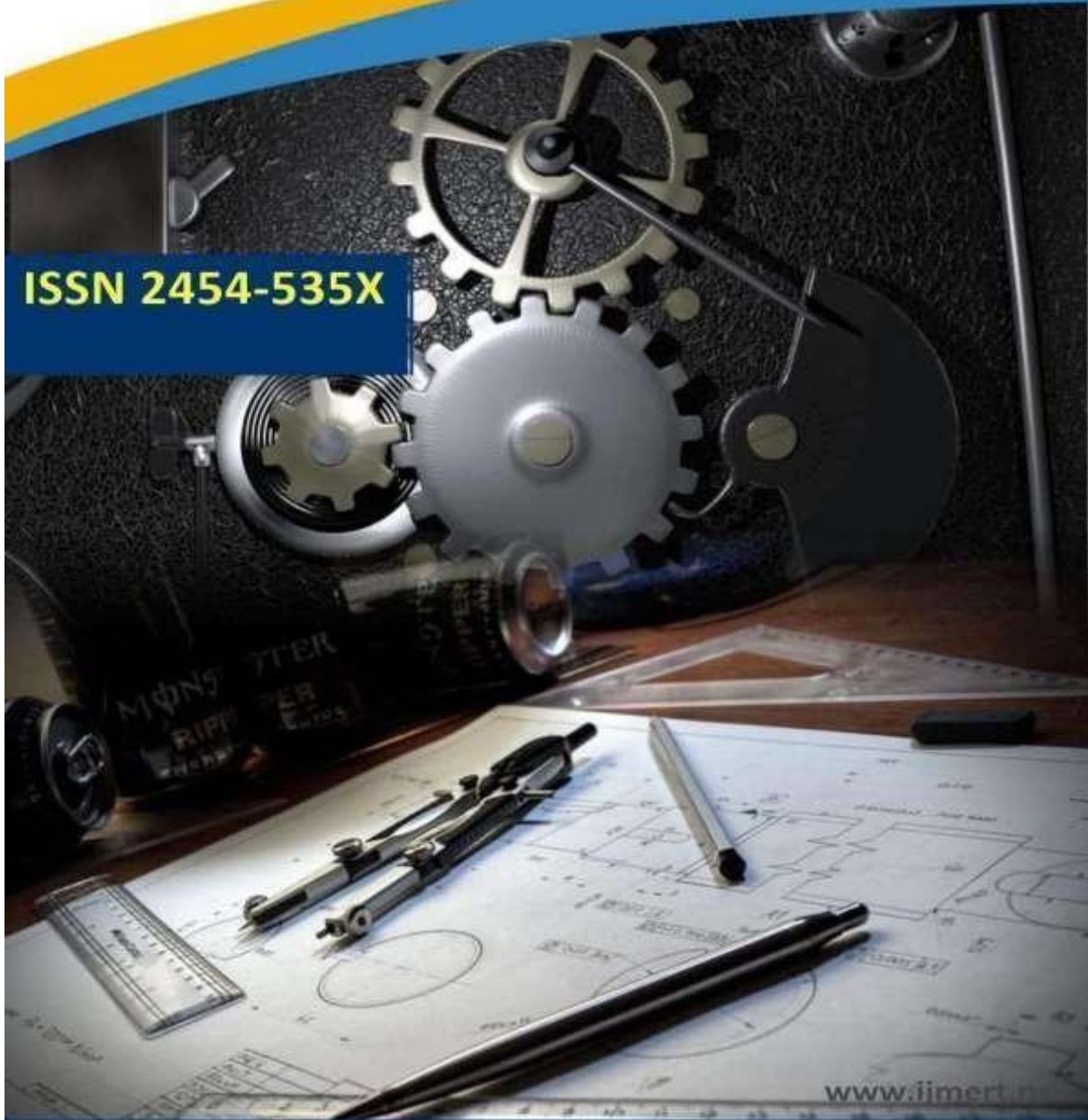




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RAILWAY TRACK CRACK DETECTION SYSTEM USING GPS AND GSM

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ABSTRACT

Indian Railroad is one of the biggest railroad systems on earth. Despite the enormous development of the Indian Railroads, some accidents occur due to the cracks in the railway track. To overcome this major problem we have proposed a monitoring device that used to detect the crack in the track and to send SMS via GSM and GPS module with the help of Arduino UNO.

