

Railway Track Crack Detection

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Abstract - In India railways transportation service is the cheap and the majority convenient mode of passenger transport and also for long distance and suburban traffic. The main cause of the accidents happened in railways are railway track crossing and unrevealed crack in railway tracks. Therefore, there is a need to have new technology which will be robust, efficient and stable for both crack detection in railway track as well as object detection. 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.

Key Words: GPS Module; Arduino Microcontroller; Railway Track

1. INTRODUCTION

Railway is one of the most significant transportation modes of our country but it is a matter of great sorrow that, railway tracks of our country are very prone. That's why, a vast number of accidents are occurred every year due to this primitive type of railway tracks and as the consequences of those accidents we lose huge number of lives every year.

These types of incidents motivate us to think over the above-mentioned issue and take necessary steps to protect those lives. Through our proposed system, we need to establish more modern and secure railway system. Besides this, there is no such type of technology or system in our country which can stop the collision between two trains coming from the opposite direction of each other on the same track. We actually think over this matter and motivated to do so. Moreover, natural disaster can throw any object on the rail track which cannot be removed very quickly in the remote area. We thought if our system can detect those object or barrier and inform to the control room then they can take necessary steps to avoid accident. Figure1 depicts the crack on track. 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

railway 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. These goes unnoticed and the properly maintenance of tracks is not done.

To overcome this disadvantage, here sensors are used, which will detect the crack accurately. 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.

2. Body of Paper

In India the railway network has a track length of 113,617 kilometers (70,598 mi) over a route of 63,974 kilometers (39,752 mi) and 7,083 stations. This is the fourth largest railway network in the world. The Rail transport is growing at a rapid pace in India. Indian railways are one of busiest network in the world covering track network of 1,27,000 sq.km. Almost 2/3rd of the population use the railway network in India. Almost 60% of the accidents are occurring at railway track crossing and due to crack in railway tracks resulting in loss of precious life and loss of economy.

Table -1: Statistics of the number of injuries caused due to the accidents.

| Year | Number of train accidents | Number of deaths/injuries | Number of deaths due to rail crack |
|---------|---------------------------|---------------------------|------------------------------------|
| 2013-14 | 20 | 275 | 156 |
| 2014-15 | 15 | 196 | 124 |
| 2015-16 | 17 | 249 | 150 |
| 2016-17 | 29 | 57 | 58 |
| 2018-19 | 59 | 57 | 108 |

EXISTING SYSTEM

The existing system railway tracks are surveyed manually. LED (Light Emitting Diode) LDR (Light Dependent Resistor) sensors cannot use on the slab of the tracks. Image processing input images are noisy system and it's not getting accurate output. This analysis is used to identify the crack in rail track under the bad weather condition which is not getting perfect output. The existing system is found delay in passing the information because still it uses telephonic communication which is not that fast and accurate.

PROPOSED SYSTEM

In proposed system, the cracks in the railway tracks are detected by using Arduino microcontroller and sensors. In this project we use infrared sensors to detect the crack. If any crack is occurred in the track means longitude and latitude coordinates of the place are to be sent to the nearest station or control room and ultrasonic sensor measured the distance between the two tracks 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 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 cost-effective but also with good accuracy and time saving facility.

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

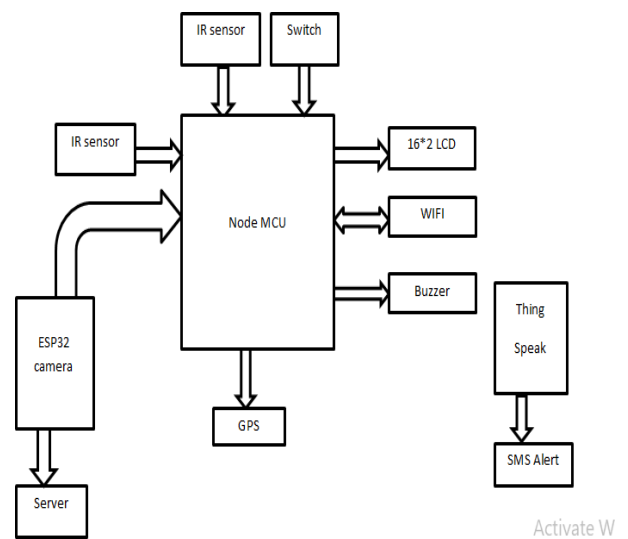


Figure: Block Diagram

3. CONCLUSIONS

We have designed a cost-effective low power system. The prototype of testing vehicle can efficiently detect crack and the object on the railway track. The system is capable of sending the alert message on the real time basis. It can also work in any environment condition without logging. We found that the system we are using (GPS with IR sensor) is effective and cheap technology. Accurate data helps in preventing the accidents. The main aim is to protect the people from accidents and to reduce the man power. When the prototype is industrialized it will definitely helpful for the Indian railway. The result shows that this new technology will increase the reliability of the Indian Railway. This makes Indian railway more competitive with other countries rail system.

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