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Railway Track Damage Detection Robot

Sunil Yadav[1], Meet Bhanushali[2], Nazrul Shaikh[3], Sabir Shaikh[4], Prof. Chandramohan Konduri[5], Prof. Nargis Shaikh[6]

B.E. Students, Dept. of Electronics Engineering, Rizvi College of Engineering, Mumbai, Maharashtra, India[1,2,3,4]

Assistant Professor, Dept. of Electronics Engineering, Rizvi College of Engineering, Mumbai, Maharashtra, India[5]

Associate Professor, Dept. of Electronics Engineering, Rizvi College of Engineering, Mumbai, Maharashtra, India[6]

ABSTRACT: The Indian railways is the largest passenger transport in Asia and is the back bone of the country's transport infrastructure. Almost 24 million passengers use the railway system on a daily basis. One of the most widely used and comfortable modes of transportation system is train, but occasionally, accidents are occurring due to collision as well as other reason. It is difficult to prevent such collisions because of the speed of the moving trains, which is needs a long distance to apply brakes. Collisions are happening due to human errors and/or faulty equipment's. The main weak point in a railway analysis is the detection of cracks in the railway tracks. If these faults are not detected and repaired at early stages they might lead to a number of derailments resulting in a heavy loss of life and property. This paper proposes a cost effective solution that will help in railway track crack detection and with the help of GPS and mobile data services give the exact location of track damage which can then be mended immediately so that accidents don't take place and many lives will be saved.

KEYWORDS: Railway track, Crack, GPS, Mobile Data Service, Security.

I.INTRODUCTION

In India, railways are a prominent mode of transportation to sustain needs of a rapidly growing economy. Today, India possesses the second largest railway network in the world. The Indian railway network has a track length of 113,617 kilometres over a route of 63,974 kilometres and having 7,083 stations. In spite of having such impressive statistics, the Indian rail network is still on a rapid growth trajectory trying to satisfy the economic needs of our nation. Talking about reliability and safety, we have not yet reached truly global standards for safety. Although Indian Railways is growing at a rapid pace, the associated safety infrastructure facilities have not kept up with the overall proliferation. On 28th May, 2010 due to damage of the rail track 148 passengers were dead and on 12th July, 2013 because of crack in railway track 6 people were confirmed dead and nearly 200 were injured. The main weak point in a railway analysis is the detection of cracks in the railway tracks. If these faults are not contained at early stages they might lead to a number of derailments resulting in a great loss of life and property.

II. DESIGN GOALS

In India, we can say that rail transport prominent transportation solution for providing the necessary transport infrastructure to sustain the quench of a rapidly growing economy. But in terms of reliability and safety, we lack global standards.

With rail transport growing with a rapid pace, the associated safety infrastructure facilities lag behind. There is a definite need for a low cost and an automated monitoring system which will be easy to use and with maximum accuracy. To reduce the railway accidents due to fault in track; we tried to design a robot which will continuously travel over the track to detect the crack present over the tracks.

III.WORKING

Robot used in this system consists of two IR sensors at its either sides. When Robot travels over the track, IR transmitter transmits the IR signal continuously. When crack is detected in the track, the transmitted IR signal is passed through crack and received by receiver. Initially IR receiver is active low, when transmitted IR signal is received by receiver the IR receiver change into active high mode.

This signal is feed to the comparator which compares the two signals i.e. transmitted and received signal. When the signal is high then comparator pass the signal to the microcontroller which indicates that crack is detected. At this instant the motor is stopped by IC L293D. Also the microcontroller receives the distance travelled by robot from a fixed point and it sends this distance to given mobile number by using GSM module.

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IV.BLOCK DIAGRAM

Block diagram of the designed system is as shown in Fig. 1.

