Automatic Crack Detection in Railway Track

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ABSTRACT

In India, rail transport occupies a prominent position in quenching the ever barge owing needs of rapidly growing economy. However, in terms of the reliability and safety parameters, global standards have not yet been truly reached. Though rail transport in India is growing at a rapid pace, the associated safety infrastructure facilities have not kept up with the mentioned prolife ration. The principal problem is the lack of efficient and cost-effective technology to detect the problems in the rail tracks and the lack of proper maintenance. Monitoring the inspection methods like are visual inspection, ultrasonic inspection, 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 tracks 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. Cracks in rails have been identified to be the main cause of derailments in the past, yet there have been no cheap automated solutions available for testing purposes.

Keywords:

Ultra sonic Sensor, Motor Driver, GPS system.

INTRODUCTION

In India, railway network is the main mode of transportation. Due to long term usage, bad weather condition, antisocial activities (Naxalism) there are chances of damage to these networks.

This results in the large-scale destruction of life and property.

There are different types of cracks identified in the railway tracks. These effects include bending and shear stresses, wheel/rail contact stresses, thermal stresses, residual stresses and dynamic effects.
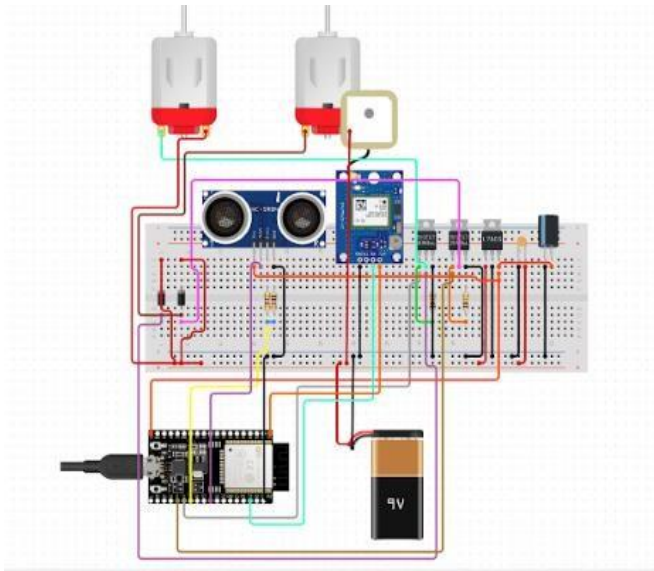
Recent analysis of the factors that cause the rail accidents reveals, about 90% of railway accidents are due to cracks on the rails either due to natural causes (like excessive expansion due to heat) or due to antisocial elements. At present railways are using manual methods of crack detection through human inspectors. Manual detection is nearly unreliable and impossible in bad weather condition, remote and inaccessible locations.

This proposal aims to automate crack detection process by making use of US waves (Ultrasonic waves), propagating through the length of the track, enabling the detection of cracks on railway tracks.

This is discussed under topic "Crake or break ranging and detection system".

Another cause for railway accidents is the collision with the foreign objects that block the railway route. This system also predicts the foreign objects that might be responsible for accident. This is discussed under the topic "Foreign object detection system"

CIRCUIT DIAGRAM

II PROBLEM STATEMENT

The principal problem is the lack of cheap and efficient technology to detect problems in the Automatic Detection Of Crack In Railway Track rail tracks and of course, the lack of proper maintenance of rails which have resulted in the formation of cracks in the rails and railway crossing. 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 tracks 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. Cracks in rails have been identified to be the main cause of derailments in the past, yet there have been no cheap automated solutions available for testing purposes. Although, the railway has a maintenance department which consumes much of the manpower and money.

III.LITERATURE REVIEW

Laxmi Goswami, "Railway Route Crack Detection System" This paper proposes a railway route crack detection system. More particularly, this paper presents the detection system that is capable of detecting any cracks or disjoints in the railway tracks by using microcontroller based smart robot. Hence for this an advance technology-based robot is develop that is capable of locating faults or cracks in the tracks and protect the trains from any accident. In present era, the detection of cracks in the railway lines are done manually by the workers physically going to the railway track to do inspection. These inspections waste a lot of time and is very difficult task. Hence, the proposed method eliminates these efforts made by railway staff to search the cracks. From the proposed system the time spend on detecting the cracks of railway track is reduced.
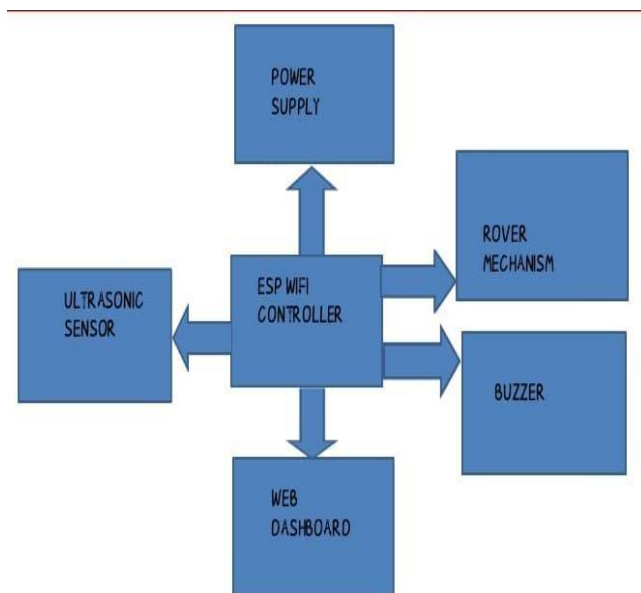
IV.OBJECTIVES

1. This project is very useful to find any crack present on railway track.
2. Also, it will identify any living body present on track.
3. If found any of above problems, it will give signal to maintenance staff to solve the problem
4. By loud buzzer, it will seek attention of people or animal present on track to move away

