iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 6 **Issue:** III **Month of publication:** March 2018

**DOI:** http://doi.org/10.22214/ijraset.2018.3060

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887*
*Volume 6 Issue III, March 2018- Available at www.ijraset.com*

# Implementation of Advance Techniques in Railways

Raghav Agarwal[1], Sahaj Kumar[2], Sankalp Rastogi[3], Shivam Kumar Singh[4], Balwant Singh[5]
[1, 2, 3, 4]*UG Student, Dept. of ECE, IMS Engineering College, Ghaziabad, Uttar Pradesh., India*
[5]*Assistant Professor, Dept. of ECE, IMS Engineering College, Ghaziabad, Uttar Pradesh, India[*

***Abstract:** One of the most devastated railways across the globe is that of India and we owe this to our poor railway network and outdated technologies. Day to day delays, thousands of lives of innocent people lost and huge loss of capital were the driving forces for us to execute this project. This project proposes economical solutions to the problems faced by our railway network with reduced human intervention. Our project incorporates RF technology for improved crack detection, object detection and display signals on driver's dashboard. There has been an urge to expand the transportation systems since eternity. Railway, one of the major public transportation systems had faced the heedless waves of rapid expansion which has led to negligence on many levels. Today, government is unable to cope up with ever increasing passenger and freight traffic and deal with this mess. This has made railways unsafe not only for the people but also for the staff working for railways. Railways are prone to both delays and accidents which make it unsafe to travel.*

***Keywords:** RF module, Cab signaling, Crack detection, AT89S52 microcontroller, Sensors.*

## I. INTRODUCTION

The Indian railway network is the largest rail-passenger transportation system and it is now the backbone of the country's transport infrastructure. In India, railway network is responsible for carrying out most of the commercial transportation because it is the cheapest mode of transportation among all other means such as flight, bus etc.

The Indian economy is increasing at a very fast pace resulting in exponential increase in demand for rapid transportation and as a consequence, there is a very huge rise in the volume of traffic in the Indian railway network.[1] Problem in our railway network starts in the very primary requirement needed to run railways i.e. railway tracks. We are still forced to use the tracks build during the reign of Britishers.

Deteriorating tracks are results of various factor is of improper maintenance i.e. tracks are not repaired at the time when small cracks are developed. Other factors which contribute in the degradation of tracks include climatic factors, natural disasters and some anti-social elements present in our society. Apart from the above mentioned problems, railway also suffers from outdated technologies. For e.g. - During foggy conditions, there is no means for railway drives to interpret the signal ahead which ultimately result in slowing of trains and cause them to undergo a lot of delay.

## II. LITERATURE - SURVEY

To cope up with above problems we broadly use two technologies for our project

### *A. RF Signaling*

Traditional signaling system detect trains in discrete sections of the track called blocks, each protected by signals that prevent a train entering an occupied block.[2] In RF signaling, our system works as the basis of RF technology . Whenever a signal turns red, it sets ON the RF transmitter fitted in it. The transmitter constantly transmit RF signal informing about a red signal. Now every train needs as receiver circuit in it. When receiver circuit comes within a certain range of the RF transmitter, it receives the input and sends it to the microcontroller. The microcontroller then processes this data in order to notify the driver about signal ahead.

### *B. Crack Detection*

1) *Using Infrared Sensor:* The principle involved in the crack detection of railway tracks through IR sensor includes an LED which emits infrared rays and is called IR transmitter. The transmitted light is received by IR receiver on adjacent side. The IR transmitter and receiver must be in line of sight so that transmitted light is not lost and falls on receiver directly. Then the LCD display can be used to view result.[3]

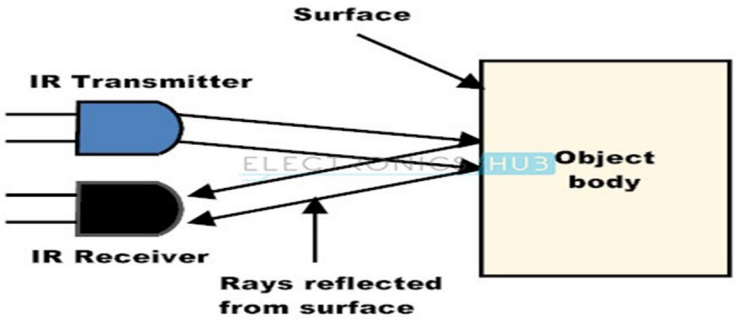



Fig. 1 Working of Infrared Sensor

*2) Using Ultrasonic Sensor:* In this method of crack detection, sound waves are used for detection of crack or any object. The sensor works by sending out a sound wave at a specific frequency and listening for that sound wave when it bounces back. The transmitter and receiver are not needed to be aligned in a single direction because it has only one module that has both transmitter and receiver [4].

Here a sound wave of specified frequency is transmitted which falls back on the module after sometime, the crack can be detected using the data collected and the variation studied.

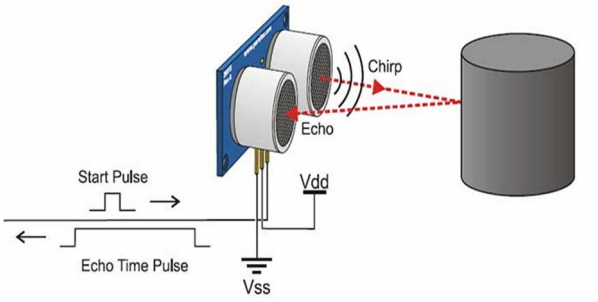



Fig. 2 Working of Ultrasonic Sensor

*3)* Using LED LDR Sensor: In this method, crack detection is done using LED & LDR. LED is attached to one side of rails and LDR to another. In this operation, when there is no crack then light from LED does not fall on the LDR and its resistance is high. But if crack is detected then light from LED deviates causing change in resistance and hence will provide crack detection.

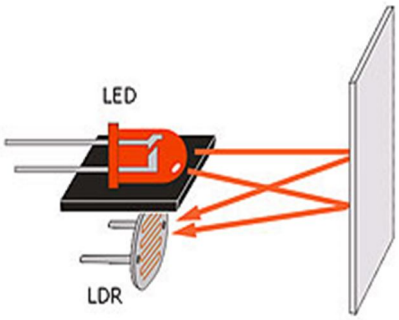



Fig. 3 Working of LED LDR Sensor

*C. Comparison Among Various Sensors*

*1) Ultrasonic Sensor*

*a) Advantages*

*i)* They are designed for contact free detection.

*ii)* Accurate detection of even small object.

*b) Disadvantages*

*i)* It has a minimum sensing distance.

*ii)* Affected by change in environment (Temp, Humidity, etc.)

*2) Infrared Sensor*

*a) Advantages*

i) Can detect Infrared Light over a large area.

ii) Uses non visible light for detection.

*b) Disadvantages*

*i)* Very Sensitive to IR light & sunlight

*ii)* Weakness to darker color (Black).

## III. PROPOSED WORK

In this proposed system, we are aiming to achieve signaling, i.e. the signals will be displayed on the dashboard of locomotive. This will help the driver to easily drive the train in low visibility conditions as it will show the STOP signal or GO signal on the dashboard itself.

A pair of RF module, encoder – decoder, led indicator & microcontroller are implemented in the project.

There are basically two section involved in the project :-

### *A. Transmitter section*

In this section, signals are transmitted from signaling pole to the dashboard of locomotive. Firstly, the signal from the pole is encoded with the help of encoder (HT12E). Now, this encoded signal is transmitted through RF transmission module.

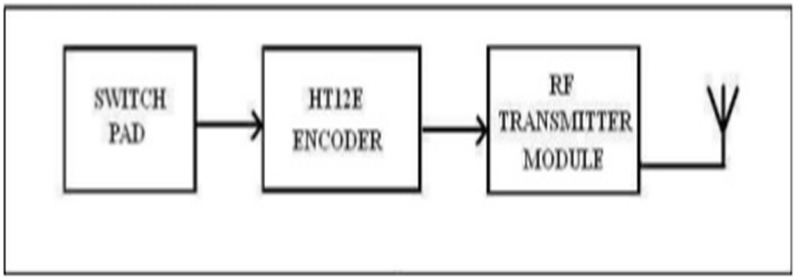



Fig. 4 Block Diagram of Transmitter Section

### *B. Receiver Section*

The transmitted RF signal is first received by RF receiver module and is forwarded to decoder (HT12D) to decode the incoming signal .This decoded signal is supplied to AT89S52 microcontroller for interpretation whether it is a STOP (Red) signal or GO (Green) signal. Then the corresponding led turns on indicating the driver about the signal.

