# RAILWAY TRACK CRACK DETECTION AND ALERT SYSTEM USING ARDUINO

**B. SREEVALLI, D. HEMALATHA, D. SINDHU, K. SAJAL KUMAR** Department of ECE, Narayana Engineering College (Autonomous), Gudur, AP, India
**Mrs. CH. MANJUSHA** Associate Professor, Department of ECE, Narayana Engineering College (Autonomous), Gudur, AP, India : valli2000ece@gmail.com, manjusha.chinta1@gmail.com

***ABSTRACT***
*In India, rail is quite possibly the most every now and again utilized methods for transport, the fourth biggest railway assemblage on the planet. Albeit the Indian railways are going through an excellent blast, a portion of the fundamental issues, for example, the issue at the door crossing, the fire fiascos and the issue out and about that stays unattended and causes derailment, stay beset. Because of changes in the season the inclines contract and expand. Therefore, cracks on the track can create. This proposed framework identifies the cracks and obstructions on the track by means of sensors and utilizations a GSM and GPS module to alarm the control room through a SMS. The primary goal is to recognize the cracks on the railway track to keep away from train mishaps because of derailment. This model proposes a financially savvy answer for the issue of railway track crack detection using ultrasonic sensor get together which tracks the specific area of flawed track, then, at that point illuminate to close control room through SMS, so numerous lives will be saved.*
**Keywords**: Arduino Uno, Ultrasonic sensors, GSM Module, GPS Module, DC Gear Motors.

## I.INTRODUCTION

The Indian Railway network is the fourth biggest in the world with a course length of 67,368 Kilometers (41,861 mi), a absolute track length of 121,407-kilometer (75,439 mi) and 7,349 Railway stations. In contrast with the worldwide guidelines, the Indian railway networks does not have the wellbeing framework causing incessant derailment bringing about extreme loss of human lives. In the year 2016-17, India has seen the most elevated demise cost in the decade because of derailments and out of which 90% were because of cracks in the railway tracks . Hence, there is a need to resolve this issue of crack detection in railway tracks with the most extreme consideration because of the recurrence of the utilization of railway lines. Because of the manual railway line checking and sporadic support, there is a high possibility that these cracks are by and large ignored. Henceforth, there is a requirement for computerized frameworks to investigate and recognize the cracks in the railway lines. A large portion of the current frameworks are outfitted with Light Dependent Resistor (LDR) and Light Emitting Diode (LED), the disadvantages with these sorts of frameworks are the sensors need to be adjusted inverse to one another to recognize the cracks. In our work, we have utilized a solitary module ultrasonic sensor, which has both transmitter and beneficiary addressing arrangement issues.

The fundamental issue is that there is no solid and reasonable hardware to analyze train track issues and the absence of legitimate support. The appropriate working and upkeep of transport framework, in any case, fundamentally affects the economy. This model talks about a proposed test train plan for distinguishing impediments and cracks, like the line following the test train.To overcome this issue multiple techniques have been proposed which involve graphical inspections, Non-destructive testing (NDT) technologies such as magnetic field methods, radiography, fiber optic sensors of various kinds, use of LDR[1] etc. Another composite detection framework is proposed which comprises of laser source, an advanced preparing CCD camera and an oversight framework. These current frameworks for detection of crack are either not extremely exact or a bit of unwieldy interaction. The essential target of the proposed work is to foster a minimal expense breakage detection arrangement of railway tracks utilizing ultrasonic sensors and send the area data to the approved faculty for additional activity.

## II. LITERATURESURVEY

**Shailesh D. Kuthe, Sharadchandra A. Amale, Vinod G. Barbuddhye "Modern Method for Detecting Cracks In Railway Tracks By The Efficient Utilization Of Ultrasonic Sensor System"**

 Copyright @ 2021 Authors

In the proposed design, the LED will be attached to one side of the crack sand the LDR to the opposite side. During typical activity, when there are no cracks, the LED light doesn't fall on the LDR and consequently the LDR obstruction is high. Accordingly, when the LED light falls on the LDR, the obstruction of the LDR gets diminished and the measure of decrease will blare generally relative to the power of the episode light. As an outcome, when light from the LED veers off from its way because of the presence of a crack or a break, an unexpected reduction in the opposition worth of the LDR results. This adjustment of opposition demonstrates the presence of a crack or some other comparative underlying deformity in the rails. To recognize the Existing area of the gadget if there should be an occurrence of detection of a crack, a GPS recipient whose capacity is to get the Existing scope and longitude information is utilized. To convey the got data, a GSM modem has been used.

