iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** I **Month of publication:** January 2017

DOI:

www.ijraset.com

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

Volume 5 Issue I, January 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Op-amp based railway track crack detection System with GSM technique

Siddhant Patil[1], Anand Muley[2], Avinash Shelar[3]
[1, 2]Students of Electrical (E&P) Engineering, DES'sCOET Dhamangaon Rly, Maharashtra, India
[3]Assistant Professor, Electrical (E&P) Engineering, DES'sCOET Dhamangaon Rly, Maharashtra, India

Abstract : ***In the rapidly flourishing country like ours, accidents in the unmanned level crossings are increasing day by day no fruitful steps have been taken so far in these areas. In India, we find that rail transport occupies a prominent position in providing the necessary transport infrastructure to sustain and quench the ever-burgeoning needs of a rapidly growing economy. Today, India possesses the fourth largest railway network in the world. However, in terms of the reliability and safety parameters, we have not yet reached truly global standards. The principal problem has been the lack of cheap and efficient technology to detect problems in the rail tracks and of course, the lack of proper maintenance of rails which have resulted in the formation of cracks in the rails. Railway track security is most important part of railways. Very few techniques have been implemented concerning the crack detection in track. In this paper we are developing a fully automated system for reducing a cracking problem which is based on op-amp with GSM technology for communication purpose. Here the microcontroller is interfaced with op-amp, GSM modem, Liquid Crystal Display (LCD) and real time clock (RTC) to monitoring the track during whole working time. The Op-amp is used to determine the cracking problem by comparing two different voltage levels then it gives the signal to the microcontroller. The microcontroller process on receiving signal and give command to LCD to display the cracking message on screen. It immediately gets the exact location information using Global System for mobile (GSM) and sends that location and crack information to the control section. And the control section displays the exact location. The Liquid Crystal Display (LCD) is used to display the current status of the system***
Keywords: Flourishing, Burgeoning, Infrastructure, Microcontroller, Operational Amplifier, Liquid Crystal Display (LCD)

I. INTRODUCTION

India is a very fast developing country and thus the Indian Railways. But though the use Indian railways are increasing day by day, the numbers of accidents are also increasing and that too occurred by derailments or the improper surveying of the railway tracks. The main reasons for these derailments are the cracks occurred in the railway track due to many reasons such as rusting of tracks through dirt, worn out of rails because improper welding of tracks and corrugations and rolling contact fatigue (RCF) initiated problems. If the cracks are undetected and if any action is not taken on that cracks then the small crack also can make a very big issue, it can take many lives. Indian railways are one of the largest railway networks of the world. Despite the huge size, the rampant negligence and lack of maintenance have created a number of problems.

The main problem being that, frequent cracks are found in the rail lines. Because of this accidents are occur frequently which cause derailments leading to huge loss of life and property. To appoint any person there is not affordable and feasible for railway department. Another reason is that such a crossing is present at very remote places surrounded by hilly areas and forests. So to maintain such cracks we made plan to make project by which, if the cracks is found it is detected by sensors and automatically the message will be send to nearby station master and control room using GSM. In this project, whenever that train passes over the track, the Cracks are detected with the help of current Sensor.

II. LITERATURE SURVEY

Which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. Application areas include transducer amplifiers, dc gain blocks and all the conventional op amp circuits which now can be more easily implemented in single power supply systems. In the linear mode the input common-mode voltage range includes ground and the output voltage can also swing to ground, even though operated from only a single power supply voltage.

Volume 5 Issue I, January 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

A. Micro-Controller

It is a low power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash Programmable and Erasable Read Only Memory ROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the MCS-51. Instruction set and pin out. The on chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, it provides a highly flexible and cost effective solution so many embedded control applications.

B. LCD Display

Liquid Crystal Display, which is commonly known as LCD, is an Alphanumeric Display it means that it can display Alphabets, Numbers as well as special symbols thus LCD is a user friendly Display device which can be used for displaying various messages unlike seven segment display which can display only numbers and some of the alphabets. The only disadvantage of LCD over seven segment is that seven segment is robust display and be visualized from a longer distance as compared to LCD. Here we have use d 16 x 2 Alphanumeric Display, which means on this display we can display two, lines with maximum of 16 characters in one line.

C. Real Time Clock (RTC

The DS1307 serial real-time clock (RTC) is a low power, full binary coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially through an I2C, bidirectional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information.

D. Memory Block

When larger amounts of static data are to be stored (such as in USB flash drives) a specific type of EEPROM such as flash memory is more economical than traditional EEPROM devices. EEPROMs realized as arrays of floating-gate transistors. EEPROM is user-modifiable read-only memory (ROM) that can be erased and reprogrammed (written to) repeatedly through the application of higher than normal electrical voltage generated externally or internally in the case of modern EEPROMs.

E. *GSM Modem*

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. Here we are using it only for transmitting and receiving the messages. GSM wireless data module is used for remote wireless applications, machine to machine or user to machine and remote data communications in many applications. Microcontroller sends AT commands to GSM modem and accordingly it operates.

F. *Power Supply*

For our project we require + 5 Volt, and +12 Volts supply. +5 Volts and. 5Volts is given to Micro-controller board, RF modem, memory, real time clock etc. +12 Volts are used to drive the relay.

G. Block diagram

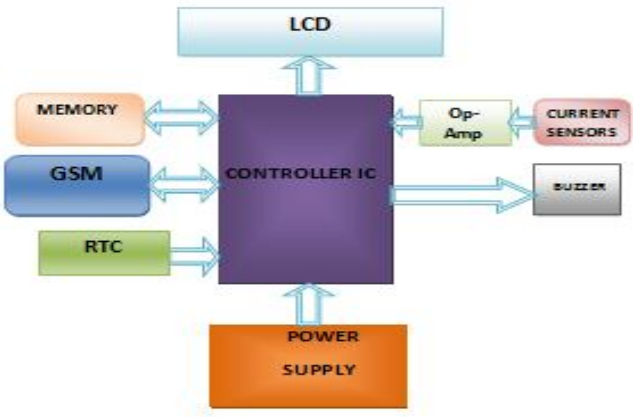


Fig. 1 Transmitting Section

Volume 5 Issue I, January 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Fig. 2 Receiving Section

III. METHODOLOGY

In this system op-amp play a vital role that helps to identify the cracks in railway line. Here use LM358 op-amp that is connected to resistive network and in another terminal, apply reference voltage. The core of the proposed crack detection arrangement consists of a op-amp as comparator assembly that functions as the rail crack detector. The principle involved in crack detection is the perception of comparison of voltage level at input of comparator. In the proposed design, +5V volt will be attached to both side of the rail tracks and +2.5V set as reference voltage for inverting terminal of comparator and non-inverting terminal is connected to the track. Suppose there is no crack in the main line then it gives a predefine voltage or the Comparator output is high and display continuously shows the “No Crack Found” but due to crack in the line voltage changes & non-inverting pin voltage level goes down less than+ 2.5V then comparator output goes low, immediately . Output of op-amp is applied to microcontroller. After this the crack message “Crack Detected” are shows on LCD screen with pole no. Using GSM modem can find out whole information of the track whether the track has gap. The GSM transmitter is connected at transmitting section then by using this transmitter the crack message are transmit to receiver where the receiving system are available at nearest control station or railway station. Another indication for inform to the user that is buzzer. The buzzer & LED indicator are connected to microcontroller through the relay driver circuitry which turns on the buzzer & LED when relay receive the signal from microcontroller.

A. Advantages

It is fast detection application
Accurate crack detection possible
Network connection is highly reliable.
It will avoid accidents and manpower.