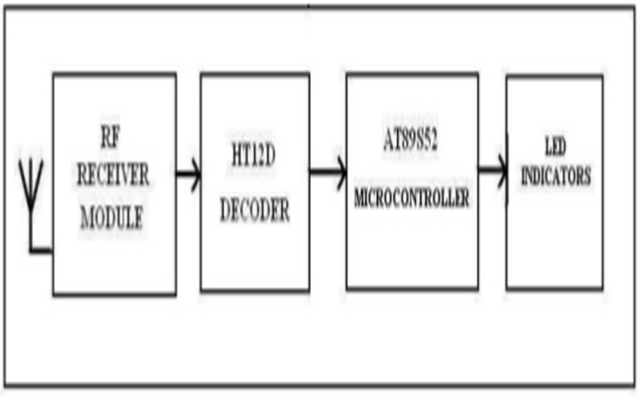



Fig. 5 Block Diagram of Receiver Section

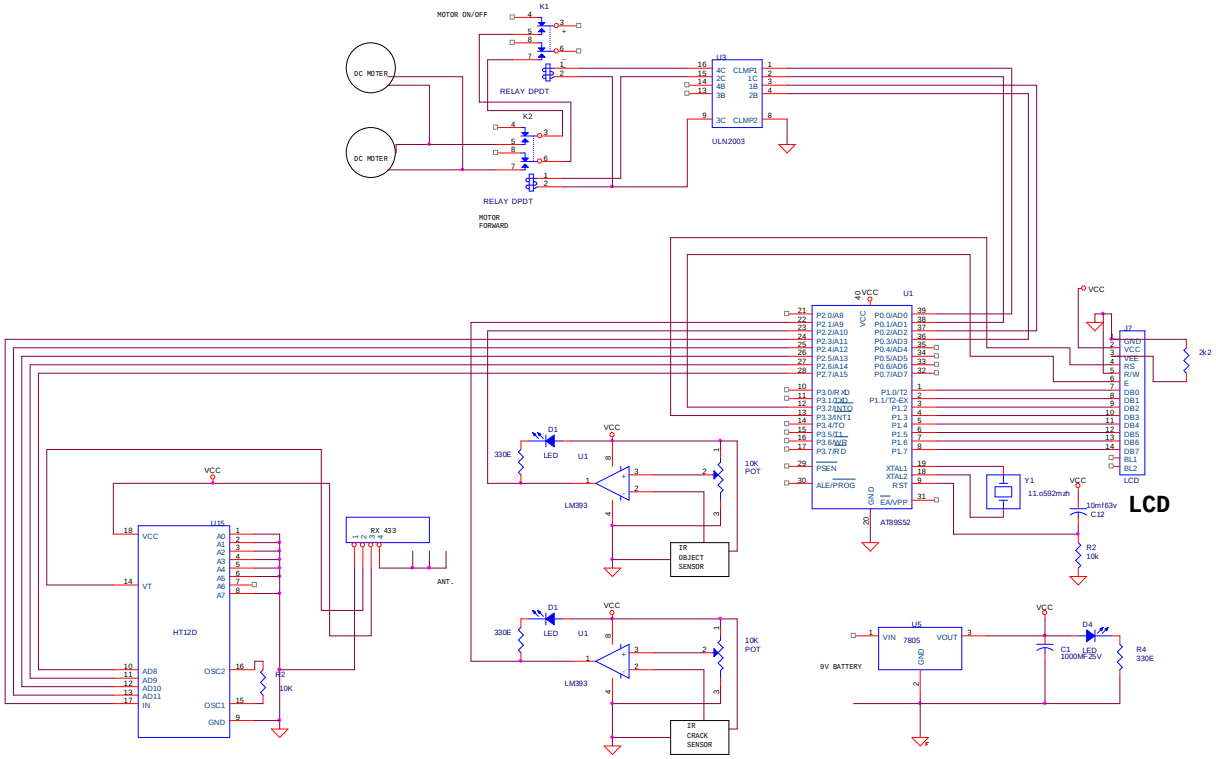


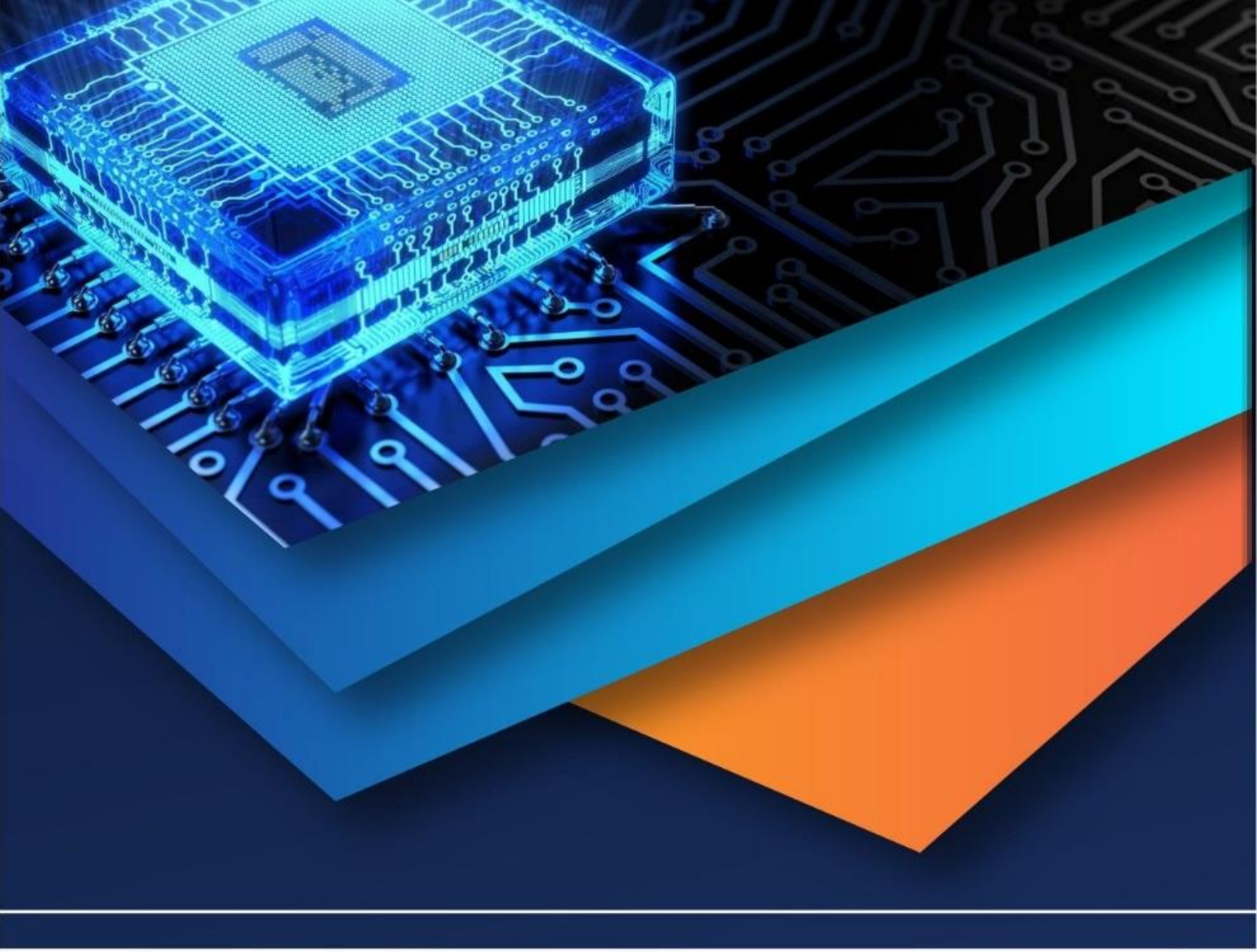

Fig. 6 Circuit Diagram of Proposed System

## IV. CONCLUSION

The proposed system helps in providing in low cost, fast and reliable solution to problems related to trains. The functioning of train becomes more efficient and proper even in low visibility. It also helps in reduction in train accidents and collisions.

## REFERENCES

[1] " International Journal Volume 96 - no. 25 June 2014 Title- Railway Security System Based On Wireless Sensor Network - State Of Art" , Author - Kalpana Sharma, Jagdish Kumawat, Saurab Maheshwari, Neeti Jain.
[2] https://en:wikipedia.org/wiki/Communications_based_train_control.
[3] Review on railway track crack detection using IR transmitter and receiver. [Rakesh V. Pise, Parag D Nikhor, Prof. Avinash H. Shelon]
[4] S. Sam Jai Kumar, T. Joby Titus, V. Ganesh, V.S. Sanjana Devi "Automatic Crack Detection using Ultrasonic Sensor."



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY