

## RAILWAY TRACK CRACK DETECTION SYSTEM

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### ABSTRACT

The Indian Railways has one of the largest railway networks in the world, criss-crossing over 1,15,000 km in distance, all over India. However, with regard to reliability and passenger safety Indian Railways is not up to global standards. Among other factors, cracks developed on the rails due to absence of timely detection and the associated maintenance pose serious questions on the security of operation of rail transport. A recent study revealed that over 25% of the track length is in need of replacement due to the development of cracks on it. Manual detection of tracks is cumbersome and not fully effective owing to much time consumption and requirement of skilled technicians. This project work is aimed towards addressing the issue by developing an automatic railway track crack detection system. This work introduces a project that aims in designing robust railway crack detection scheme using IR RECEIVER SENSOR assembly

system which avoids the train accidents by detecting the cracks on railway tracks. And also capable of alerting the authorities in the form of SMS messages along with location by using GPS and GSM modules. The system also includes distance measuring sensor which displays the track deviation distance between the railway tracks.

### 1.INTRODUCTION

Transport is a key necessity for specialization that allows production and consumption of products to occur at different locations. Transport has throughout history been a spur to expansion as better transport leads to more trade. Economic prosperity has always been dependent on increasing the capacity and rationality of transport. But the infrastructure and operation of transport has a great impact on the land and is the largest drainer of energy, making transport sustainability and safety a major issue. 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 GSM (Global System for Mobile Communications), GPS (Global Positioning System) and microcontroller based broken railway track detection when implemented is an efficient method of detection of cracks which is present in the tracks and thus avoiding derailment of the trains. This system is used in-between two stations which will detect the cracks present on the track using TSOP sensors which transmit sine waves for an ideal track. If a crack is detected then this sensor will send a signal to the Arduino Uno board which will activate the GPS receiver. The GPS receiver will pinpoint the exact location which will then be messaged to the authorities.

**Keywords:** GSM,GPS.Arduino,IR Sensor.etc.

## II.PROPOSED SYSTEM

This system involves the design of crack finding robot for finding cracks in railway tracks. This system uses controller for interfacing the robotic vehicle and crack

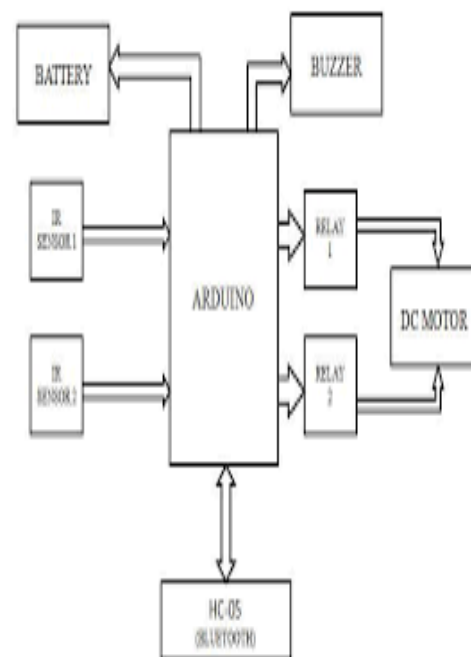
detection sensor. The sensing device senses the voltage variations from the crack sensor and then it gives the signal to the microcontroller. The microcontroller checks the voltage variations between measured value and threshold value and controls the robot according to it. The robotic model is interfaced with the microcontroller with the help of motor driver circuit. The Arduino integrated development environment is an open source project which simplified the coding greatly. Proposed system will consist of IR sensor array assembly for crack detection and Ultrasonic sensor for obstacle detection. Then analog readings from IR sensor array and ultrasonic sensor will be converted into the digital reading and set point will be allotted to these sensors. Motor driver will be used to drive dc motors. The microcontroller is used to control the IR sensor array output and ultrasonic sensor output and transmit the information by using the GSM module and the function of GSM module being used is to send the signal whenever it detects the crack to the base .If any crack occurs in the rail, the robot will be stopped and then a SMS will be send.

