IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

ISO 3297:2007 Certified ⁜ Impact Factor 7.23 ⁜ Vol. 11, Issue 1, January 2023

DOI: 10.17148/IJIREEICE.2023.11103

Railway Track Crack Detection System Using Arduino

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Abstract: The project proposes designing of robust railway crack detection using IR sensor assembly for railway track geometry surveying system by detecting the cracks on railway tracks. Most of the accidents in the train are caused due the cracks in the railway track, which cannot be easily identified. The two IR sensors are installed at front end of inspection robot which monitors the track and gives the status to Arduino controller. The proposed broken rail detection system automatically detects the faulty railway track without any human interference. There are many advantages with the proposed system when compared to the traditional detective techniques. The advantages include less cost, low power consumption and less analysis me and also facilitate be era safety standards for railway tracks and provide effective testing infrastructure. Most of the commercial transport is being carried out by the railway network and therefore, any problems in the same has the capacity to induce major damage to the economy-not withstanding the social impact of loss of life or limb. This project presents a cost effective yet robust solution to the problem of railway crack detection utilizing a method that is unique in the sense that while it is simple, the idea is completely novel.. The project also presents the details of the implementation results of the utilizing simple components inclusive of IR LED-PHOTODIODE based crack detector assembly. The currently existing technical solutions in the detection of cracks in rails involve periodic maintenance coupled with occasional monitoring the inspection methods like are visual inspection, ultrasonic inspection, eddy current and laser methods.

Keywords: Arduino, IR Sensors, GSM Module, GPS Module, Relay Module.

I. INTRODUCTION

The main aim of project is to design and develop an automatic rail crack detection system based on infrared technology, where in on-board robot circuitry can use obstacle detection on principle using pair of infrared LED & Photodiode. In this proposed project system using the infrared technology, where the hardware & program developed can take the live data of number of crack & the instant at which the crack is detected. With help of infrared module which will capture the instantaneous detection and location of that respective crack, which can send message to head office using GSM module. This assembly consists of two DC motor for movement of robot over the railway track. This is cost effective and efficient in its operation and can also increase efficiency of the whole system. The instantaneous crack information is send to head office immediately.

II. PROPOSED SYSTEM

Block Diagram:

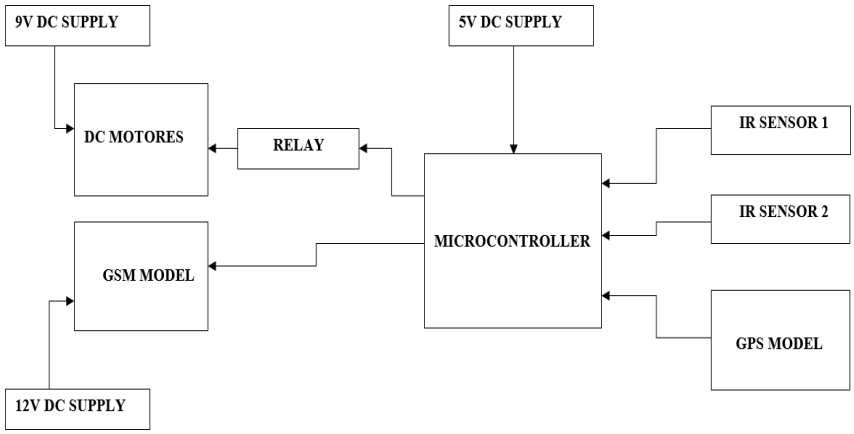

Fig. Block Diagram Of System

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Components:

- Arduino Uno
- IR Sensors
- SIM 900A GSM Module
- Neo 6m GPS Module
- 5V Relay Module
- 100 RPM Centre Shaft Economy Series DC Motor
- 12V Power Supply
- Connecting Wires
- General Purpose PCB

III. WORKING

The all sensors and other components are connected to the controller as shown in block diagram above and working of system is as follows.Now we see how system works,

Step 1: When we turn on the robot then the controller which is Arduino uno and other modules and sensors turn on. After that controller trigger relay to ON the DC motors and collect data from IR sensors.
Step 2: Controller sets GSM module in right mode to send message and set GSM module as per requirements.
Step 3: Robot starts running on railway track to detect crack. For that we use IR sensor here, IR sensors sense the track continuously and give 0 value to the controller.
Step 4: When crack detected by the IR sensor it gives 1 value to the controller, controller read that value and trigger relay to stop motors.
Step 5: After getting 0 value from IR sensor controller request to GPS module for location of that instance. Controller store that location in local variable and request GSM module to send this location to the head office.

IV. CONCLUSION

As per the study the existing systems are time consuming as well as uneconomical. The proposed system overcome this problem and improve accuracy as well as crack detection in rails. It is most important system in order to minimize the accidents. Thereby saves life of passengers and loss of economy.It also saves the money and time for identification of crack.

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