**V.Muralidharan, V.Dinesh, P.Manikandan "An Enhanced Railway Track Crack Detection System",**

This strategy is utilized for outside of base station. Estimating distance between two rail tracks IR sensors are utilized to recognize the crack in the track. In the event that anybody seeking after on the track implies they stop the studying work IR sensors used to distinguish the crack in railway track. Two IR sensors are fixed before the train is utilized to discover the crack on the rail. Every sensor will create the sign related situation with the rail.

**Sadhana Gawade,Sandhya Solunke, Supriya Nimunkar, Yogita Survase "CRACK DETECTION SYSTEM FOR RAILWAY TRACK BY USING ULTRASONIC AND PIR SENSOR"**

In this task we presented the incorporation of ultrasonic and absolute station for railway track calculation looking over framework. this venture comprise of GPS module, GSM modem, IR sensor, PIR sensor for utilization of correspondence reason, crack detection and finding of individual present in the railway track. The GPS module and GSM modem assist us with finding and sending railway mathematical boundary of crack detection to closest railway station.

## III. PROPOSED SYSTEM

We use Arduino UNO board in this proposed system. Arduino is an integrated open source development environment, which simplifies coding considerably. The system proposed is consisting of an ultrasonic sensor designed to detect cracks and IR sensors used to detect obstacles. The motor controller L293D helps to power the DC motors. The Arduino controller is primarily used for controlling the sensor outputs and is used for the transmission of information through GSM module, the purpose of which is to send the signal to the base station whenever a crack or obstacle is detected via an SMS. Using the GPS module, the exact latitude and longitudinal direction of the faulty track is obtained.

### A. BLOCK DIAGRAM:

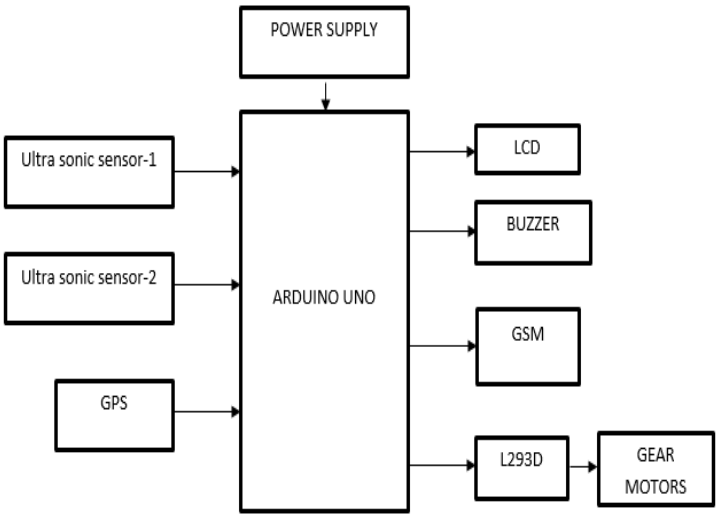



Fig . Block diagram


Copyright @ 2021 Authors

**HARDWARE REQUIREMENTS:**

- Arduino Uno(ATMega 328P)
- Ultrasonic sensors
- L293 Driver circuit
- DC Gear Motors
- GPS Modem
- GSM Modem
- Buzzer
- Battery
- LCD