## III.SYSTEM ARCHITECTURE

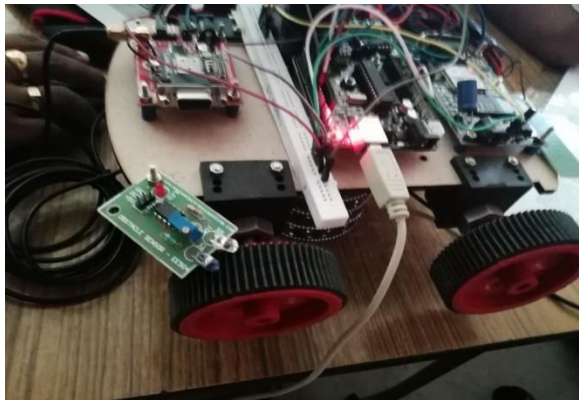
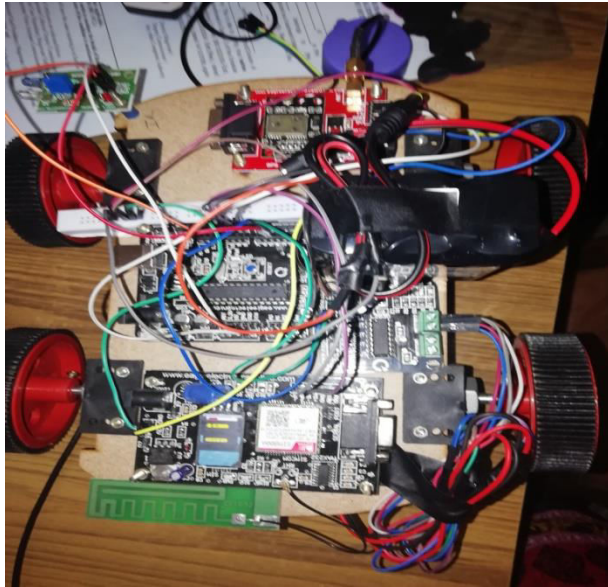
The proposed work “railway track crack identification system”. In this system we are using Arduino Uno microcontroller,

which acts as a brain of the system. This microcontroller controls the circuit function. Various components are interfaced with this microcontroller to perform desired operation of the system. The hardware components used in this system requires regulated power supply for the operation. This power is provided by the rechargeable battery connected in the system. The battery will be charged through solar power with the help of solar panel connected. In this system we have interfaced two TSOP IR sensors with the microcontroller for the distance and detection of the crack present in the track of the railway line. To communicate the received information, we make use of a GSM modem. The GSM module is being used to send the current latitude and longitude data to the relevant authority as an SMS. This GSM module is interfaced with the microcontroller through a matching circuit MAX232. A GPS receiver is also interfaced with the microcontroller to determine the exact location of the crack on the railway track. This GPS receiver will provide the longitude and latitude parameter values to the controller. Two DC motors are used to move the robot in forward direction. These motors are interfaced and controlled through the microcontroller. To operate these motors through a microcontroller a driver circuit is required for interfacing

between microcontroller and motors. A wireless camera is also used in this system. This camera is interfaced in the system for live streaming of the status of the railway track. This camera provides the live video to the device in which the application of that camera is installed. The architecture of the proposed system also consists of a 16x2 LCD display, interfaced with the microcontroller for the display purpose. This LCD display will display the longitude and latitude values of the crack detected by the system.



#### IV.SCREENSHOT



#### V.CONCLUSION

This project discusses the critical safety techniques for high-speed train operation environment based on the train control system .In order to ensure operation of trains ,we propose a wireless network framework according to the monitoring network of surrounding environment and the deployment of transaction network to avoid collision of trains and obstacles detection . System his ability to pin point the location and other attributes of an operational train in an economical accurate miner .The goal of this work is to design and implement a cost effective and intelligent fully fledged and wireless based Train Anti Collision and detection System to avoid accident

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