

# Advanced Railway Signalling System

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**Abstract-** As growth in the railway sector is increasing the train traffic density is also increasing. This has resulted in the increase in the train accidents. To avoid this we have to design the system which will reduce the train collision. This paper presents the solution to avoid the train collision. The proposed system includes several features which avoid train accidents like crack detection using IR sensor, obstacle avoidance using ultrasonic sensor, gate controller using RFID. The goal of this paper is to deal with the control arrangement of railroad entryway utilizing 89s52 microcontroller.

**Keywords-** RFID, Sensor, Python

## I. INTRODUCTION

The Indian Railways has the world's fourth largest railway network in the world, after that of the United States, Russia and China. It is one of the world's largest commercial or utility employers, with more than 1.6 million employees. About 15000 trains work every day. Unfortunately there have been many accidents involved in the railways. As the major part of the public transport system railway is serving millions of passengers and carrying tones of goods everyday. The railway provides a better alternative to other modes of transport by being energy efficient since it can carry large number of people and goods at same time. As a result, the railways had groven over the year and also the number of people using it. It contributes a lot in are economy. It is there responsibility to have a good management system for good customer Services. Therefore, it is necessary for the management to make the train journey safe and reliable. The old signalling and operating system sometimes make wrong operation which causes severe train accidents with a huge number of casualties. The objective of this project is to build a RFID based Railway Signalling System with 89S51microcontroller.

This system provides athe security in four ways by automatic gate opening/closing system at track crossing, signalling for the train driver, obstacle avoidance, crack detection. The main idea is to design a system to avoid the collision of train due to disoperation. We are using python for keeping the database.

## II. PROBLEM STATEMENT

The aim of this paper is to be able to avoid Train Accident and Indian Railway Technology. These particular topic our choose because of Railroad related accidents and landslides are more dangerous than other transportation accident in terms of severity and death rate etc. Therefore more efforts are necessary for improving safety of railway system. There are many railways crossing which are unmanned due to lack of manpower needed to fulfil the demands because of which many accidents are happened in a day to day life.

## III. LITERATURE SURVEY

IR crack sensing module and a communication module based on GSM technology are used to give the information about the location of the crack to a central location enabling the immediate attention and intervention of maintenance personals [1]. Two IR sensors are fixed in front of the train which is used to find out the crack on the rail. Both the sensors gives the constant sensed output. If anyone misses their output condition to fail then there is defect on that side and it will inform this by giving alarm. Ultrasonic sensor is also used to measure the distance of a crack[2]. Train collision accidents that take place in platform, alert people about the train arrival which makes the use of microcontroller, ZigBee and LEDs[3]. RFID reader detects wrong Unique code automatically speed of the train is slow and stop. Uses Wi-Fi, RTSU act as a wireless base station and provide internet connection to trains [4]. A railway track switching system detects the train path to avoid the train collision using a microcontroller [5]. RFID tag is used to detect the station in which the train is present and this data is processed and send it to the display by using microcontroller. Automatic announcement has been implemented using voice Integrated Chip. RFID tag encoded with station name is fitted in the railway stations [6]. Automatic railway gate control using sensor and microcontroller. Sensor placed at certain distance from the gate provides the signal to the gate to close the gate automatically and an indicator light alerts the motorist about the train approaching [7].

## IV. SYSTEM ARCHITECTURE

The present project is designed to satisfy the security needs of the railways. The automatic gate opening and closing system is provided with the RFID where the RFID reader is placed on to beside of platform and tag is on the train which gives the train entering status to the embedded controller at the gate to which they are connected.

The gate operates as per the received signal from RFID. The train driver always observes the signals placed beside the track. The green light denotes that the track is free and red light denotes the track is busy or damaged. These signals are controlled based on the train position which is sensed by using the RFID. IR sensor is used for track crack detection. When an object is close to the sensor, the light from the LED bounces off the track and if the

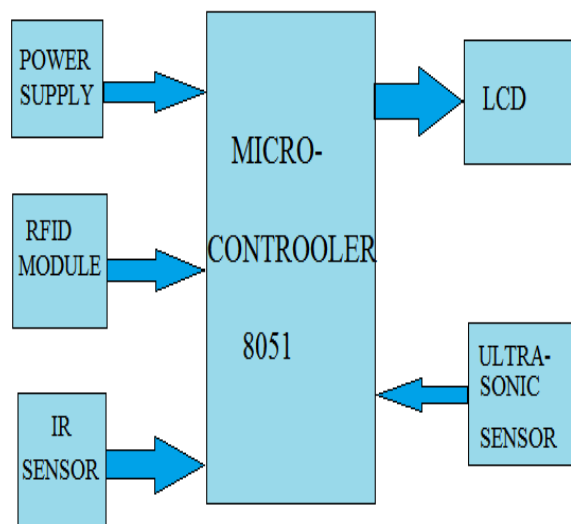


Figure 1.

crack is present on the track then reflected light cannot be detected by the light sensor. Ultrasonic sensor is used for obstacle avoidance. When two trains are coming on a same track or any object is comes in front of train then the train will get stop at a particular distance to avoid accident.

## V. HARDWARE DESIGN

### A. Microcontroller

AT89S52 microcontroller is a small electronic structure. We are using 'AT89S52' which belongs to a 8051 microcontroller family manufactured by Atmel. Features of AT89S52 like a low-power as well as high-performance CMOS 8-bit microcontroller with 8Kbytes. All four ports in the AT89S52 are bidirectional. Each ports consist a separate latch, an output driver and an output buffer. AT89S52 has a

high flexibility. It is a perfect solution for many embedded application.

### B. IR sensor

It works by using a specific light sensor to detect a select light wavelength in the Infrared (IR) spectrum. by using an LED which produces light at the same wavelength as what the sensor looking for, we can look at the intensity of the received light. When the sensor is near to the object, the light emitted from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.

### C. Ultrasonic sensor

Ultrasonic sensor is a device which is used to measure the distance to the object by sending sound waves or radio waves. It generates high frequency sound waves and evaluates the echo which is received back by the sensor. To determine the distance to an object, Sensors calculate the time interval between sending the signal and receiving the echos from that object. This sensor is fitted in front of train engine to detect any obstacle present on track with in the line of sight. It sends appropriate signal to train control system, which in-turn stops train immediately if an obstacle is detected

### D. DC motor

It is used to open or close railway gate when train is approaching or leaving the gate.

### E. RFID (Radio Frequency Identification)

It uses electromagnetic field . The tags contain electronically stored information..RFID system uses 3 components which are given as RFID tag/smart lable, an RFID reader, antenna. RFID tags are nothing but the integrated circuit and antenna are used to transmit the data to the reader then reader converts the radio waves into a data which is more usable. Information is collected from the tags is given to the microcontroller.

## VI. RESULT

This paper introduced a low cost, low power, embedded system for railway accident control system. We discuss the design of proposed safety system for railway using AT89C52 and RFID which is used to control the gate. By using RFID system become easily implementable and follows simple procedures to perform operation at low operating costs. In addition to this we are using python which keep the record

of things that happened in railway system. Ex. railway accidents, entering and leaving status of the train from station. It can be accessed only by authorized person.

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## VII. CONCLUSION

This paper introduced a low cost, low-power embedded system for railway accidents control system. In this paper, we discuss the design of proposed safety system for railway, using AT89S52 Microcontroller of Atmel as hardware platform.

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