Monitoring System for Railway Track

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Abstract

The railway conveyance mainly depends on railway track. The railway track is the combination of several components, if there is any damage to any component of track it cause major accident. Most of the accidents in the railway conveyance are due to failure of materials and human error. To avoid this problem, we are using the crack detector model, In this project have come up with a solution for the same using this simple electrical and the mechanical technology we have sorted to automate the control from either side, The infra-red sensor mounted at reliable distance from the both side of the track for crack detection and metal detecting sensor are used for the detecting land mine under the track line accordingly controls the operation by solar power. Withal our robot is immaculate the track when it goes forward by remote command. This detecting system can be used to prevent the railway accidents.

Keywords: Crack detection, infra-red sensors, land-mine detection, metal detecting sensors, railway track inspection

I. INTRODUCTION

Railways are the paramount and potential denotes of conveying men and materials over long distance. Railway being chipset mode of transportation are preferred over all the other means. In India, Railways got precedence of development over highways. Railway system is India's astronomically immense scale project. The Indian railway network has a length of 113,617 kilometers, over a route of 63,974 kilometer and 7,083 stations. When we go through the circadian newspaper, we got acquainted with many railway accidents occurring because of a minor or the major failure of track i.e. crack in track, looseness of nut and bolt in joints. This is mainly due to carelessness in manual inspection in operation or lack of worker. To over comes this problem, this project presents an implementation of an efficient and cost effective solution. The main objective of this is proposed detects the crack on railway track and detects mines on and under the railways track. It will also remove the fine dust particles from the railway track. It will identify the level different between two rails of the track.

II. LITERATURE SURVEY

Recently research and development of rail track inspection have received a great deal of attention to save passengers life. The prompt detection of the condition in rails that may lead to crack or rather a break now plays a critical role in the maintenance of rail. Victoria J. Hodge et.al, (2014) The railways infrastructure like wagons, rail tracks, bridges, equipment having monitoring system that use wireless sensor. For expansion and upgrading of railway this system is useful. They give fixed monitoring for immobile structure. Author focused on sensor technology generating condition monitoring data to enable practical condition and also the work to understand modern monitoring using smart sensor. Fatima Imdad et.al, (2015) the author proposed a model system, design, These sensors accumulate data through computational analysis so faults on the railway tracks can identify. The accumulated data can avail in finding cracks in the track and catastrophic accidents can be eschewed. Shailesh D. Kuthe et.al, (2015) presents a monetary impressive robust solution for railway crack problem. The project presents specification of implementation results of RRCDS used, simple components inclusive of crack detector IR LED-PHOTODIODE based setup. They worked on implementing an economic and cost effective solution that is suitable that application. K. SARITHA et.al, (2015) observed cracks in railway track structure. They design crack inspection system and utilized for low-cost feature robot which is on embedded platform for finding the cracks. Model design is predicated on a microcontroller, sensors, motor, and IT technologies. Mr. Prashanth. et.al, describe a model for detection of cracks in rail tracks which automatically detect without interference of human. By utilizing this system the exact location of the faulty rail track can be located which will make immediately. Dr. B Paulchamy et.al,(2016) describe automated visual examination proposed structure. The cracks and obstruction are detected by utilizing sensors in the robot, which are then apprised to the train driver through the GSM utilizing radio frequency signals. In that system, the train can be controlled without driver control when the quandary is identified. Disha Bhat et.al, (2015) author describe visual inspection automatically for projected structure that will investigate obstacles and the

railway crack by utilizing inspection robot, then the system additionally concluded automatic control system gate. The obstacles and cracks are detected by utilizing sensors in the robot, which are then apprised to the train driver through the GSM utilizing radio frequency signals. S Ramesh et.al (2014) in their project proposes a cost effective solution to the problem of railway track crack detection utilizing RF control assembly which tracks the exact location of faulty track which then mended immediately so that many lives will be saved.

III. PROPOSED SYSTEM

In the proposed system we are using the simple electrical and the mechanical technology for track maintenance. The proposed system will consist of IR sensor array assembly for crack detection on rail of track and metal detector for mine detections under the track. Motor driver will be used drive DC motor and it will operated by wireless remote over the rail track. And the battery will also charge by solar energy. The solar panel is made silicon crystal of 10 watt and DC dry battery of 12 watt. Whenever IR sensors detect the crack on track the system will stop at that place. It will also help to get level difference between two rails by using level gauge. The following fig. 1 shows the working of model.

