YOUR SAFETY PREVENTION AND COMMUNICATION

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Abstract: Accidents are un-intentional and unpredicted events which may lead to fatal conditions taking a precious life. This condition can be prevented if we can take certain steps which are accompanied with modern tools and technology. Here we have tried to take a small step towards this perspective. One of the main cause of the accidents is sudden appearance of an object may it be an animal, a unconscious human being or even a stationary vehicle. Here we have tried to take action both in case of an object in a shorter distance or a longer distance. The proposed system(Accident detection and accident prevention) ADAP uses ultrasonic sensors and Infrared sensors to detect an object straight and in its surrounding within 180D. The system can be mounted with the control system of the car.

So what if an accident occours , the stop time after the application of breaks is inversly proportional to the mass of the vehicle , heavier the vehicle lesser the stop time .So in case the vehicle hits we need quick and swift means of communication to maximize chances to save life. In extension to this we propose the following mechanism for communication with ambulance services with sensors.

Keywords: Arduino , GPS module (NEO -6m) , GSM *module ,IR Sensors, Ultrasonic Sensors, Relay, Shock Sensors*

1.Introduction:

In modern world, there is an exponential increase in automobile usage with corresponding increase in population. Consequently, the accident rates have also increased due to distinct reasons. The accident prevention module attached to this system gives safety to the vehicle. In this module, we have connected the ultrasonic sensors on all sides of the vehicle which sends the distance upon detection of any obstacle and, IR sensors readings that will take action on the brakes of the vehicle automatically.

The required output from the system will be the data which is the approximate distance of the object from the vehicle from all sides, and a relay output generated by the IR sensors, connected to the front brakes of the car. The distance can be send to a serial output connected to a display device kept in-front of the driver, which also includes a voice saying the distance alert to the driver. Accordingly the driver can take action if the object distance is under his control. If the obstacle is much closer the IR sensors output will be send to relay which when in condition "1" puts 'on' the brakes.

If the vehicle hits the shock sensors go on and sends signals which calculates the GPS coordinates and sends the message with coordinates through the GSM module to the ambulance services and the police station , it will also send the coordinates to one's loved ones which will be precoded into the module.

2. Architectural design:

2.1 Infrared Sensors:

An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion. A transmission medium is required for infrared transmission, which can be comprised of either a vacuum, the atmosphere or an optical fiber.An IR sensor consists of an emitter, detector and associated circuitry. The circuit required to make an IR sensor consists of two parts; the emitter circuit and the receiver circuit. The IR sensors reading are connected to a LED which glows on detection of an obstacle.
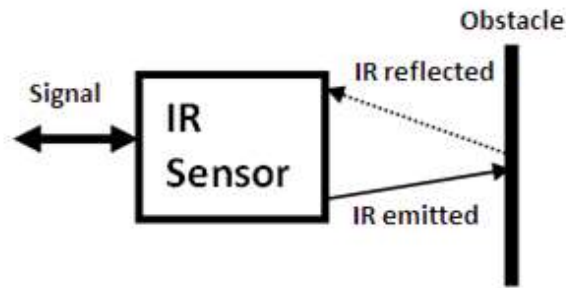
2.2 Ultrasonic Sensors:

Ultrasonic Sensors are designed to detect solid or liquid targets by using sound waves. These compact sensors provide enhanced flexibility for areas with limited space and are excellent for standard packaging and assembly applications. They are ideal for sensing targets that are challenging for photoelectric sensors to detect, including clear, shiny, or non-reflective objects. Tround the hese sensors play a vital role in accident detection system. The output of this sensor will be give us the distance of the object from the car.

2.3 Relay:

Relays are switches that open and close circuits electromechanically or electronically. Relays are generally used to switch smaller currents in a control circuit and do not usually control power consuming devices except for small motors and Solenoids that draw low amps. Nonetheless, relays can "control" larger voltages and amperes by having an amplifying effect because a small voltage applied to a relays coil can result in a large voltage being switched by the contacts.

Here relay is connected to output of IR sensor which when detects an obstacle transfers the signal to relay. The output can be visualized by a LED.

2.4 GPS Module (NEO -6m):

GPS stands for Global Positioning System. Satellites which track GPS Modules revolves around the Earth twice a day. The GPS module is a circuit that calculates your position . The GPS module can connect upto 8 satellites maximum and a minimum of 2 satellites . The module can calulate your 3D or 2D position ie. yourlaititude, longitude in case of 2D and also your altitude in case of 3D.We need atleast 3 satellites lock on to the device for execution.

2.5 GSM Module:

It is circuit used to send sms betweensources.We can code numbers into this which will send a text message.. We use SIM900 GSM Module – This means the module supports communication in 900MHz band . In india we use the 900 MHz system . The module will be connected to the microcontroller.

2.6 Shock Sensors:
This is used to detect heavy impact or shock . This contains accelerometers and vibration sensors which go on during heavy impact status. If a impact occours signals are send by this to the connected microcontroller .

3. Work description:

The Model detects any solid obstacle coming suddenly in-front of the vehicle. Depending on the distance of the obstacle automated or manual actions are taken. The distance of the obstacle can be received by using ultrasonic sensors that gets displayed on the serial output. The IR sensors can detect obstacle within a close distance, so the distance detection is not required in this case. We can have an automation in the braking system if the obstacle is very near. The distance can also give information whether the obstacle is moving or halting. This information also gives an idea whether there is a parked car, or hurdle etc. When any object is detected, it sends signal to the relay which turns on the LED connected to it. We implemented our work using Arduino 1.8.5.

If the vehicles fails to stop and the accident occours the shock sensors will go on and send a signal to the microprocessor which then tracks the location of the vehicle with help of the GPS module and then it sends signals to the GSM module that will deliver the message of crash along   to the Ambulance sevices and Police services and also to the loved ones whose number will be precoded into the module that , the accident has occoured at so and so location (Latitude , Longitude and Amplitude)

This message when recieved , the emergency services will be dispached to the targeted location.

4. Conclusion:

The ADAP system can be utilized to prevent accidents to some extent. After few years every vehicle will be equipped with different kind of sensors, so we felt this could help the automobile developers to some level. The IR sensors and the ultrasonic sensors are easily available products. The idea to incorporate them in the vehicles can be effective.

The shock and communication mechanism will then help in swift dispatchment of the Emengency services since swifter the action greater the chances of saving the victims life . It will also let the ones who hold the victim dear to get to the scene faster.

5. Experimental result
Serial Monitor Readings:
Distance 12
No Problem
Distance 20
Chance of Accident proven range
Distance 30
Chance of Accident proven range

6. Future Work:

Since automation is the future of technology and with the development of smart cars we will be able to handel the mentioned system more efficiently . We can also find the probability of accidents occouring with the help off enough stasticial data we can implement it in machine learning and identify roads with risk ,there by roads with high frequency of accident will have Emergency services localized which will further increase the swiftness of this mechanism.

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Working Model:

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