

Smart Road Safety and Accident Prevention System

Pramod Mali¹, Aditya Pachpunde², Rohit Ballal³, Yash Kulkarni⁴

Students, Department of Electrical Engineering^{1,2,3,4}

D. Y. Patil Institute of Engineering and Technology, Ambi, Pune, Maharashtra, India

Abstract: Population growth has resulted in technological advancement. People use cars in large numbers, and the number of accidents that occur on a daily basis is increasing. Road accidents are without a doubt the most common occurrences and, overall, the cause of the most damage. In the world, there are many dangerous roads, such as mountain roads, narrow curve roads, and T roads. Some mountain roads are extremely narrow and have numerous curves. The issue with these curve roads is that drivers are unable to see vehicles or obstacles approaching from the opposite end of the curve. When the vehicle is moving at high speeds, it is difficult to control and there is a risk of falling off a cliff. Accident detection can be done under various domains. Most papers surveyed use the application of sensors technology, machine learning and computer surveillance systems.

Keywords: Smart Road safety, Accident Prevention, ultrasonic sensor, mountain roads, Microcontroller

I. INTRODUCTION

Road traffic accidents are now one of the leading causes of death, disability, and hospitalisation in the country. In March 2016, India's road network was approximately 56 lakh kilometres long, making it one of the world's largest. In the calendar year 2017, states and union territories (UTs) reported a total of 4,64,910 road accidents, claiming 1,47,913 lives and injuring 4,70,975 people. These figures equate to 1274 accidents and 405 deaths per day, or 53 accidents and 17 deaths per hour in the country. At least one person is killed in a car accident every minute on average. Every year, at least 10 million people are injured in car accidents, with two or three million of them seriously injured.

In our system, ultrasonic sensors are used to detect whether a vehicle is coming from one side of the road or the other by calculating distance. If the vehicle is coming from the wrong side, the system sends a RED signal to the opposite side of the road. If the vehicle side is safe, the system displays a yellow LED on the opposite side of the road. Green LED is normally and safely used for safety indication, indicating that no vehicles are passing or that vehicles have passed securely. For generating power we have used solar panels. The generated output is stored in the battery and used for our system and street light also. Street light is intensity based as dark intensity detects system makes street light ON with that intensity

II. MATERIAL AND METHODS

2.1 ATmega 328p

The ATmega328P-based Arduino Uno is a microcontroller board. It has 14 digital I/O pins (of which 6 are PWM outputs), 6 analogue inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header, and a reset button.

2.2 Ultrasonic sensor

The ultrasonic ranging module HC - SR04 has a non-contact measurement range of 2cm - 400cm and a ranging accuracy of 3mm. Ultrasonic transmitters, receivers, and control circuits are included in the modules. The fundamental principle of work: (1) Using an IO trigger for at least a 10us high level signal, (2) the Module automatically sends eight 40 kHz pulse signals and detects whether a pulse signal is returned. (3) If the signal is returned via high level, the time of high output IO duration is the time between sending ultrasonic and returning.

(high level time velocity of sound (340M/S) / 2) = test distance

2.3 LDR

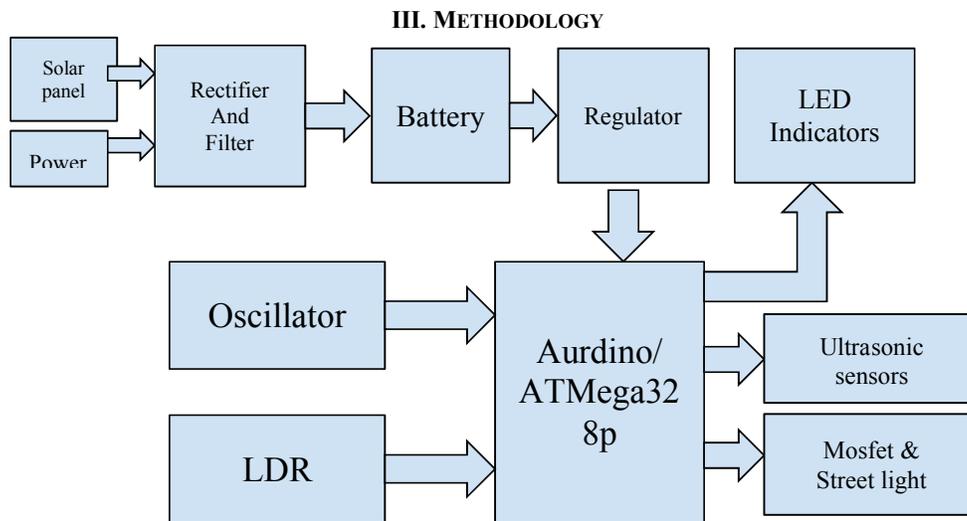
As the name implies, an LDR (Light Dependent Resistor) is a type of resistor that operates on the photoconductivity principle, which means that resistance varies with the intensity of light.

2.4 MOSFET

The MOSFET (Metal Oxide Semiconductor Field Effect Transistor) transistor is a semiconductor device that is widely used in electronic devices for switching and amplifying electronic signals.

