



TRAIN TRACK FAULT DETECTION SYSTEM

Prof.Swati.D.Patil¹, Prof.Pallavi.M.Taralkar²

^{1,2}Professor, Dept. of E & TC Engineering, Maharashtra, India

Abstract

The Transportation of train always depends on railway tracks (rails) only. If there is a crack in these rails, it creates a major problem. Most of the accidents in the train are caused due to cracks in the railway tracks, which cannot be easily identified. Also it takes more time to rectify this problem. In order to avoid this problem, we are using the crack detector robot, which detects the crack in the rails and gives an alarm. A robot is an apparently human automation, intelligent and obedient but impersonal machine. It is relative, that robots have started to employ a degree of Artificial Intelligence (AI) in their work and many robots required human operators, or precise guidance throughout their missions. Slowly, robots are becoming more and more autonomous. Use of robots gives accurate and correct results compared to human interference. This system involves the design of crack finding robot for finding cracks in railway tracks. System uses controller for interfacing the robotic vehicle and crack detection sensor. The sensing device senses the voltage variations from the crack sensor and then it gives the signal to the microcontroller. The microcontroller checks the voltage variations between measured value and threshold value and controls the robot according to it. The robotic model is interfaced with the microcontroller with the help of SPDT relays and driver IC. If any crack occurs in the rail, the robot will be stopped and then an alarm will be raised.

Keywords: Track, Vehicle, Detection, Buzzer, Signal, Control, Network etc

1.INTRODUCTION

In India most of the commercial transport is being carried out by the railway network and therefore as any problem occurred during transportation the

major damage is getting occurred to the economy-non withstanding a social life.It is the fourth largest railway networking the world exceeded only by those of the United States, Russia and China. The rail network traverses every length and breadth of India and is known carry over 30 million passengers and 2.8 million tons of freight daily. Though rail transport in India growing at a rapid pace, the associated safety infrastructure facilities have not kept up with as previously Mentioned. The principle point of the present exploration work is to outline and create a strong safety framework for train tracks that can avoid accidents and give data on mischance. These days trains accident cases are higher than any other Time, it has gotten to be fundamental to give train tracks superb safety system with fault detecting technique. Train track fault detection system guarantees the best ensure to secure your train track from various types of faults. It is a train track security system that offers fantastic insurance to train and track. Framework is based on Zigbee. The outline and framework is inserted in robot. Train track fault is detected by robot and the framework send information about fault to base station. After that the buzzer is the signal to the base station. Infrastructure facilities have not kept up with as previously mentioned.

The principle point of the present exploration work is to outline and create a strong safety framework for train tracks that can avoid accidents and give data on mischance. These days trains accident cases are higher than any other time, it has gotten to be fundamental to give train tracks superb safety system with fault detecting technique. Train track fault detection system guarantees the best ensure to secure your train track from various types of faults. It is a train track security system that offers fantastic insurance to train and track. Framework is based on zigbee. The outline and framework is inserted in robot. Train track fault is detected by robot and

the framework send information about fault to base station. after that the buzzer is the signal to the base station.

1.1 Proposed Work

This system involves the design of crack finding robot for finding cracks in railway tracks. This system uses controller for interfacing the robotic vehicle e and crack detection sensor. The sensing device senses the voltage variations from the crack sensor and then it gives the signal to the microcontroller. The microcontroller checks the voltage variations between measured value and threshold value and controls the robot according to it. This project uses regulated 3.3V Power supply the project is suitable for Indian scenario The system can be operated at tunnels also, without interruption. IRsensors are used for obstacles detection.

1.2 Block Diagram

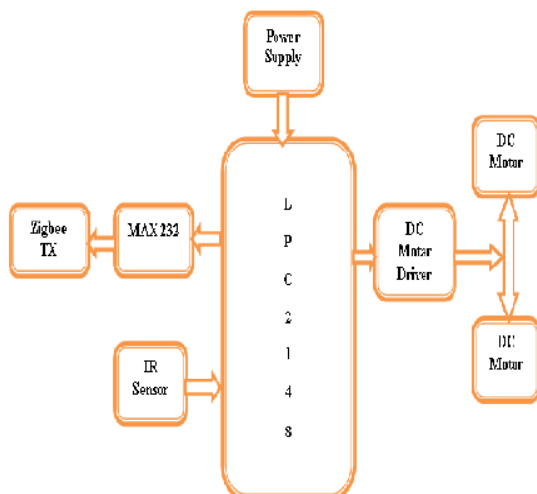


Fig.1Block Diagram of Robot

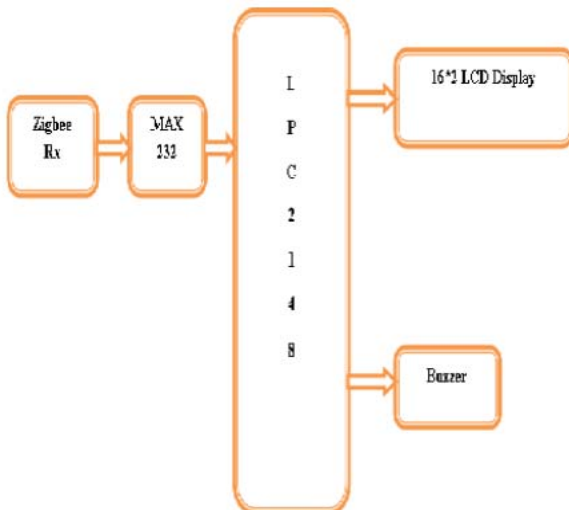


Fig.2 Block Diagram of Base Station

2. COMPONENT DESCRIPTION

Component Description contains the features and specifications of the microcontroller, Zigbee, IR Sensor.

2.1 Microcontroller:

- 10 bit successive approximation analog to digital converter.
- Measurement range of 0 V to VREF
- Each converter capable of performing more than 400,000 10-bit samples per second.
- Every analog input has a dedicated result register to reduce Interrupt overhead.
- Burst conversion mode for single or multiple inputs.
- Global Start command for both converters (LPC2142/44/46/48 only).

2.2 ZIGBEE:

- ZigBee is a standard that defines a set of Communication protocols for low-data-rate short range wireless networking.
- ZigBee-based wireless devices operate in 868 MHz, 915 MHz and 2.4 GHz frequency bands.
- The maximum data rate is 250 K bits per second.
- ZigBee is targeted mainly for battery-powered applications where low data rate, low cost, and long battery life are main requirements.

2.3 IR Sensor:

- Very low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Component in accordance to RoHS 2002/95/EC And WEEE 2002/96/EC

3 HARDWAER & SOFTWARE REQUIRED

3.1Hardware Requirement:

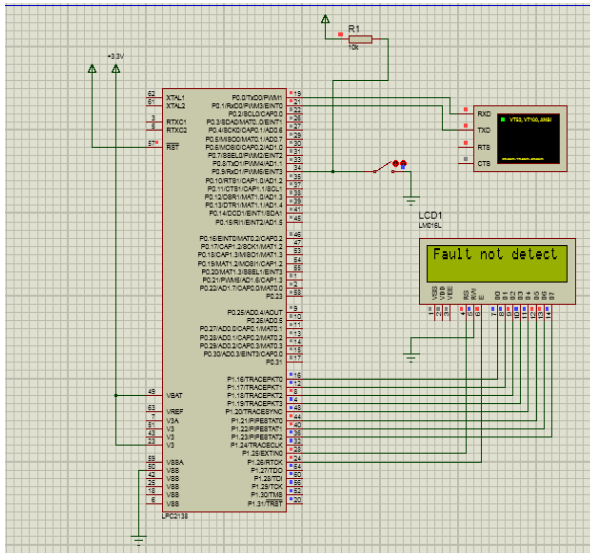
- □ Microcontroller unit
- Crack detection sensor (IR SENSOR)
- Interfacing unit
- □ Robot Mechanism

3.2Software Requirement:

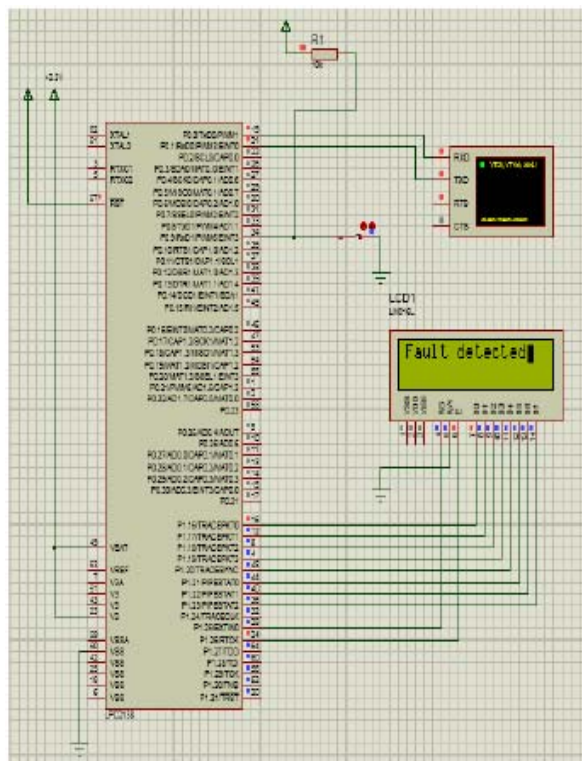
- □ Eagle-required for the circuit design and PCB layout.
- □ proteus7-required for simulation of project.

4 RESULTS

When fault is not detected:



When Fault is detected:



5 CONCLUSIONS

Cracks in rails have been identified to be the main cause of accident in the past. Hence, solution of this problem, using robot to detect the cracks in railway track and when robot detect the fault it sends the message to base station. This system automatically detects the faulty rail track without any human interaction. There are many advantages with the proposed system when compared with the traditional detection techniques. The advantages include less cost, low

power consumption and less analysis time. By this proposed system the exact location of the faulty rail track can easily be located.

FUTURE SCOPE

By using various sensor networks techniques we also develop more and more reliable security systems applications, in which continuously monitors the railway track through the sensors and detect any abnormality in the track. By using GPS in this system we can monitor position of railway and display on digital map. Enhance features of GPS includes video feature, trace mode, history track.

REFERENCES

- [1] V.Reddy, "Deployment Of An Integrated Model For Assessment of Operational Risk in Railway Track",2007.
- [2] C. Esveld, "Modern Railway Track". Second Edition, MRT Productions. 2001
- [3] D.Hesse "Rail Inspection Using Ultrasonic Surface Waves"Thesis, Imperial College of London,2007.
- [4] C. Campos-Castellanos, Y.Gharaibeh, P.Mudge *, V. Kappatos, "The Application of long Range Ultrasonic Testing (LRUT) For Examination Of Hard To Access Areas On Railway Tracks". IEEE Railway Condition Monitoring and Non Destructive Testing (RCM2011)
- [5] A.Vanimiredd, D.A.Kumari "Automatic Broken Track Detection Using LED-LDR Assembly" International Journal of Engineering Trends and Technology (IJETT) - Volume4 Issue7- July 2013.