Solar Powered Automatic Railway Crossing System

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Abstract-*This project provides solution for problems caused due to conventional railway crossing system. Out of total railway crossings about 42% are still unmanned, and the most accident prone areas lie in these crossings. Being a transport network with this much higher size, it is not possible for authorities to keep an eye at every crossing. On the other hand there is two major problems with Manned railway crossing, first is the road traffic has to wait for a long time before the arrival and even after departure of train and Secondly the accidents, that mostly occurs due to the carelessness of the road traffic or due to the errors caused by the gatekeeper. This project single-handedly deals with the both of these problems and can be implemented in unmanned level crossings at remote areas as well as at manned level crossing. The system works on a 8051 microcontroller based control. The arrival and departure of the train and the ongoing traffic is monitored through two sensors. According to the output given by sensor placed at arriving side microcontroller gives the signal to close the gate and a signal to open the gate after receiving signal from the departure side sensor.*
Keywords :Micro controller 8051, L293D motor driver, voltage regulator, DC motor, toy train

1. INTRODUCTION

Aim of this project is to control the unmanned rail gate automatically using embedded platform. In this project Micro controller Integrated Chip plays the main role. The program for this project is embedded in this Micro controller Integrated Chip and interfaced to all the peripherals. The timer program is inside the Micro controller IC to maintain all the functions as per the scheduled time. Motors are used for the purpose of gate control interfaced with current drivers chip L293D it is a 16 pin IC. This project utilizes two sensors one is fixed at arrival side of the railway gate and similarly the other pair is fixed at the departure side of the railway gate. Whenever a signal from arrival side of the system is detected, a buzzer is sounded for say five seconds and then the gates are closed. We will be using DC geared motor to open and close the gates. Now when the train is again detected at the departure side the gates are opened. We will be using L293D driver IC to control the motor i.e. open and close the gates.This project can be proven very efficient for unmanned railway crossing. Moreover it can provide a more reliable, fully automatic operation at manned crossings too.

In[1] author **HninNgwe Yee Pwint, ZawMyoTun, HlaMyoTun** says 'As a train approaches the railway crossing from either side, the sensors placed at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate'

In[2] author **Subrata Biswas, RafiulHoqueBhuiyan, SamiulHoque, Robiul Hasan, TanzilaNusrat Khan** says 'As atrain approaches at the railway crossing from either side, the sensors placed at a certain distance from the gate detect the approaching train and accordingly controls the operation of the gate. Also an indicator light has been provided to alert the driver of the train if any vehicle or living object gets stuck at the level crossing of the rail-line'

2. TECHNOLOGY

In this project Micro controller Integrated Chip plays the main role. A micro-controller can be compared to a small stand-alone computer; it is a very powerful device, which is capable of executing a series of pre-programmed tasks and interacting with other hardware devices. Being packed in a tiny integrated circuit (IC) whose size and weight is usually negligible, it is becoming the perfect controller for robots or any machines requiring some kind of intelligent automation. A single microcontroller can be sufficient to control a small mobile robot, an automatic washer machine or a security system. Any microcontroller contains a memory to store the program to be

executed, and a number of input/output lines that can be used to interact with other devices, like reading the state of a sensor or controlling a motor.

A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices and are increasingly used for other lighting. Introduced as a practical electronic component in 1962, early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelengths, with very high brightness.

LM293 is a 14pin IC consisting of four independent operational amplifiers (op-amps) compensated in asingle package. Op-amps are high gain electronic voltage amplifier with differential input and, usually, a single-ended output. The output voltage is many times higher than the voltage difference between input terminals of an op-amp.These op-amps are operated by a single power supply **LM324** and need for a dual supply is eliminated. They can be used as amplifiers, comparators, oscillators, rectifiers etc. The conventional op-amp applications can be more easily implemented with LM324.

3. BLOCK DIAGRAM AND WORKING

Railways being the cheapest mode of transportation are preferred over all the other means when we go through the daily newspapers we come across many railway accidents occurring at unmanned railway crossings. This is mainly due to the carelessness in manual operations or lack of workers .We in this project have come up with a solution for the same. Using simple electronic components we have tried to automate the control of railway gates. As a train approaches the railway crossing from either side, the sensors placed at a certain distance from the gate detects the approaching train and accordingly Considered 5 seconds for this project. Sensors are fixed at 1km on both sides of the gate. We call the sensor along the train direction as 'foreside sensor' and the other as 'after side sensor'. When foreside receiver gets activated, the gate motor is turned on in one direction and the gate is closed and stays closed until the train crosses the gate and reaches aft side sensors. When aft side receiver gets activated motor turns in opposite direction and gate opens and motor stops. Buzzer will immediately sound at the fore side receiver activation and gate will close after 5 seconds,so going time to drivers to clear gate area in order to avoid trapping between the gates and stop sound after the train has crossed.

