

Intelligent Railway Crossing System

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Abstract -Objective of this paper is to provide safety of people and reduce train accidents taking place due to manual handling of the gates at railway crossing and also irresponsible behavior of the people. It includes many precautions and safety measures. Accident on railway crossing covers large percentage in train accidents. It also looks after the accident detection and takes actions related to that. It highly reduces time for which people have to wait at the railway crossing and wait for the signal to go green. Since the whole process is automatic human error is prevented. The whole process works on microcontroller based control. Here we have used AVR ATMEGA 16 MICROCONTROLLER.

Key Words: GSM Module, AVR ATMEGA 16, GPS Module, Image processor.

1. INTRODUCTION

Accident that is Collision of trains with automobiles, at railway crossing covers large percentage of train accidents. Accident causes loss of life and property. Train delay results in economical losses as well affects smooth functioning of train schedule. Accidents at railway crossing are mainly due to personal mistake that is irresponsibility of human being rather than train's mistakes. Accident at railway crossing leads to increased number of deaths, despite several measures taken by the authorities, the railway crossing are the bigger killers, although trespassing into railway track is punishable offence but then also no one cares. It has become a human habit; one can wait for long in cinemas, restaurants etc. but can't wait for crossing to be clear. Before going deep into the matter, we all must be well aware about the basic meaning of the term "level crossing". So, what is railway crossing?. railway crossing level is an intersection where a railway tracks or lines crosses a road or a highway at same level, this is called railway crossing. And the most important problem that is very difficult to minimize is the careless behavior of the passengers to cross the railway crossing even if the gate is closed and that's how the accidents takes place.

1.1. INTELLIGENT RAILWAY CROSSING SYSTEM

Most of the researchers have worked upon Railway crossing, some have tried to reduce the manual operation by designing railway crossing as total automatic opening and closing of gates and some have made intelligent railway crossing using load sensors etc. But still better technology is needed to minimize the accident. Here, this journal consists interfacing of automatic railway crossing with new technologies and trying to present something ahead of previous researches. It has been prepared keeping in mind all possible measures for safety of the people. Before going into detail lets have look upon the system setup.

2. ULTRASONIC SENSOR

Ultrasonic is a device that detect as well as measures the distance of an object from sensor using sound waves. It has four pins as shown in fig 1

- 1.VCC,
- 2.Trigger,
- 3.ground
4. echo.

Using Trigger Ultrasonic sensor transmits the Ultrasonic sound, which is a high frequency sound whose audible range is greater than the human hearing. It measures distance by transmitting Ultrasonic sound and then wait for listening the sound wave using echo pin. As the sound travels in air at a speed of 344m/s. So distance covered,

$$\text{Distance covered} = (\text{speed of sound} * \text{time taken}) / 2.$$

**Fig-1: ULTRASONIC SENSOR****Fig-3: GPS MODULE**

2.1.GSM MODULE

GSM (global system for mobile communication) is a standard that was developed for 2 G protocols. It is widely used mobile communication system. It is used to transmit voice and data services with a frequency of 850MHZ, 900MHZ etc.GSM modem is a type wireless modem devices that are used to communicate between GSM and Processor. It uses a SIM CARD to communicate with network. It can receive or make voice call as well as SMS. It uses GSM module using USB it gets connected with microcontroller. For power supply adapter is used.

**Fig-2: GSM MODULE**

2.2.GPS MODULE

GPS system (Global positioning System) is a navigation satellite which is run and maintained by government but freely available worldwide then used by GPS receiver. It is used to provide position and time information anywhere or near earth. The signals which are transmitted from the satellites is received by the receiver on or near earth. GPS uses satellite data to calculate accurate position on the earth.GPS module has to be connected with computer or smart Phone to work.

2.3. IMAGE PROCESSOR

It is also called as image processing engine. It is used to process the image. Image processing is a technique in which input is image, series of image or video etc and output may either be image or set of characteristics or parameter related to that image. It is a method to convert image into digital form and perform some already set signaling method to extract some useful information from it. Here image processor is used for Image retrieval that is Seek for the image of interest.

2.4. AVR ATMEGA 16 MICROCONTROLLERS

Atmega 16 is a 8 bit, 40 pin microcontroller of AVR family. Power consumption is very less. It is based on RISC (Reduced instruction set computing) architecture. It has 131 powerful instructions and most of the instruction can be executed in one machine cycle. It's maximum operating frequency is 16 MHZ. It has 32 input/output lines. Among these 32 it is divided into four ports of 8 bit. Here it is working as brain of project. This project consists of two Atmega 16 microcontrollers, one is at Railway crossing and other is at Train. Microcontroller is used for switching purpose. What, when and how it has to be done is decided by microcontroller.