V.METHODOLOGY

The proposed work "railway track crack identification system". In this system we are using Arduino Uno microcontroller, International Journal of Advanced Research in Basic Engineering Sciences and Technology (IJARBEST) ISSN (ONLINE):2456-5717 31 Vol.5, Issue.5, May 2019 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. 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 with ARDUINO mega to measure the RPM so that the longitude data to the relevant authority as an SMS authority can know the exact location of the robot and there This GSM module is interfaced with the microcontroller is a command given in Arduino mega to skip the regular through a matching circuit MAX232. A GPS receiver is frame of the railway track which is default feature created also interfaced with the microcontroller to determine the its implementation period 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.
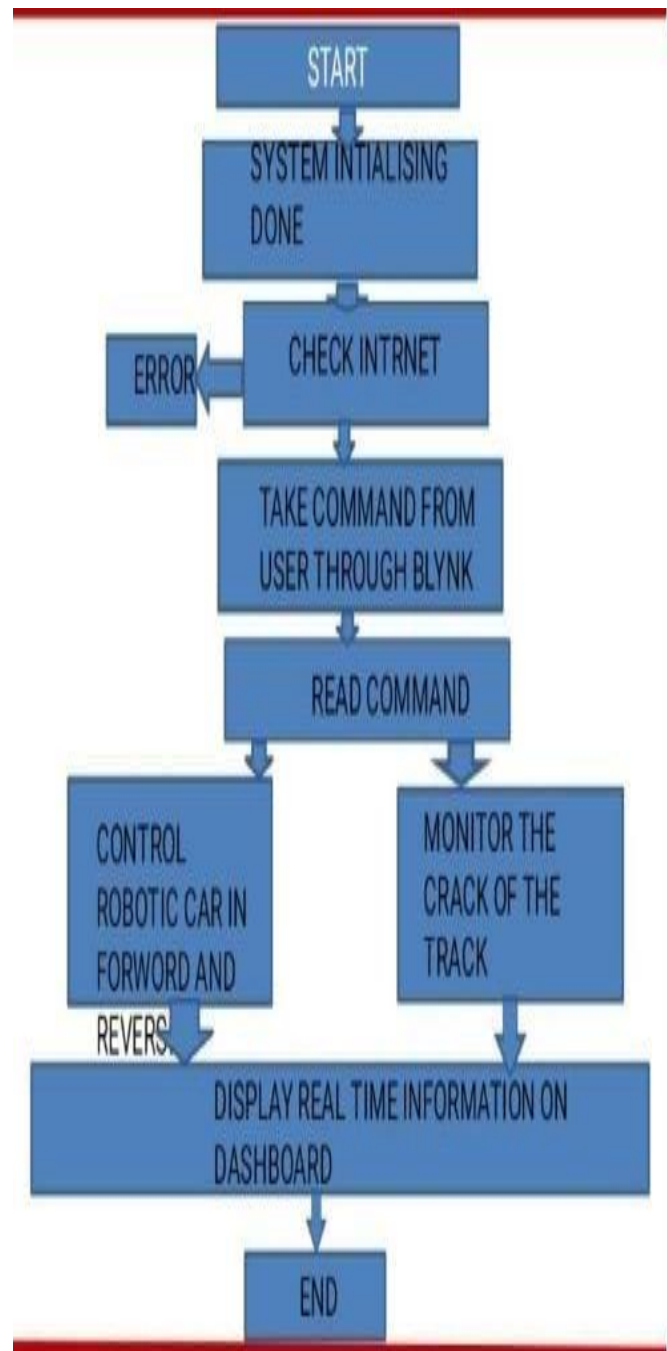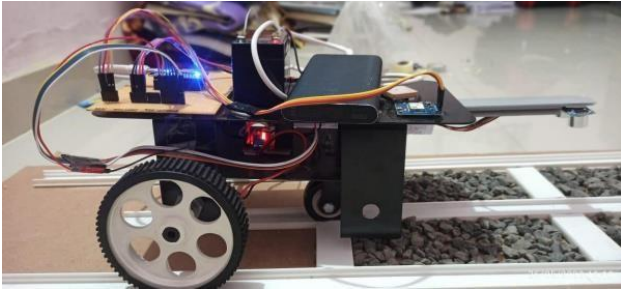

Block Diagram

ALGORITHM

Step1:GPS module is a device that uses global positioning system to determine the location of crack in railway track.
Step2: An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver.
Step3: Motor and driver circuit- DC geared motor is used to run the robot which is system. An optical encoder is included

HARDWARE RESULT

VII.CONCLUSION

The project itself speaks about its own value in real life as it saves more than thousands of lives by doing a very important yet unexplored work. After completion of the project the conclusion is that it works each and every time until and unless any network issues with the GSM is there. The project is valuable yet cheap to manufacture and can be implemented in different kinds of railway gauges with minor tweaking. The approach taken is capable, if there are any, of detecting flaws and obstacles on the surface. The method proposed has lots of advantages over conventional detection approaches that include minimal cost, reduced energy consumption, efficient detection system without human involvement and shorter analytical times. With this prototype, train collisions and derailments can be easily prevented to save many lives. It is also very beneficial for railroad operations testing units. And we can also notice the position failure and the system used in this, and also the location data is sent to the default mobile number. So that this enables us in rail line preservation and control as well. When we use the detector model for monitoring and we can claim that it is a fusion energy vehicle. The result

shows that this exciting new technology will keep increasing the efficiency of the safety features for rail infrastructure.

Areas where manual testing is not feasible with this vehicle, such as in shallow coalmines, mountainous areas and thick and deep forests regions, can be easily carried out. When this vehicle is used for railway inspections and breakage detection, automatic SMS will be sent to a predetermined mobile number if cracks or abnormalities are identified by the device sensors. This will lead without errors to the management and control of the state of the railway tracks, and thus to the preservation of the tracks in good condition.

VIII.REFERENCES

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