Present project is designed using 8051 microcontroller to avoid railway accidents happening at unmanded railway gates, if implemented efficiently. This project utilizes two powerful IR transmitters and two receivers; one pair of transmitter and receiver is fixed at upside (from where the train comes) at a level higher than a human being in exact alignment and similarly the other pair is fixed at down side of the train direction. Sensor activation time is so adjusted by calculating the time taken at a certain speed to cross at least one compartment of standard minimum size of the Indian railway. We have considered 5 seconds for this project. Sensors are fixed at 1km on both sides of the gate. We call the sensor along the train direction as 'foreside sensor' and the other as 'after side sensor'. When foreside receiver gets activated, the gate motor is turned on in one direction and the gate is closed and stays closed until the train crosses the gate and reaches after side sensors. When aft side receiver gets activatedmotor turns in opposite direction and gate opens and motor stops. Buzzer will immediately sound at the fore side receiver activation and gate will close after 5 seconds, so giving time to drivers to clear gate area in order to avoid trapping between the gates and stop sound after the train has crossed.
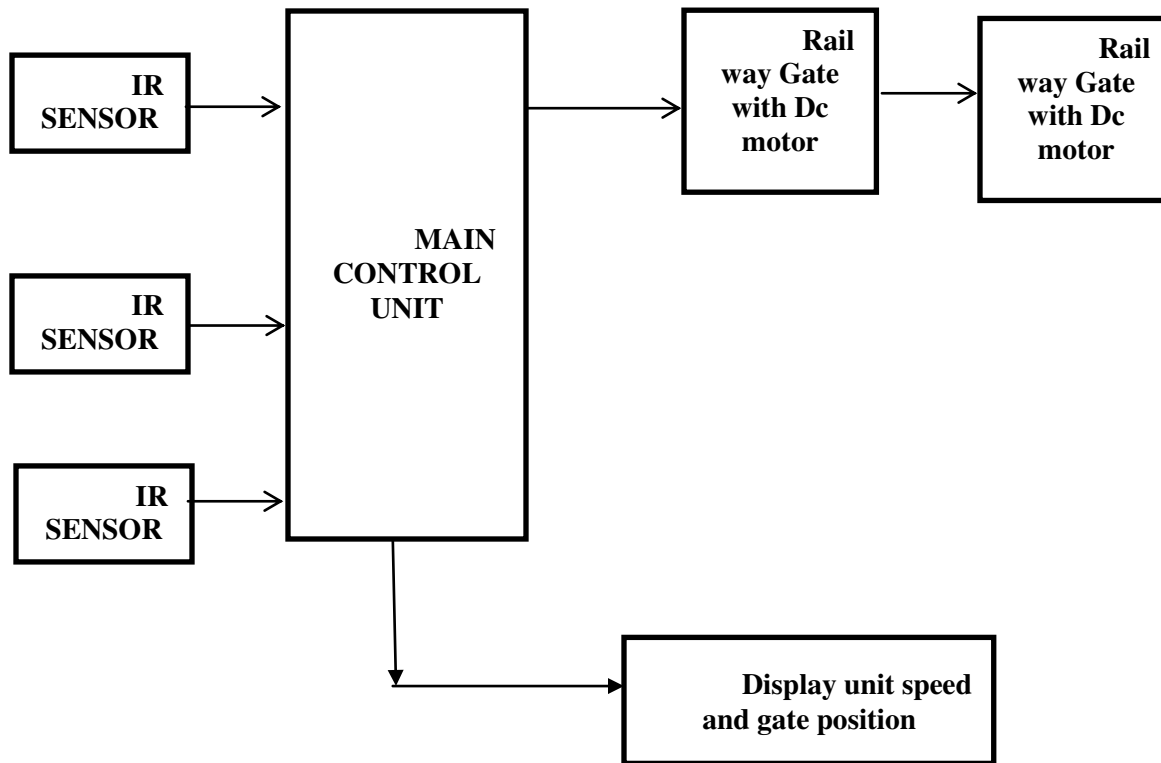
Fig1: Block Diagram of Solar Powered Automatic Railway Control System

A level crossing occurs where a railway line is intersected by a road or path on one level, without recourse to a bridge or tunnel, It is a type of at grade intersection. The term also applies when a light rail line with separate right-or-way or reserved track crosses a road crossing, railroad crossing, road through railroad, train crossing or gate crossing.

It deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept closed. And secondly, to provide safety to the road users by reducing the accidents that usually occur due to carelessness of road users and at times errors made by the gatekeeper's. In this paper we are concern about automatic gate control of railway crossing.

4. FUTURE SCOPE

The project has great scope of future enhancement and implementation with different enhancements. With some modifications it could be used for several different purposes in future. Some of them are-
1. In future, accident prevention system facilities can also be added.
2. Chances to trap vehicle can be avoided by sensor and signal to the train.
3. Sometimes this system fail to operate so it gives the signal to authorized person.

5. CONCLUSION

From the above discussion and information of this system we, upto now surely comes to know that it is highly reliable effective and economical at dense traffic area, sub urban area and the route where frequency of trains is more.

As it saves some auxiliary structure as well as the expenditure on attendant it is more economical at above mentioned places than traditional railway crossing gate system. We know that though it is very beneficial but it is

also impossible to install such system at each and every places, but it gives certainly a considerable benefit to us, thereby to our nation.

6. REFERENCES

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