

IR SENSOR BASED DIGITIZED RAILWAY CROSSING BARRICADE

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ABSTRACT

This project is developed in order to help the Indian Railways in making its present working system a better one, by eliminating some of the loopholes existing in it. This project is designed to avoid railway accidents happening at unattended railway gates, if implemented in spirit. Provide an automatic railway gate at a level crossing replacing the gates operated by the gatekeeper for reducing of time for closing and opening the gate, higher reliability as it is not subjected to manual error and provide safety to the road user by reducing the accidents. Railway crossing barricade here is controlled by embedded system and a pair of IR sensors. This is basically deployed for reducing accidents, saving time and reducing human efforts. Further this paper include seven parts in total. Part I consist of introduction of Indian Railways. Part II consists of working principle of IR sensor based digitized railway crossing barricade. Part III consists of scientific procedure. Part IV contains description of components used to make this project. Part V contains further implementations which could be added in this project. Part VI contains benefits and applications of this project. Part VII concludes the complete paper.

I INTRODUCTION

The Indian Railways (IR), quite one hundred fifty year recent, is one among the most important and oldest systems within the world, lovingly referred to as by the individuals as the 'Lifeline of the Nation'. With an intensive network unfold across the country, Asian nation Railways play a key role within the social and economic development of India. IR may be a principal mode of transportation for long run freight movement in bulk, long distance traveller traffic, and mass public transit in residential district areas. It occupies a novel position within the socio-economic map of the country and is taken into account as a vehicle and measuring instrument of growth. Railway transport occupies a big role within the transport system of a rustic as a result of the event of trade, business and commerce of a rustic for the most part depends on the event of railways. It facilitates long distance travel and transport of large merchandise. It encourages quality of labor and there by provides scope for employment. In terms of energy and setting, movement by train is associate order of magnitude superior as compared to road transport. With high-speed trains, rail transport may complete favorably with air. Railway board vide letter no.-2010/E&R/3400/1 dated eleven.05.2010 has prompt following areas for analysis are already identified- serious haul technology, High speed technologies, Material sciences for railway connected composites as well as rubber, polymers and insulation

materials .The present government(2014) is emphasizing on digitization of the country and hence, the digitization of Indian railways.

II. WORKING PRINCIPLE

The automatic railway barricade of level crossing system is used for opening and closing of the barricade automatically. In this system the train which is coming will be detected with the help of the IR sensor i.e., when the communication link between the IR transmitter and IR sensor of infrared rays is broken, then the relays which work on the low power signal gets activated which then activate the further circuitry along with the microcontroller which is controlling the stepper motor. When foreside receiver gets activated, the stepper motor is turned on in one direction and the barricade is closed and stays closed until the train crosses the barricade and reaches after side sensors. When after side receiver gets activated motor turns in opposite direction and barricade opens and motor stops.

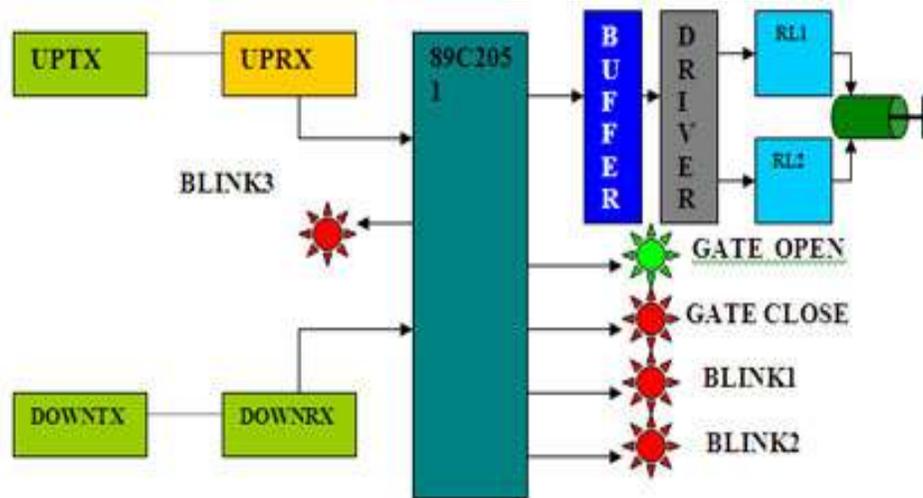


Fig.1: Block diagram of IR sensor based digitized railway crossing barricade system.

III. SCIENTIFIC PROCEDURE

This paper is written to provide information of the project which is designed using AT89S52 microcontroller to avoid railway accidents happening at unattended railway gates, if implemented in spirit. 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 after 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 giving time to drivers to clear gate area in order to avoid trapping between the gates and stop sound after the train has crossed.

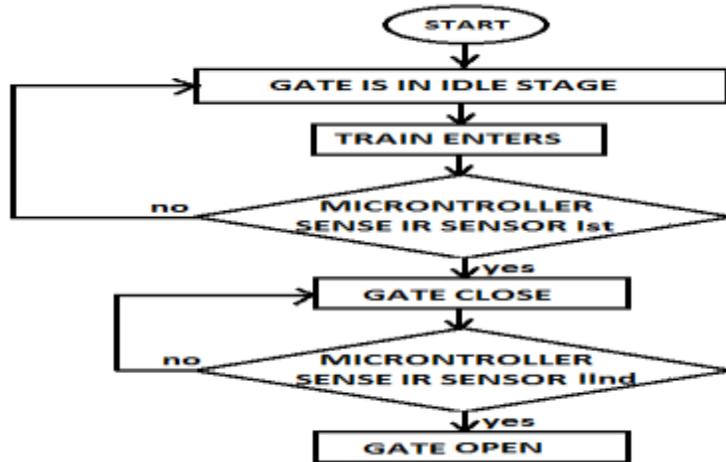


Fig.2: Flow Chart of the Procedure

IV. COMPONENT DESCRIPTION

4.1 IR SENSOR: An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

4.2 MCU AT89S52: The AT89S52 is a low-power, high performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The on chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer.

4.3 STEPPER MOTOR: Stepper motors provide a means for precise positioning and speed control without the use of feedback sensors. The basic operation of a stepper motor allows the shaft to move a precise number of degrees each time a pulse of electricity is sent to the motor.

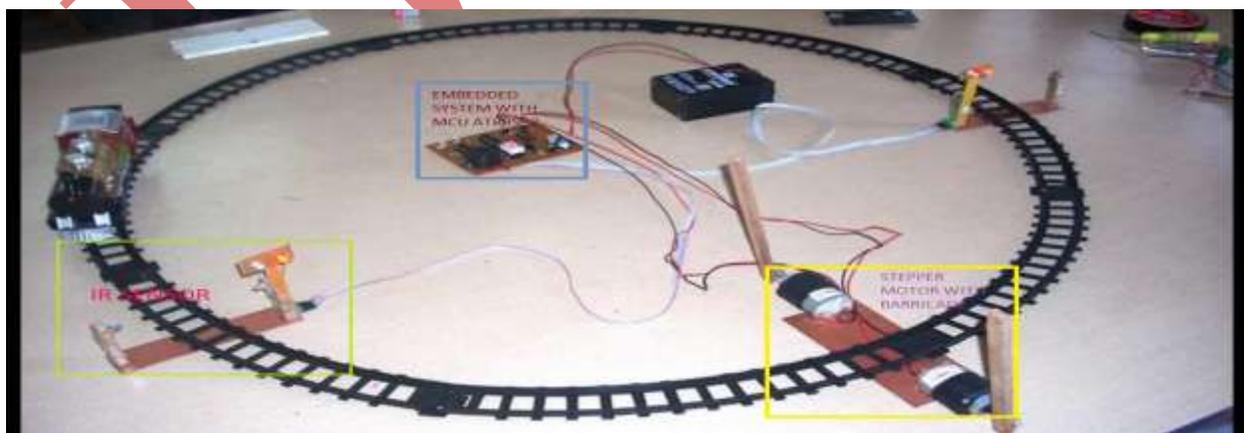


Fig.3: Circuit Diagram of the Project

V. FURTHER INNOVATION

Based on the responses and reports obtained as a result of the significant development in the working system of INDIAN RAILWAYS, this project can be further extended to meet the demands according to situation:

- This can be further implemented to have control room to regulate the working of the system. Thus becomes the user friendliness.
- This circuit can be expanded and used in a station with any number of platforms as per the usage.
- Additional modules can be added without affecting the remaining modules. This allows the flexibility and easy maintenance of the developed system. This system consists of following features over manual system. There is no time lag to operate the device.
- This circuitry can be further used to display a message over LCD for awareness of people about the status of the train.
- A sound system basically a siren, can be implemented with the help of this circuitry placed near the railway crossing to aware the common crowd around the railway track.
- A traffic light system can also be placed near the crossing and operated by this circuitry.

VI. BENEFITS AND APPLICATIONS

- (i) Time Saving
- (ii) Reducing accidents
- (iii) Reducing human efforts
- (iv) Digitizing the Indian railway system
- (v) For the development of the country
- (vi) For safety purpose in malls
- (vii) In seminars halls/ auditoriums for entry and exit purpose

VII. CONCLUSION

IR sensor based railway crossing barricade is an innovative step to digitized INDIAN railway and hence to digitized the whole country. This is used to reduce accidents, for saving time and to reduce human efforts. This will in turn help in the development and economic growth of the country.

REFERENCES

- [1].<http://www.applied-motion.com/video/intro-amps-ip65-rated-motors-motordrives>