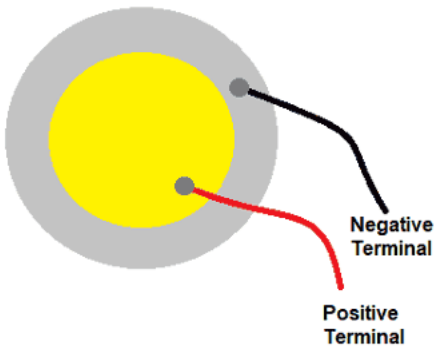
It is a device which is used to convert electrical energy into mechanical energy. The most common varieties rely on magnetic fields to produce forces. On a regular basis all DC motors changes the direction of current by using an in-house mechanism, either electronic or electromechanical.

2.8. Buzzer

A buzzer is a signaling device which is used in trains, timers, alarm clocks for triggering the stakeholders who are employing them in different circuits as per their applications. Buzzer converts audio signals into sound signals. The buzzer can produce a variety of sounds, including sirens, buzzers, alarms, music and electric bells, depending on its design and intended application.

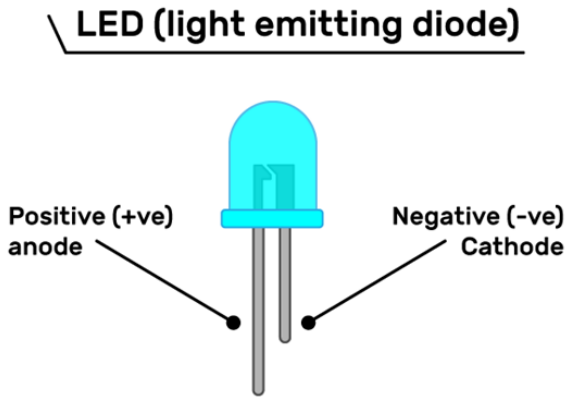
2.9 Piezoelectric

During the 1970s and 1980s, Japanese manufacturers invented and installed these buzzers in a wide range of gadgets. As a result, this progress was primarily the result of Japanese industrial businesses cooperating. They established the Application Research Committee of Barium Titanate in 1951, which permits firms to collaborate competitively and create countless piezoelectric innovations.



2.10. Led

A device which emits light in darkness when an electric current passes through it is known as Light Emitting Diode (LED). It is a semiconductor device.



III.WORKING OF PROJECT MODEL

This project was developed with the motto to avoid collisions or accidents of vehicles. For this we are using ultrasonic sensor, eye blink sensor etc. in the circuitry which are interfaced with Arduino.

A significant speed differential may indicate that a collision is likely to occur, in which case the system is capable of automatically activating the brakes.

To detect an impending crash, many technologies and sensors are utilized, including radar (all-weather), laser (LIDAR), and cameras (using image recognition). Through a location database, GPS sensors can detect stationary risks such as approaching stop signs. Pedestrian detection is another characteristic that these systems can have. Now a days most of the driving is getting worse because of traffic jams, rough and rash drivers. The designed system where automatic control in the speed of the vehicle is implanted which is the need of the hour. Also this system helps the drivers in overcoming accidents and to prevent various hazards of driving. Fatigue driving, especially among long-distance drivers, overspeeding, overtaking, overloading, and non-maintenance of vehicles are all factors that contribute to road traffic accidents.

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AEBS is defined by the World Forum for Harmonization of Vehicle Regulations. According to UN ECE rule 131, a system must be able to detect a probable forward collision and trigger the vehicle braking system to decelerate the vehicle in order to avoid or alleviate the impact. Deceleration can be up to 5 metres per second squared, according to UN ECE rule 152.

When these systems notice an imminent collision, they dispute a warning to the driver. They can operate automatically without the need for driver input when a collision is imminent (by braking or steering or both). Adaptive cruise control, which uses the same forward-looking sensors as collision avoidance, may be available in cars with collision avoidance. AEB is not the same as forward collision warning (FCW), which warns the driver but does not automatically stop the car.

Time-to-collision may be a useful metric for determining which evading approach (braking or steering) is best. A steering-based collision evasion system is a novel notion. Some research efforts take it into account. The steering-based collision avoidance system has some drawbacks, including an over-reliance on lane markings, sensor limitations, and driver-system contact. Drowsiness, loss of focus, and an inability to gauge distances and reaction times are all side consequences of driving while inebriated. According to available figures, over 10,000 vehicles are involved in road traffic accidents, resulting in over 10,000 individuals being injured as a result of these accidents.

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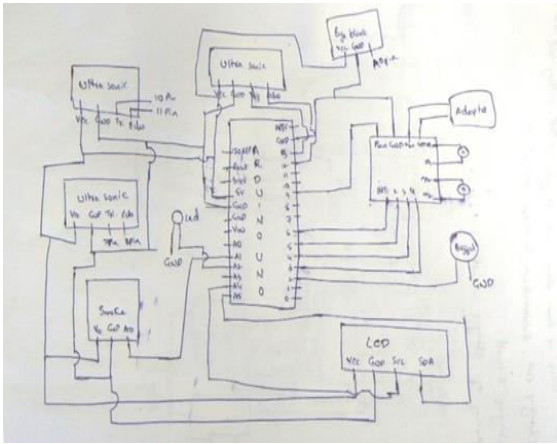
IV.FINAL CIRCUIT DIAGRAM AND CODE

The below is the final circuit diagram which we have implemented using smoke sensor, ultrasonic sensor, buzzer and motor to automate the vehicles in order to reduce accidents. The same circuit is used to avoid any collisions between vehicles or any automobiles by impending this circuitry into them. Here all the elements are interfaced with the Android so that by means of software implementation the entire process will be controlled. The code which we have used for the implementation of the below circuit is also placed in this chapter for providing required support in order to justify the discussion and to prove that the design which we have developed for the safety and security of public will be achieved.

CIRCUIT DIAGRAM:



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From avoiding this kind of accident, the alert system, that contains alarm and display system can place at back side of each and every vehicle. Even ever If we get any short circuit occurs in engine part smoke sensor noticing and give alert to driver and stop the vehicle. When the motor is moving at a certain distance when another vehicle is coming in the opposite direction at certain distance the object detects the light intensity will reduce automatically. By this the accidents will be reduced mostly at night.

Whenever the motor is moving at certain distance that means less than 15mts the vehicle speed will be automatically reduce while the user is trying to increase the speed also the vehicle speed will not increases unless until the opposite vehicle is less 15 mts. If the opposite vehicle is above 15mts the vehicle will automatically come to its original speed. By this whole function will works on the ultrasonic sensor.

Whenever the opposite vehicle distance is less than 5mts the vehicle will stop. Inside the vehicle any fire happens and smokes comes the smoke sensor will sense the smoke and the buzzer will on. This way the buzzer will tell to the user that smoke is coming from the car. While the driver is sleeping more than 20 sec

the buzzer will on to wake up the driver and the driver is not opening the eyes more than 20 sec the car will stops this process will happen through eye blink sensor. From the LCD display it displays the speed of the vehicle and if any object display it will print that “object detected”.

V.CONCLUSION

The project "Automatic Vehicle Speed Control Using Ultrasonic Sensors, Eye Blink Sensor" was built and tested successfully. It was created by integrating performance from all of the hardware components used. Every element's presence has been carefully measured and decided, resulting in the optimum likely operation of the unit.

Second, the idea was efficiently executed retaining modern integrated circuits and growing technology.

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