2.5 Solar Panel

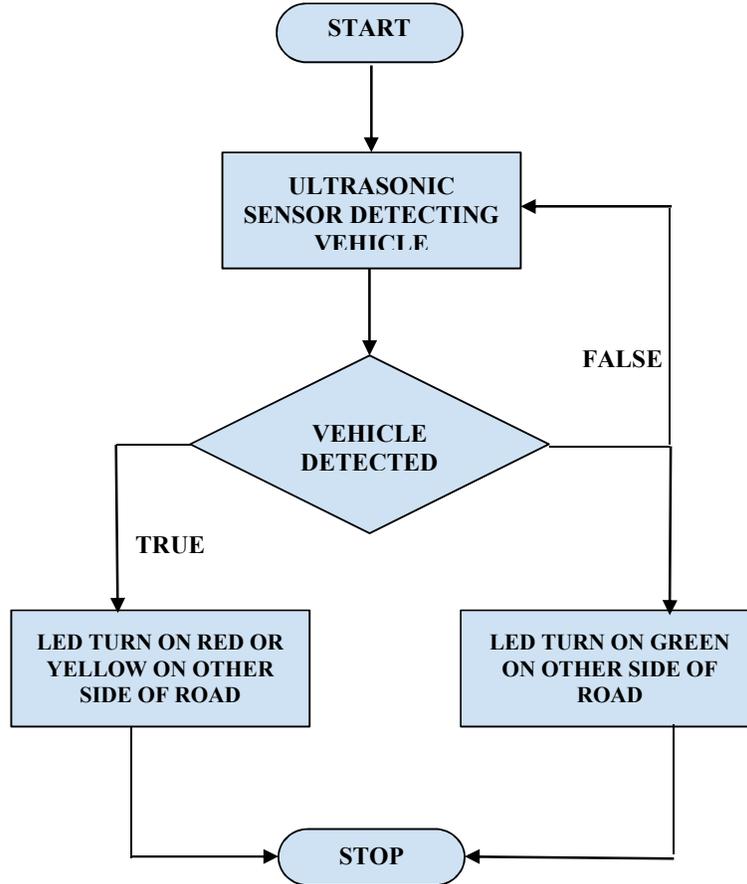
A solar cell (also known as a photovoltaic cell or a photoelectric cell) is a solid-state electrical device that uses the photovoltaic effect to convert light energy directly into electricity. In this solar panel is used for powering the system as backup



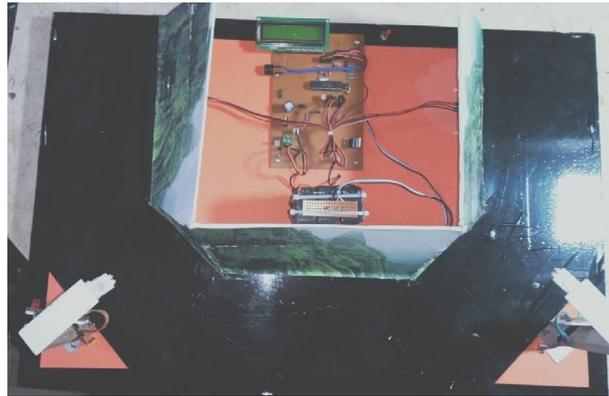
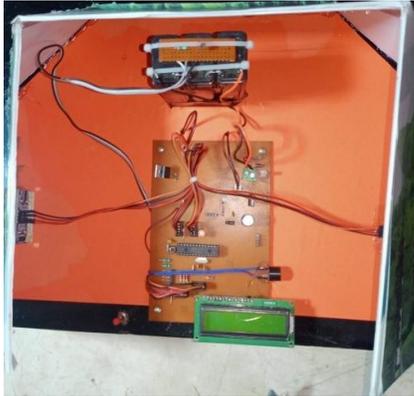
The Block diagram of proposed model is as above and its explanation is given below:

1. The system has to power source:
 - a. Solar power
 - b. External power supply as backup
2. The rectifier is used for converting Ac power to Dc power, because system works totally on Dc power and Filter is used for to provide Pure Dc power
3. The battery is used for storing the power for the system
4. The regulator is used to provide constant 5V Dc power for microcontrollers, Ultrasonic sensors etc.
5. The Aurdino or microcontroller 328p is the heart of the system. Three outputs go from the microcontroller LED indicators, Ultrasonic sensors and street lights etc.
6. The Oscillator is used to provide Clock pulse to the microcontroller
7. There are three indicators RED, YELLOW, GREEN to indicate status of the vehicle.

IV. FLOWCHART



1. Start.
2. Ultrasonic sensors which are placed on the other side of the road will detect the vehicle and give the signal to the microcontroller.
3. If the vehicle is coming from other side of road then ultrasonic sensor will give signal to microcontroller and YELLOW LED will glow the other side of road to indicate the vehicle is coming towards our side.
4. If the vehicle is coming from the wrong side of the road then the ultrasonic sensor will detect the large distance from the sensor and it will give the signal as per distance and LED turns RED.
5. If there is No vehicle coming from other side of road then ultrasonic sensor will give false signal to microcontroller and it will indicate GREEN LED to other side of road that there is no vehicle coming from other side road.
6. END



V. ADVANTAGES

1. The goal of the project is to reduce the number of accidents.
2. This system helps people to drive day and night carefully.
3. With the help of this system we can save thousands of lives.

VI. RESULTS

It implies the physical arrangement of the model. Two Ultrasonic sensors are kept at a set distance apart. The two sensors are used because the intention is to show that the vehicle is at a safe distance from the curve but that the vehicle is approaching. This can be accomplished by glowing the green LED light, and when the vehicle approaches the curve, it will glow the red LED light, alerting the driver on the other side. This contributes to the avoidance of the accident.

VII. CONCLUSION

The goal of this project is to reduce the number of accidents that occur on hilly and curved roads. This is accomplished by placing an Ultrasonic sensor on one side of the road before the curve and an LED light on the opposite side, so that if a vehicle approaches from one end of the curve, the sensor detects it and the LED light glows on the opposite side. We can save thousands of lives, including animals, by doing so.

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