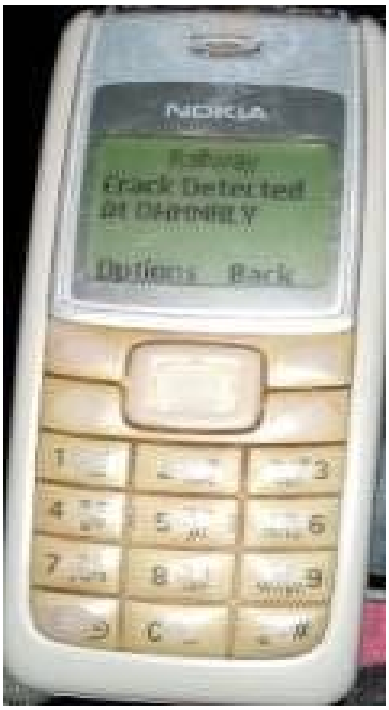
B. Application

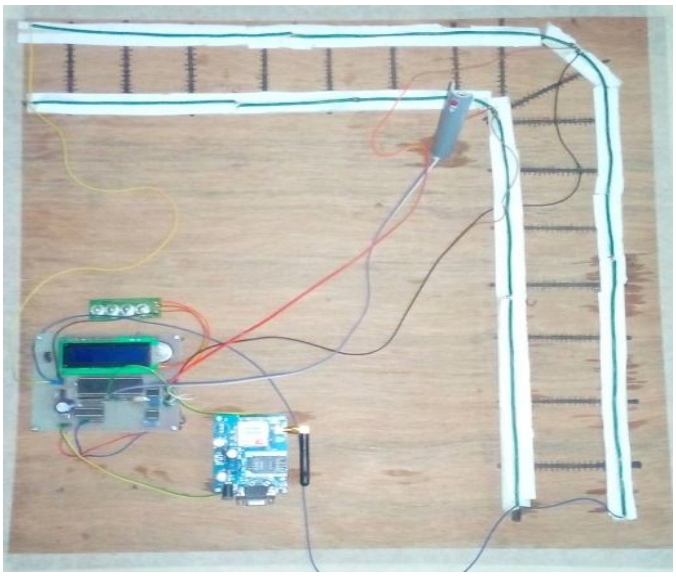
For Track security purpose this system is very necessary so after installation the cracking problem is reduced & prevents the use from accident.
In naxalite area the blast on railway track triggered by the naxalism, by using this system the cracking information are inform at nearest control station.
At railway bridge where the manually maintenance is very difficult at this place this system is very beneficial

IV. RESULTS

This technique is totally automated which can monitoring the track at every time, after instilling this system the overall problem related track cracking is mightily reduces and provide a better protection to safe transportation of railway.

Volume 5 Issue I, January 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)





V. CONCLUSION

The accidents are avoided at places where, the CRACKS are found or detect in the track using current Sensor and SMS is send immediately at the nearby Station. And it is found that all the Sensors are working properly and it initiates, trigger message or alert message immediately to the nearby Railway Station. It also Updates, the signally system of railway so that, driver can take immediate action over it.

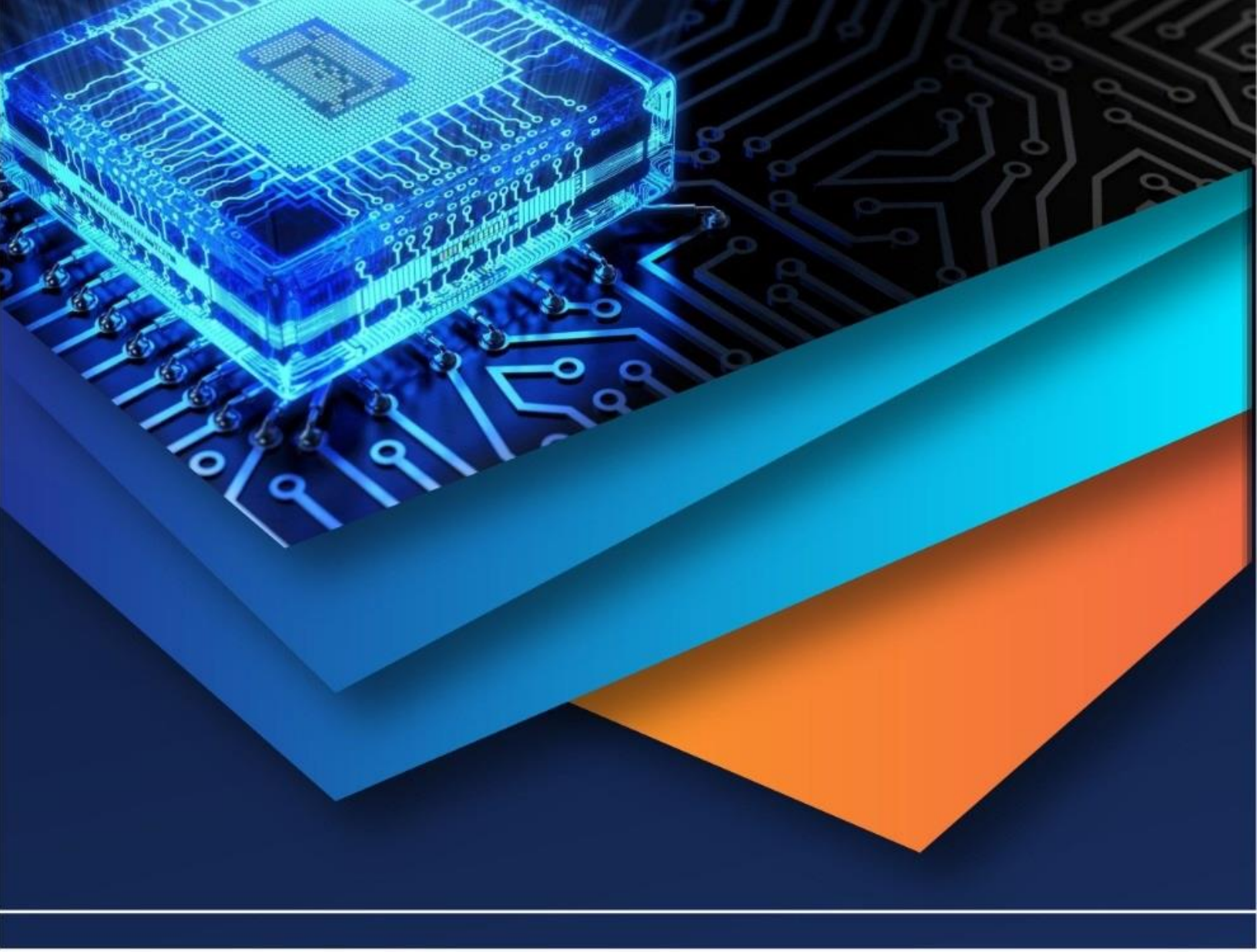
REFERENCES

[1] G. Tarnai, "Safety verification for train traffic control communications", IEEE journal on selected areas in communications, vol. sac-4, no. I, (2012) October, pp. 1118-1120.
[2] K. Vijayakumar, S.R. Wylie, J. D. Cullen, C.C. Wright, A.I. Shammaa, " Non invasive rail track detection system using Microwave sensor", Journal of App. Phy., vol. 9, iss. 11, pg. 1743-1749, June 2009

[3] Qiao Jian-hua; Li Lin-sheng; Zhang Jing-gang; "Design of Rail Surface Crack- detecting System Based on Linear CCD Sensor", IEEE Int. Conf. on Networking, Sensing and Control, vol. 14, no. 4, pp. 961-970, April 200
[4] Ravi Shankar Shekhar, Purushottam Shekhar, Ganesan P, "Automatic Detection of Squats in Railway Track", IEEE Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems. vol. 3, iss. 6, pg. 413-413 December 2015
[5] R.J. Greene, J.R. Yates, E.A. Patterson, "Rail Crack Detection: An Infrared Approach to In-service Track Monitoring", SEM Annual Conference & Exposition on Experimental and Applied Mechanics, vol. 112, nos. 23, pp. 291301, May 2006
[6] Selvamraju Somalraju, Vigneshwar Murali, Gourav Saha, Dr.V.Vaidehi, "Robust Railway Crack Detection Scheme (RRCDS) Using LDR Assembly," IEEE Int. Conf. on Networking, Sensing and Control, vol. 6, iss. 3, pg. 453-460 , May2012

BIOGRAPHIES

Mr. SIDDHANT B. PATIL
Contact No – 7875352889
Email-Siddhantpatil39@gmail.com
Bachelor in Electrical (E&P) Engineering,
DES's College of Engineering, Sant Gadge Baba Amravati University(2017)



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY