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Auto Sensing Railway Level Crossing Safety Alarm System Using Infrared

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ABSTRACT:This paper presents a concept of “AUTOMATIC LEVEL CROSSING SAFETY SYSTEM”. The main objective of this paper is to install the system in unmanned level crossing. It will make the road users aware of the train approaching the level crossing and reduce the risk exposure. Day-by-day accidents in the unmanned level crossing are increasing and no steps have been taken so far in these areas. By employing the automatic railway siren at the level crossing the arrival of the train is detected by the IR detector which is placed below the rails at about 3KM from the level crossing. Subsequently, the siren started to alarm. This system provides safety to the road users by avoiding the accidents and useful to the public.

KEYWORDS:IR Detector, Zener Diode, IC NE555, Battery, Speaker, LED

I. INTRODUCTION

Level crossing is one of the major causes of accidents. In spite of various measures taken by Railways, level crossing accidents have continued to occur too frequently. Level crossing is the place where track and road intersects each other at the same level .There is two types of level crossing Manned and Unmanned level crossing. When we go through the daily newspapers we come across many railway accidents occurring at unmanned level crossings. This is mainly due to the carelessness in manual operations or lack of workers. We come up with a solution for the same. Using simple techniques we tried to avoid the accidents at unprotected level. The approach of using infrared sensor opened up a wide array of advantages as opposed to the currently prevalent level crossing system. As infrared sensor are relatively cheaper and easier to fabricate which also being integration ,it decimates the possibility of causality occurring due to shortcoming to the existing of the manned level crossing ,which relays human unpredictability, there by rendering it a much more effective way of supporting vehicular movement.

II. RELATED WORK

There were many methods proposed for railway level crossing in order to safeguard the people to reduce the number of accidents occurred while crossing the railway gate.AcyM.Kottalil, Abhijith S, Abilash L J, Ajmal M M, AjithBabu proposed a ‘Automatic Railway Gate control System’ using Atmega16 microcontroller and IR sensor.This method consists of three sections such as microcontroller section, sensor section and servo motor section. The IR sensor is placed in both the side of the gate, sensor senses and sends the signal to the microcontroller. When no vehicle is sensed the microcontroller drives the motor to close the gates. But whenever the vehicle is sensed it alerts the train driver by means of red light from few kilometers to reach level crossing and after the obstacle is crossed the controller again drives the motor to reopen the gates. The 8051 microcontroller and IR sensor is implemented in ‘Automatic Railway crossing system ‘ by Akiriti and Upendra Prasad which also describes the working principle of the above proposed method. By replacing Atmega16 and 8051 microcontroller the PIC microcontroller can also be used along with IR sensor to design for an unmanned railway level crossing is explained in ‘Automatic Railway Gate Control System’ by Hnin Ngwe Yee Pwint , ZawMyoTun and HlaMyo Tun.’ Advanced Railway Accident Prevention System Using Sensor

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Networks' by M.D.Anil, S.Sangeetha, B.Divya, B.Nirajana, K.S.Shruthi explained that along with microcontroller and IR sensor the zigbee and fire sensors can also be used to alert the people from the occurrence of accidents. Instead of buzzer and IR sensor the ultrasonic sensor along with alarm generator is used so that when the obstacle is detected during level crossing the signal is send to the control unit where the red light glows suddenly the alarm generated to aware the public is explained briefly in ' Automatic Railway Gate Controlling system' by Saifuddin Mahmud, Ishtiaq Reza Emon and Md.MohaiminBillah.

III. PROPOSED METHODOLOGY

The proposed methodology consists of various parts which are IR Detector(receiver), Zener Diode, IC NE555, Battery(9V), Resistors, Capacitors, Speaker, LED (Light Emitting Diode).The IR detector is used to detect the arrival of train in therailway track which is installed below the rails. The IC NE555 is a timer IC which is used to set for how much time that the alert signal is delivered to the people.. During the arrival of train the IR detector sends the signal to the LED so that it glows and siren sound is dispatched fromspeaker which act as the warning signal for a period of time set in the timer. After the train crosses and the public can use that path. Thismethod is repeated for every time that the train travels through thatrailway track so that thenumber of accidents occurred while crossing the railway trackis avoided.

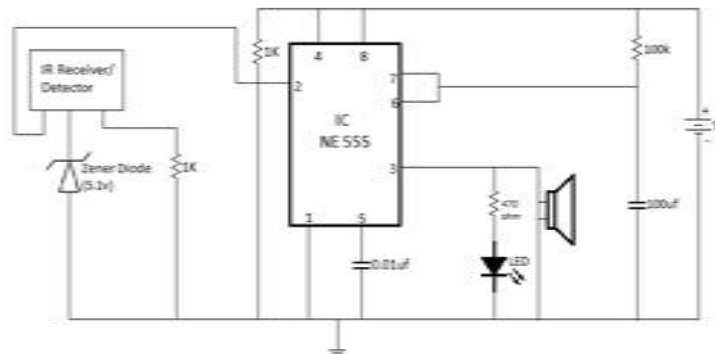


Fig.1: Block diagram of the system

Whenever the detector detects the train arrival it sends the signal to the Zener diode which is placed after the IR receiver/detector is provided to supply the constant voltage across the load resistance(1k),whereas the input voltage may be varying over a range. The timer acts as a burglar alarm so that when it receives the signal it makes the speaker to give alarm and LED also glows for time set in the timer to make aware of the arrival of train to the public which is explained in Fig.1.

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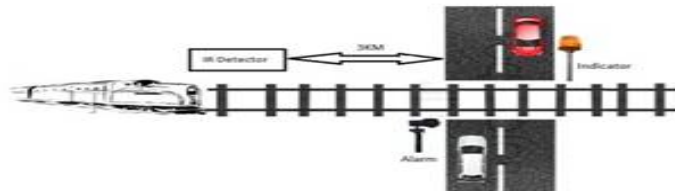


Fig.2: Architecture diagram

From the Fig.2 we can understand when the occurrence of train happens the speaker automatically alarm and the LED glows until the train crosses the track so that the road users will stop crossing the track.

Advantages of Proposed System:

- Simple to construct.
- Less expensive.
- It consumes less time to indicate the warning message.
- Reduces the count of accidents by alerting the people.

IV.EXPERIMENTAL RESULTS

This proposed method is practically experimented as the working model of real world level cross as shown in Fig.3. The major component used in this model are 80cm railway track, a toy train, IR detector, LED as indicator and alarm or speaker. The operation is that the IR detector is placed below the rails at about 3km from the level crossing. When the train passes through the detector and it is detected by IR which indicates the arrival of the train and sends the signal to the red LED as the indicator then therefore the siren started to alarm automatically. After the train crosses the level crossing the siren stops automatically.

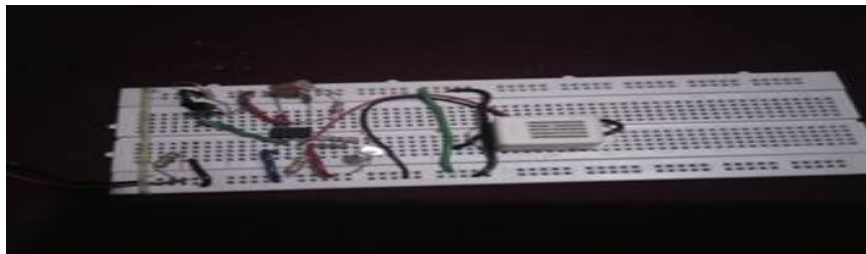


Fig.3: Construction of level crossing system

V.CONCLUSION AND FUTURE WORK

Accidents at unmanned level crossings are caused mainly due to trespassing by road vehicles across these on railway tracks. The proposed method works on a simple principle. Gatekeepers not necessary and automatic operation of automatic ON and OFF of the siren. And also this method avoids errors and provides ultimate safety to the road users. Automatic indication of the siren at unmanned level crossing is centred on the idea of reducing man work and prevents cars and humans from railway tracks. Automation of ON and OFF of the siren using the simple circuit reduces the accidents to a greater extend. In this method we are using IR sensor/detector the main limitation of using this IR is



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any obstacle in the way of sensor will be detected so it is better to use load sensor. We have not used the load sensor because it was not economically feasible. As a future scope our system can be implemented in real time by fixing the current limitations using new technologies.

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