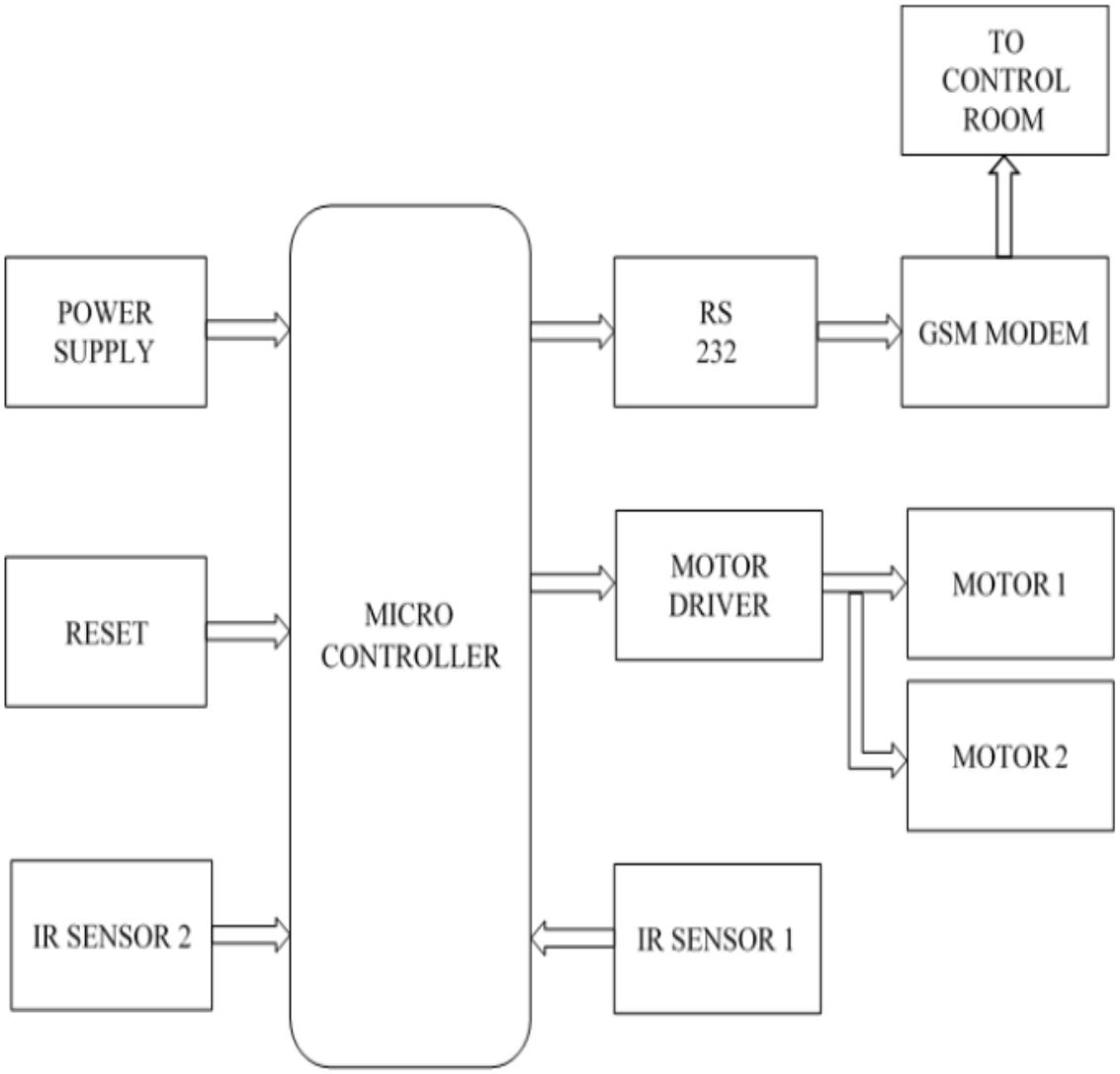

Fig. 1 Block diagram of the system

When the robot is Powered ON, it moves along the model track. The two IR obstacle sensors are fixed on the both sides of the track. The IR Obstacle sensors observe the condition of the tracks. When a crack is detected by the IR sensor the vehicle stops at that position and send the distance to mobile number of the control room. When the vehicle stops the GSM model starts working and GSM module sends the text message to the number by using SIM card that is inserted into the module. Once the message has been successfully delivered to the number, the vehicle resumes its movement forward depending on the type of crack. The designed Railways Track Crack Detection Autonomous Vehicle has been successfully tested on the model track and the detected location has been sent to the phone number.

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V.FLOW CHART

Following figure shows flowchart of the system.

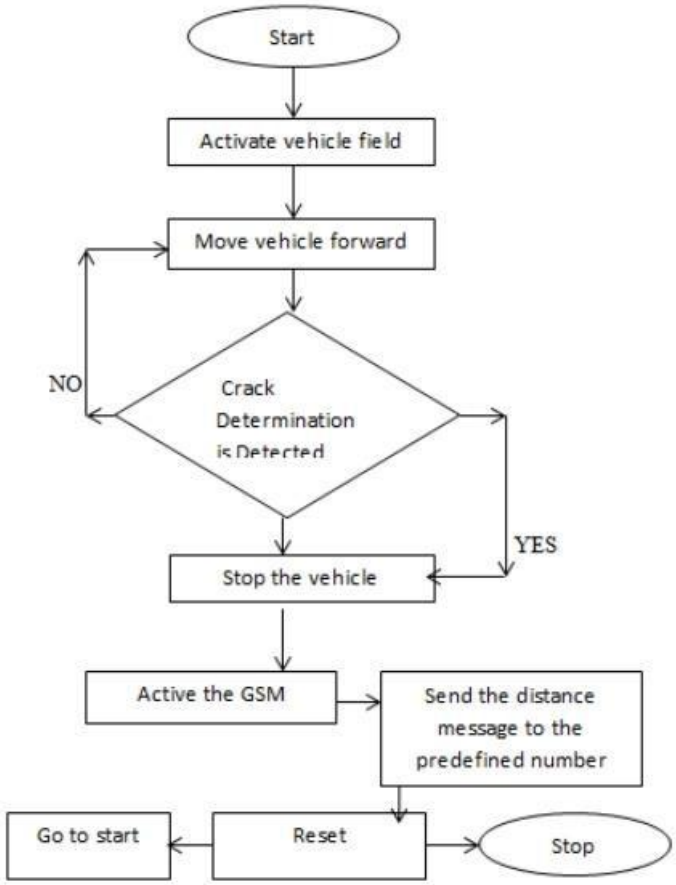

Fig. 2 Flow Chart of the system

VI.OBSERVATIONS

Robot continuously moves along the track to check whether any fault is present or not on the track as shown in figure 3.

Fig. 3 Before detection of crack

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When crack is detected, the robot will stop and the distance travelled by robot from a fixed point is displayed on LCD display as well as this distance is send to the control office through GSM modem as shown in figure 4 and 5 respectively.

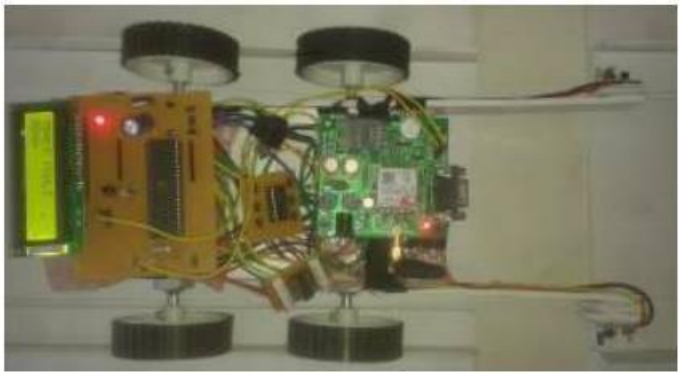

Fig. 4 After detection of crack

Fig.5 Message showing location fault

VII.CONCLUSIONS

The main problem in railway infrastructure analysis is detection of cracks in the tracks. If these cracks are not repaired at early stages they might lead to a number of derailments resulting in a massive loss of life and property. The proposed system automatically detects the cracks in rail track without any human intervention. There are many advantages with the proposed system when compared with the traditional techniques such as less cost, low power consumption and less analysis time. With the help of the proposed system the exact location of the crack can easily be located and the necessary repairs can be made.

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