The main goal of our project is to ensure the safety of both people and the cargo. The device processes the data from different sensors set up on the railroad lines using Arduino microcontroller.

The sensors detects the cracks and and the microcontroller analyses the information gathered by the sensors. Then the device contacts the relevant authorities alerting them about the threat. The alert system uses the GPS and GSM module to send crack detection location through SMS format.

The alert may appear as alarm or message on the screen.The Railway Crack Detection system that uses Arduino is cost effective and straightforward to implement making it viable solution for railways worldwide.

INTRODUCTION

In today's world, transport, being one of the biggest drainers of energy, its sustainability and safety are issues of importance. This is the fourth largest railway network in the world. The

Rail transport is growing at a rapid pace in India. It is one of the major modes of transport but still our facilities are not that accurate, safer as compared to international standards. A survey on the internet states that about 60% of all the rail accidents is due to derailments, recent measurements shows that about 90% are due to cracks on the rails. Hence, it is not safer for Human Life. This needs to be at the utmost attention. This is need to be at the utmost attention. These goes unnoticed and the properly maintenance of tracks is not done. This model says about a proposed proto type of testing train for detecting obstacles and crack.. To overcome this disadvantage, here proximity sensor is used, which will detect the crack accurately. This project discusses a Railway track crack detection using sensors and is a dynamic approach which combines the use of GPS tracking system to send alert messages and the geographical coordinate of location. Arduino Microcontrollers used to control and coordinate the activities of this device. The existing system is slow, tedious and time consuming. This system has GSM and GPS module which will give the real time location or coordinates in the form of Short Message Service(SMS) to the nearest railway station .To

identify defect of di track elements the Railway service presently uses machine of im from algorithms. These machines are lesser in size and ar ed by proposed system is small and efficient t

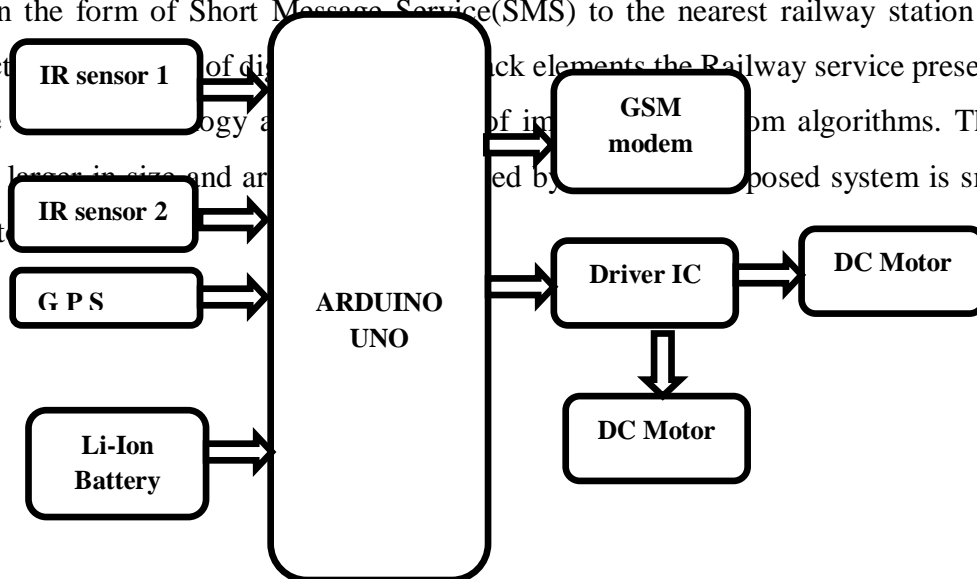


Figure.1 Block diagram

LITERATURE SURVEY

Introduction to Railway Track Crack Detection:

Begin by understanding the significance of detecting cracks in railway tracks to ensure safety and prevent accidents.

Explore literature that introduces the concept of using GPS and GSM technologies for real-time monitoring of railway tracks.

Existing Crack Detection Techniques:

Investigate research papers and articles that discuss traditional methods for detecting cracks in railway tracks, such as visual inspection, ultrasonic testing, and eddy current testing.

Look for studies that evaluate the limitations and challenges of these methods, including their labor-intensive nature and limitations in coverage and accuracy.

Role of GPS and GSM in Crack Detection:

Review literature on how GPS and GSM technologies can be integrated into crack detection systems for railways.

Explore studies that discuss the advantages of using GPS for precise location tracking and GSM for real-time communication of detection results and alerts.

Sensor Technologies for Crack Detection:

Examine research papers and articles that explore sensor technologies used in conjunction with GPS and GSM for crack detection.

Look for studies that discuss the deployment of accelerometers, strain gauges, acoustic sensors, or optical sensors to detect changes in track conditions indicative of cracks.

Data Fusion and Analysis:

Investigate literature on how data from GPS, GSM, and crack detection sensors are fused and analyzed to detect and classify cracks in railway tracks. Explore studies that discuss the development of algorithms for feature extraction, pattern recognition, and anomaly detection to identify potential crack locations.

PROPOSED SYSTEM

In proposed system crack in the tracks is detected by means of sensor and Arduino microcontroller, measuring distance for two railroad. In this project we use ultrasonic sensor to detect the crack. It uses to measure the distance between the two tracks. If any crack are occurred in the track means longitude and latitude coordinates of the place are to be sent to the nearest station or control room and IR sensor measured the distance between the two track if there is any small variance found the message which contains coordinates of that particular place will be sent to the nearest station or control room with the help of GPS and GSM module. This project is to be made in order to change the system of crack detection in railways which can be resulted out as not only costeffective but also with good accuracy and time saving facility

- a) Initially the tracks are being continuously monitored with the help of sensor, which is used to detect the crack in the tracks.
- b) This monitoring is done with the help of IR sensor in order to sense the minor changes also which can be quite difficult with other sensors.
- c) Whenever the crack gets detected with the help of IR sensor it passes the alert of crack found to the Arduino microcontroller.
- d) The Arduino microcontroller will perform the 5process assigned to it accordingly.

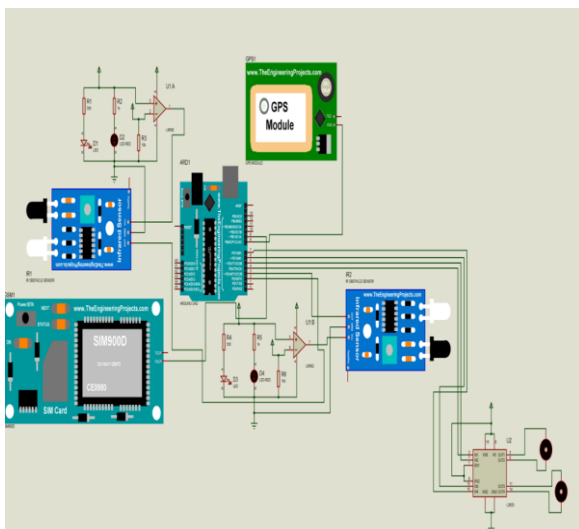


Figure.2 Stimulation Diagram

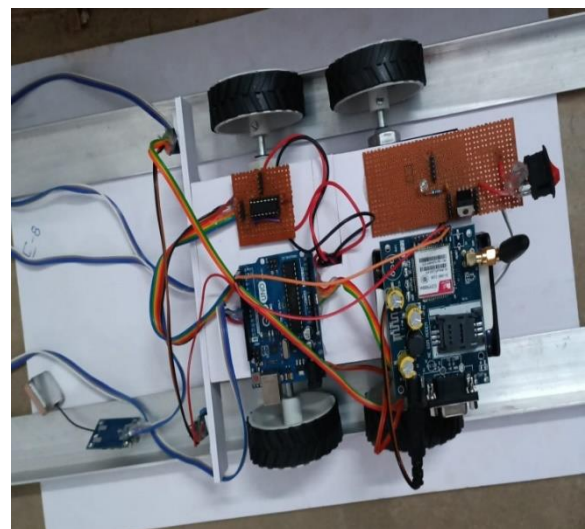


Figure.3 Top View of the device

RESULTS



Figure.4 Front View of device

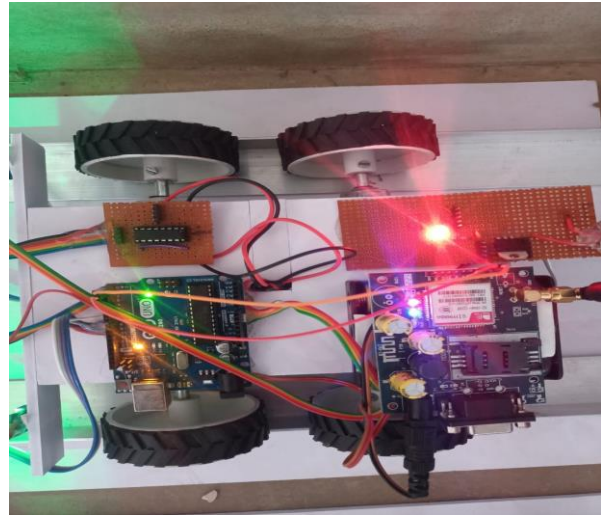


Figure.5 Top view of device in ON state

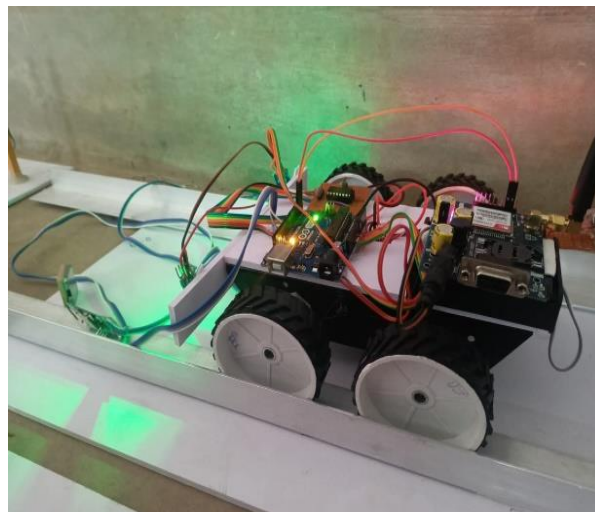


Figure.6 Device in ON state

CONCLUSION

The maintenance of the tracks will be greatly impacted by the use of this automatic vehicle for railway track inspection and crack identification, which will greatly aid in the prevention of train accidents. This vehicle can readily be used in areas where manual inspection is not feasible, such as deep coal mines, mountainous areas, and thick, dense forest regions. The

automated SMS will be sent to a pre-defined phone number anytime the vehicle sensors detect any crack or deformation when this vehicle is used for railway track inspection and crack detection. This helps in maintaining and monitoring the condition of railway tracks without any errors, thereby maintaining the tracks in good condition and preventing train accidents to a very large extent. A railway track crack detection autonomous vehicle is designed in such a way that it detects the cracks or defects on the track, which, when rectified in time, will reduce train accidents. People in remote areas can use it as a means of transportation. As per the study the existing systems are time consuming as well as uneconomical. The proposed system is not only overcome these problems but also improve accuracy and crack detection in rails. It is the most economical solution provided in order to achieve good results of railways of our country in order to minimize the stats of accidents caused. Thereby possible to save precious lives of passengers and loss of economy. It also saves the time and money for identification of crack

FUTURE SCOPE

The automated vehicle robot can be given a faster speed, but more work needs to be done in this area. In addition, improvements can be made to provide a more precise location for the fault's origin. To increase the effectiveness of this system, the robot can also be made large enough that, using its weight, the track's stress and strain parameters can be evaluated. If you want to offer robust connectivity at a low input cost, you can also add a Zigbee module for a quick, short-distance inspection mechanism. A solar supply could be used to power it. Being environmentally friendly and generally accessible, solar energy.

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