**SOFTWARE REQUIREMENTS:**

- Software IDE
- C Language

**B. FLOW CHART:**

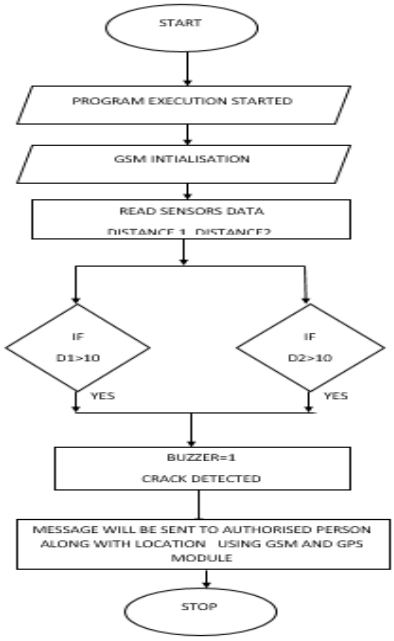



Fig . Flow chart

## IV. WORKING PRINCIPLE

The method showcased here is the detection of faulty rail track using ultrasonic sensors and sending the information to the near by stations through an SMS viva GSM case faulty track is detected. In this module, we are utilizing two ultrasonic sensors. The Ultrasonic sensor produces ultrasonic sound waves which hits the article and returns back. In the event that the article has any crack the time taken for returning the reverberation signal shifts. It estimates the distance by utilizing the equation,Test distance = (high level time * sound velocity (340M/S) / 2. When the testing teach exceeds the set value, it reads latitude and longitude position of the faulty track is obtained using GPS module and send to the base station through GSM modem.

## V. RESULTS AND DISCUSSION

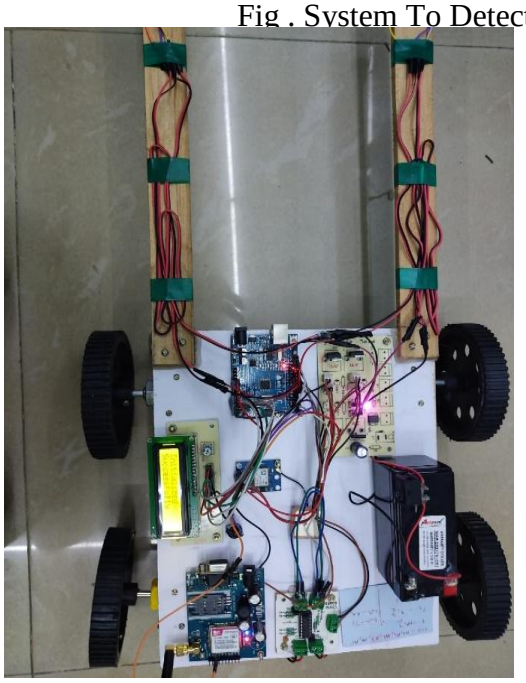
The proposed system has the ability to detect the crack and abstacles if any on the track. There are many advantages with the proposed system as compared with the traditional detection techniques which include Low cost, Low power consumption, fast detecting system without human intervention and less analysis time. By this modal we can easily avoid train accidents and derailments so that many human lives can be saved.

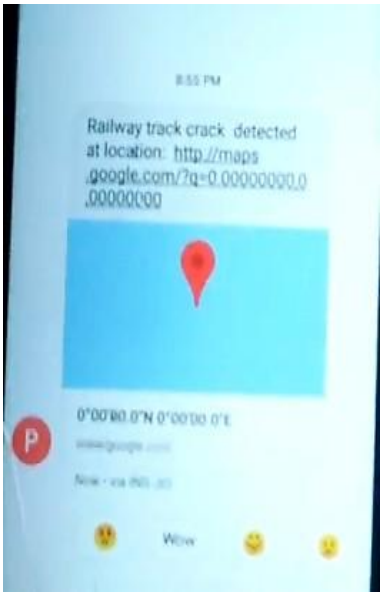

Copyright @ 2021 Authors

## V. CONCLUSION

The proposed framework can be utilized to identify the crack adequately and send the area of issue precisely in least an ideal opportunity to the predefined portable numbers. The benefits of the proposed framework are that it has no clamor, yield is a lot of exact and the expense is similarly lesser than the composite framework. This framework can be utilizedbothduring daytime and evening. In future Solar board can be associated with power the framework instead of battery-powered battery utilized for the reason which would utilize environmentally friendly power sources.

Fig . System To Detect The Crack On The Railway Track






## VII. EFERENCES

[1] Shailesh D. Kuthe, Sharadchandra A. Amale, Vinod G. Barbuddhye “Modern Method for Detecting Cracks In Railway Tracks By The Efficient Utilization Of LDR And LED System” Advance Research in Electrical and Electronic Engineering, Volume 2, Number 5; April – June, 2015

[2] V.Muralidharan, V.Dinesh, P.Manikandan “An Enhanced Crack Detection System for Railway Track”, International Journal of Engineering Trends and Technology Volume 21, Number 6 – March 2015.

[3] Prof. P.Navaraja, “Crack Detection System for Railway Track by ultrasonic and PIR sensor”, IJAICT Volume -1, Issue1, May 2014.

[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, issue. 6, December 2015

[5] 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, issue. 3, May2012


Copyright @ 2021 Authors