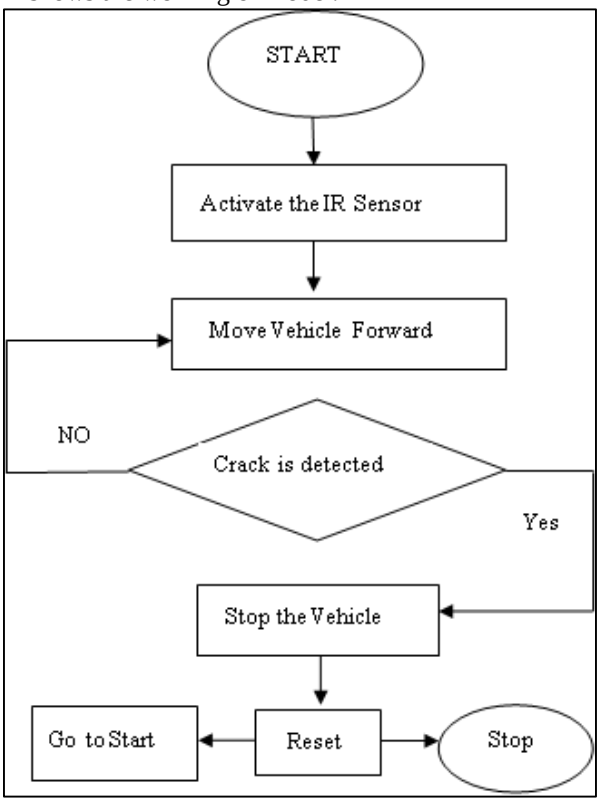

Fig. 1: Working Flow Chart of Model

A. IR Sensor:

The IR sensor array is contrivance with seven mounted infrared sensors. The IR sensor array is capable of emitting sound. The IR sensor can execute at felicitous distances. The IR sensor transmitters or receivers have an optimal operating range 0 to 5cm. The 3 pin connector gives potency, pushing the right button determines the array with set threshold values. Is nothing in IR sensor but it is rectifying valve, which is delicate to infrared radiation as shown in Fig.2.

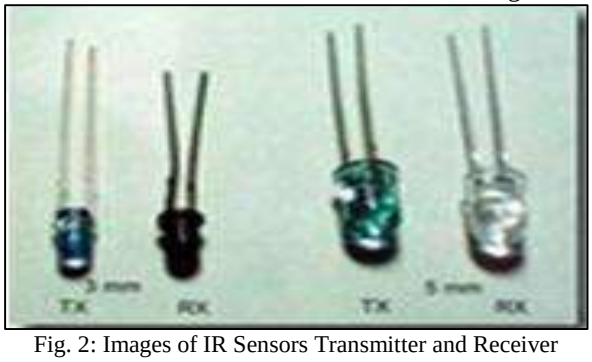

Fig. 2: Images of IR Sensors Transmitter and Receiver

The IR sensor transmitter will perpetually transmit infra-red rays and receiver (photodiode) will perpetually receive the rays whenever some obstruction passes through the IR pair the transmission will be ceased by which we come token that an intruder has been detected. This communication will avail us in safeguarding and in other related applications.

B. Metal Detector Sensor:

The remote-controlled landmine detector inductive type sensor to search out and destroy buried explosives. The Metal Detector consists copper wire detector coils shows in fig 3. The Circuit is a inductive Oscillator - able to detect metal and also live electrical cable. The inductive type generator is the convenient type of metal detector. The metal detectors use two radio frequency generators which are twist near the same frequency. The first one is the search generator and other is called the reference generator. The outputs of the two generators are victual into mixer which engenders a signal which contains the sum and difference frequency components. This signal is aliment to down-pass filter abstracting the harmonics. As long as the two oscillators are tuned to the same frequency, the output will have no signal. When metallic object perturbs magnetic field the search coil, frequency of search generator shifts remotely and the detector will engender a signal in the audio frequency range.

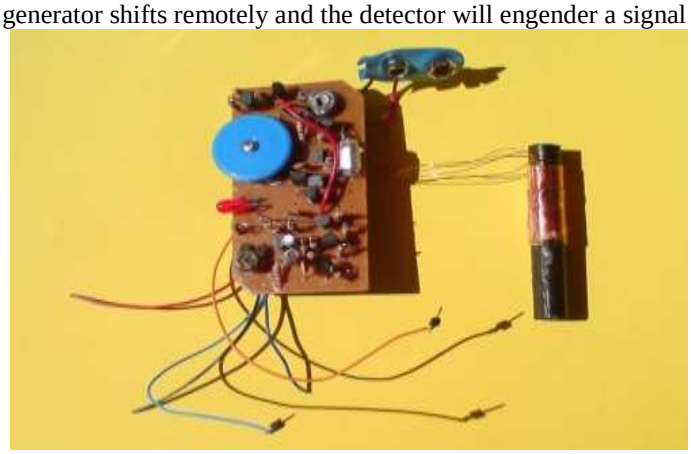

Fig. 3: Metal Detector Sensor

IV. RESULT

The arrangement of the system i.e. "Monitoring System for Railway Track" circuit shown in below fig.4.

Fig. 4: Crack and Mine Detection System

V. CONCLUSION

From the overall examination of current research on crack on railway track it is found that crack in the track have been recognized to the main factor of derailments in the past. Hence, virtue of the vital solution of this problem. There are many advantages with the proposed system when compared with traditional detection technique. The paper "Monitoring System for Railway Track" has been successfully designed and tested.

VI. FUTURE SCOPES

Here if the crack is detect, then the system is automatically stop, in case of land mine is detect the system gives buzzer, but we are not sending any crack and mine location and image anywhere. We may also send the latitude and longitude values of crack on the track to the mobile number by using GPS and GSM technology.

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