SMART ROAD SAFETY AND VEHICLE ACCIDENT PREVENTION SYSTEM FOR MOUNTAIN ROAD

Shubham Verma[1]Umesh Kumar Singh[2]Vivek Kumar[3] Aakansha Singh[4]
Electrical Engineering department

Teerthanker Mahaveer University, Moradabad
vshubham1012@gmail.com[1]umeshsingh11feb@gmail.com[2].
Er.vivekchauhan.vc560@gmail.com[3]akankshasingh8006@gmail.com[4]

***Abstract*-On road, accident is a major issue of concern. Even with all modern developments in the field of vehicle design, road lane design and management, accidents do occur. Timely accident detection and taking immediate action with respect to emergency health care of victims by informing an emergency center such as a hospital or a police station about the accident on time plays a vital role in human safety and road traffic management. Accident detection can be done under various domains. Most of the papers surveyed use application of sensor technology, besides trying to detect accidents automatically using machine learning and computer vision from surveillance systems. Any kind of accident detected is automatically sent as an alert to the required destination. Each of these methods has different percentages of accuracy and their own limitations.**

***Keywords*—Micro Electro Mechanical System (MEMS),Infra Red (IR).**

I. INTRODUCTION

Today, road traffic injuries are one of the leading causes of death, disabilities and hospitalization in the country. Road network in India, of about 56 lakh km in March 2016, is one of the largest in the world. A total of 4,64,910 road accidents have been reported by States and Union Territories (UTs) in the calendar year 2017 claiming 1,47,913 lives and causing injuries to 4,70,975 persons. These figures translate, on an average, into 1274 accidents and 405 deaths every day or 53 accidents and 17 deaths every hour in the country. Every minute, on average, at least one person dies in a vehicle crash. Auto accidents also injure at least 10 million people each year, and two or three million of them seriously. The hospital bill, damaged property, and other costs are expected to add up to 1%-3% of the world's gross domestic product. With the aim of reducing injury and accident severity, pre-crash sensing is becoming an area of active research among automotive manufacturers, suppliers and universities. Vehicle accident statistics disclose that the main threats a driver is facing are from other vehicles. The proposed system deals with an automatic accident detection system involving vehicles which sends information about the accident including the location, the time and angle of the accident to a rescue team like a first aid center and the police station. This information is sent in the form of an alert message. But in the cases where there are no casualties a switch is provided which can be turned off by the driver to terminate sending the alert message. A GSM module is used to send the alert message and a GPS module is used to detect the location of the accident. The GPS and GSM module are interfaced to the control unit using serial communication[1]. The accident itself is detected using two sensors- Micro Electro Mechanical System (MEMS) sensor and vibration sensor. MEMS sensor also helps in measuring the angle of roll over of the car. A 32-bit ARM controller is used as the main high speed data-processing unit. The vibrations are sent from the vibrating sensor to the controller after passing through an amplifying circuit [2]. The use of GPS adds to the advantage of the system being cost-effective, portable and detecting the accurate location [3]. They proposed that measures of the driver's eyes are capable to detect drowsiness under simulator or experiment conditions. The performance of the latest eye tracking based in-vehicle fatigue prediction measures are evaluated.

These measures are assessed statistically and by a classification method based on a large dataset of 90 hours of real road drives. The results show that eye-tracking drowsiness detection works well for some drivers as long as the blinks detection works properly. Even with some proposed improvements, however, there are still problems with bad light conditions and for persons wearing glasses. As a summary, the camera-based sleepiness measures provide a valuable contribution for a drowsiness reference, but are not reliable enough to be the only reference [4].

They proposed that to reduce the amount of such fatalities, a module for an advanced driver assistance system, which caters for automatic driver drowsiness detection and also driver distraction, is presented. Artificial intelligence algorithms are used to process the visual information in order to locate, track and analyze both the driver's face and eyes to compute the drowsiness and distraction indexes. This real-time system works during nocturnal conditions as a result of a near-infrared lighting system. Finally, examples of different driver images taken in a real vehicle at night time are shown to validate the proposed algorithms [5].Accident prevention in U-turn, S-turn, hilly Ghats and mountain roads using modern sensor technology, Which uses Arduino UNO, Ultrasonic sensor, RF module LED etc.It is the one having possibilities to reduce the accidents in U-turn, S-turn, hilly Ghats and mountain roads as the system is outside the vehicle. Moreover this technology covers all kind of vehicles New version and Old version cars [6].The proposed system in [7] aims at reducing the loss of lives due to traffic accidents and performs three main tasks – (1) detecting an accident and sending the location to the nearest hospital, (2) controlling traffic light signals in the route taken by the ambulance[8][9] and (3) monitoring vital parameters of the patient inside the ambulance itself and sending this information to the hospital.

II. SYSTEM INVESTIGATED

To overcome this existing system problem we developed the new system in which accidents can be avoided using ultrasonic sensor. These sensors are placed at both the sides of the road. Total four sensors are used. Two sensors are placed at left sides of the road and two sensors are placed at right sides of the road. Two lamps or buzzers are used. Lamps will be glow and buzzer will ring loudly. ultrasonic sensors are used to detect the vehicles and indication is given by a lamp so accident can be avoided at a turning point. Because of this technique people identify that what is the position of the vehicle at the turning point. This technique is easy to implement. Avoid accident, and save lives [15].The design focuses on the measurement and control of the eye blink using IR sensor to prevent vehicular accident whenever the driver becomes drowsy in the process of driving. The eye blink sensor serves as the detection unit which determines whether the driver is either drowsy or not during driving period and also the input to the control unit. The Arduino Uno microcontroller is the principal component of the design, a power supply maintains the output voltage at a constant value of 5 V required by the microcontroller, a relay which uses a low voltage circuit for switching in order to control the state of the vehicle motor, braking motor and the buzzer. A buzzer which issues a warning signal to prompt the driver when drowsiness is detected, traffic indicators to alert nearby vehicle drivers, automatic braking system which gradually brings the vehicle to a halt[16].

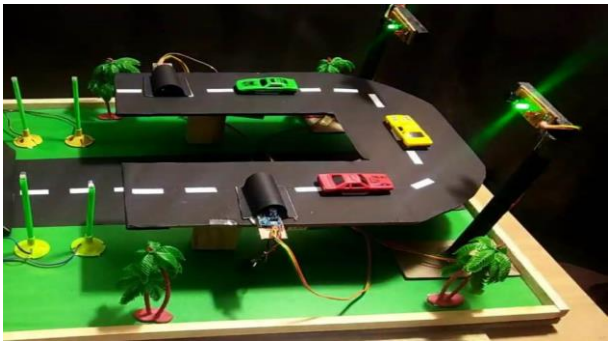

Fig.1: View of Vehicle accident prevention system

A. Implementation Methodology

This system mainly consists of two parts: Hardware and software. Hardware design consists of sensors like infrared sensor, Arduino UNO and LED. infrared sensor uses +5V DC supply. Arduino UNO need a power supply of 6-12V Arduino UNO Software design is done for sensing the vehicle or obstacle and to operate the LED by using Arduino 1.0.5 IDE tool which is open source software**.**

Block diagram

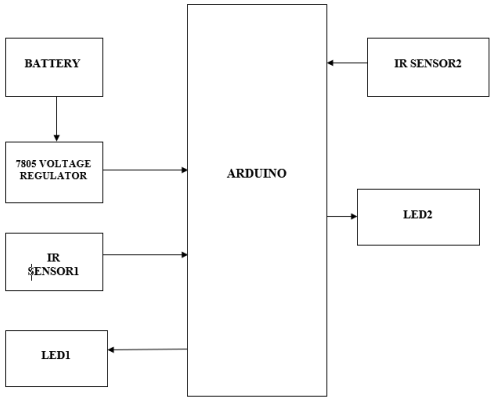

Fig2: Block diagram of accident prevention system

Working

It uses two IR sensors, which are placed on either side of the turn. One sensor ir1 is installed by the side of the uphill section of the road, similarly one sensor ir2 is installed by the side of the downhill section of the road. The sensors are connected to ATmega328P microcontroller through wires. Based on the output of sensors, position of vehicles on either side of the bend is detected which is provided as an input to the microcontroller.IR sensor has pins +5V VCC, GND, IR emitter led and IR receiver led. IR sensor sends the signal in the form of pulses from emitter led.When this signal hit the object it will get reflected back and is received by the echo receiver led. From echo the signal is sent to microcontroller Arduino UNO. Microcontroller Arduino UNO processes this data and operates the LED which is connected to output pin of the microcontroller ArduinoUNO. LED is operated according to the command i.e. LED will glow if the signal is reflected back. In the absence of the object the signal will not reflect back. Hence the LED will not glow.

Flow diagram

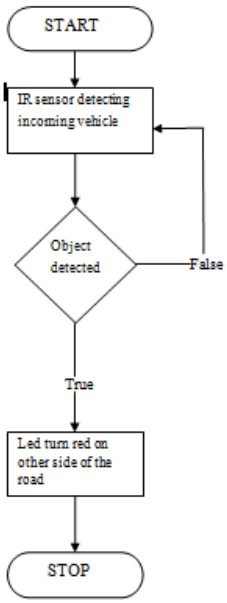

Fig.3: Flow chart of proposed system

B. Hardware Description

Hardware design consists of IR sensor, Voltage Regulator,Supply,Arduino,LED Buzzer.

ARDUINO

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button

Fig.4: Arduino ATmega328P

IR Sensors

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.

Fig.5: IR sensor

III. CONTROL TECHNIQUES

Control strategy includes the interference of Hardware and Software. The different colors of Led are being used on the both side of road as shown in fig. When the Vehicle is coming from A to B and No vehicle in coming from B to A then

the signal for the driver coming from side A is Green. The same rule is used for vice versa.

Considering the case when cars are coming from both the sides and Car coming from side A has already entered/ crossed the line then the signal for the car coming from other side will become Red. In this fashion this project provides a better way to reduce the chances of accident. In addition, we can also include a buzzer in synchronism with the Led for improving the quality of output.

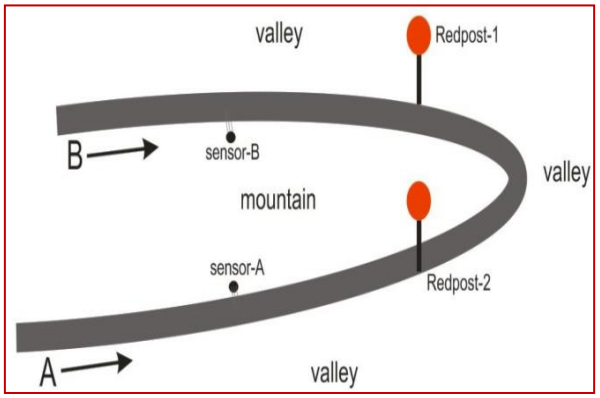

Fig.6: Schematic diagram of Accident prevention system

Condition	S_A	S_B	Output
1#	Red	Red	Stop
2#	Red	Green	Vehicle on side A will stop
3#	Green	Red	Vehicle onside B will stop
4#	Green	Green	Empty Road

IV. RESULTS

It involves the physical setup of the model. There are two infrared sensors kept at a particular distance. The two sensors are used because the intention to show that vehicle is at safe distance means far from the curve but which ensures the vehicle is coming. This can be done by glowing the green LED light and when the vehicle approaches very near the curve then it will glow red LED light, by this one can alert at the other side .Which helps to avoid the accident.

Conclusion

The purpose of this project is to decrease the number of accidents occurring on hilly and curved roads. This is done by keeping an ir sensor in one side of the road before the curve and keeping a LED light after the curve, so that if vehicle comes from one end of the curve sensor senses and LED light glows at the opposite side. By this we can save thousands of lives including animals.

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