FIG-4: ATMEGA 16 MICROCONTROLLER

3. PROPOSED SYSTEM

As the name, intelligent have been used everything is automatic. It consist of automatic opening and closing of gate, Using GSM and GPS it also keeping eye on the railway crossing as well as on railway track . The first action is performed by the ultrasonic sensors the will sense the arrival of the train and will activate the motors which will rotate and gate will be closed automatically whose block diagram is shown in Fig 5. And in the same manner open the gate when the train completely passes the railways crossing. We have also installed camera at the railway crossing whose image will be displayed to the train driver and in case of any obstacle stuck between the railway tracks will be displayed on the screen and if distance is appropriate to apply breaks the breaks will be applied. In case driver does not get time to apply breaks, he will honk and then also if way is not cleared then it is obvious that accident will takes place. We have also attached one ultrasonic sensor in front of the train. the distance between the train and the obstacle will be continuously displayed on the LCD and if the distance is 2 cm then automatically the brake will be applied, which results in decaying the speed of train. Since distance between object and train is reducing that results in reducing the distance at ultrasonic sensor. As the distance between object and train is equal to zero that means accident have taken place, and then immediately message is sent to the hospital using GSM to provide ambulance facility providing the position of the accident area using GPS whose block diagram is shown in fig 6. So, in this manner accidents can be reduced up to certain level and will be helpful in saving the life of many people.

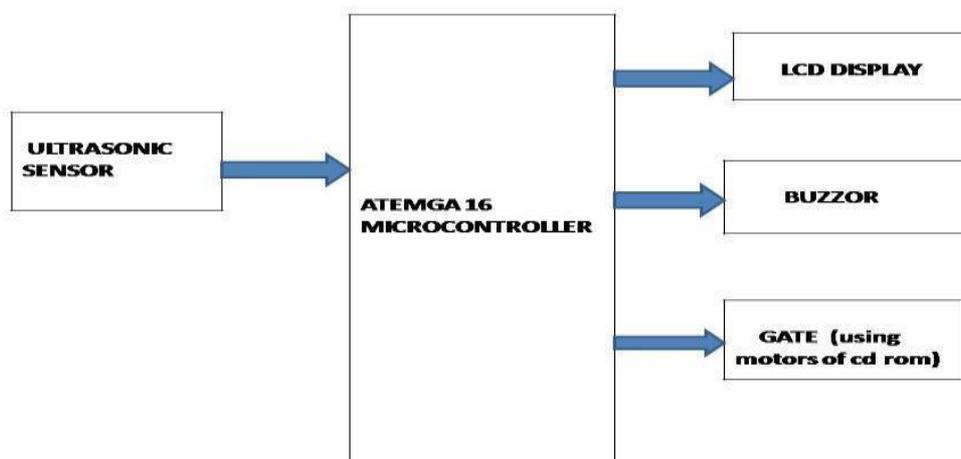


Fig-5: BLOCK DIAGRAM OF AUTOMATIC OPENING AND LOSING OF GATE.

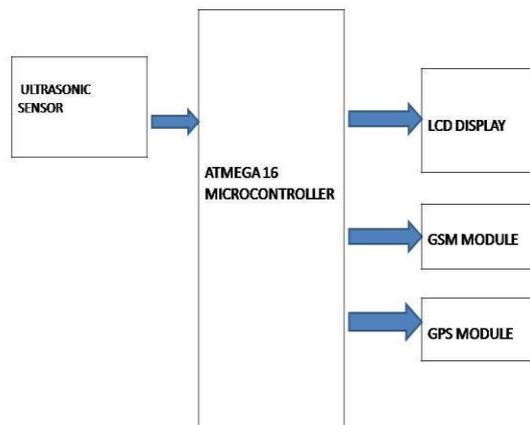


Fig-6: BLOCK DIAGRAM OF ACCIDENT DETECTION ON TRAIN.

4. CONCLUSION

The intelligent railway crossing system provide us with minimum chances of train accidents. Here we have used different equipment ideas and technology that all together helps to make it automatic. The automatic opening and closing of gates, then accident detection using GSM and GPS module and image processor that keeps a constant eye on railway crossing, all together makes the project reliable This project has been made keeping in mind each and every small mistake done by the people. If we compare the scenario of accident taking place at railway crossing then this effort will be effective and will greatly reduce the number of accident at the crossings

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