

SOLAR BASED RAILWAY TRACK FAULT DETECTION SYSTEM

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Abstract – Nowadays, our country India has one of the top largest networks in the world. But as per reliability and Safety parameter we do not have to reach positively with Global standards. Many accidents in railway line is due to the railway track fault. These accidents cause gross damage to our vital property. So, it required more effort for improvement of reliability and Safety standards. The aim in design an autonomous vehicle for railway track fault detection using some components like IR sensor which is used to detect crack on rail line after detecting crack it is also required to detect fault location it is fulfilled by GPS. The location of the fault is defined by the value of longitude and latitude coordinates from GPS module. This location is sent to pre-defined number by using GSM through SMS. In our whole system the central component is Arduino. The autonomous crack detection vehicle is powered by solar panel and battery. So, it is very energy efficient system.

Key Words: Railway track monitoring system, IR sensor, GSM, GPS, Arduino.

1. INTRODUCTION

India has 164 years of great history of railway network. The first train in India was started on 16th April 1853, Saturday at 3:35 P.M. between Bori bunder to Belgaum. Now onwards India has world's top largest railway network. Its length is 1,19,630 Km of total track and running route is 66,687 Km with 7216 stations. In India billions of passengers are traveling in railway. So, it is necessary to required safety and reliability of railway network.

According to newspaper 90% of railway accidents are occur due to railway track fault. Generally, railway track fault is occurring due to natural climates or any other mechanical damage. This cause unnecessary railway accidents and damage our valuable property of railway. So, for reduction of railway accidents we think one of the idea. By using an autonomous railway track crack detection device, we can reduce railway accidents and save people life.

So, the project relates to reduce railway accidents by using autonomous railway track crack detection vehicle for finding railway crack. It is based on solar power so its required very less amount of external power.

1.1 Aim

In this project we put up the section of railway line surveying system. In our tacit system it is used to detect the

railway crack. This project consists of IR sensor. The IR sensor is used to find fault. For gating location of fault, we use a GSM modem. The GSM module is used to send the location data in latitude and longitude coordinates to the present predefined number as an SMS. The importance of this project is that applicable for 24-hour detection process applicable both day & night time detection process.

1.2 Objective

The basic objective of this project is to give an indication or alarm to us that there is a breakage of railway line or there is any object in front of the railway track. In this proposed project, Arduino is used for multiple operation with a single device and IR sensors are controlled with help of Arduino. Solar plate is used to charge battery, so it is energy efficient system.

Our main objective of this project is:

- To prevent security to the railway track.
- Reduce labor cost and human efforts.
- Reduce rail accidents.
- Detection of railway track crack.

1.3 Problem specification

India has one of the world's top largest railway network. Manual inspection and detecting a fault in railway track is very irritating process and required lot of time and human resources. The project aims in designing solar based railway track fault detection system. It is also capable of monitoring location of fault by using GPS module and send one alert SMS through GSM module. The central component of whole system is Arduino.

2. BLOCK DIAGRAM

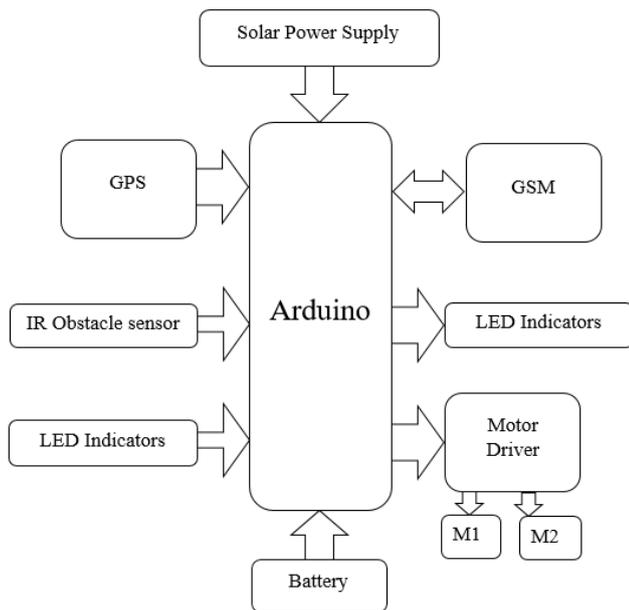


Fig-1: Block diagram of solar based railway track fault detection system

3. IMPLEMENTATION

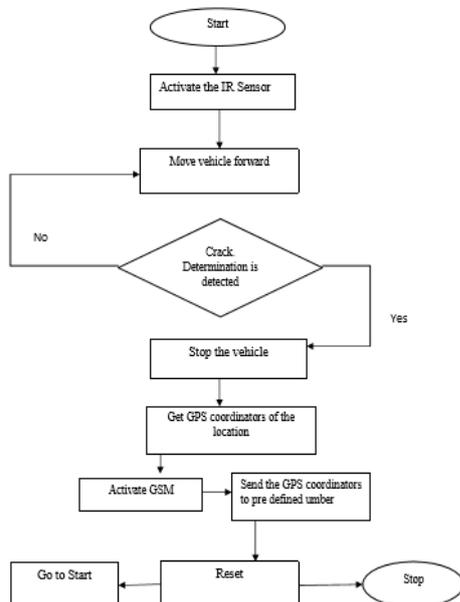


Fig-2: Flow chart of solar based railway track fault detection system

The block diagram shows basic construction of railway track fault detection system which is used for crack detection. The central component of this project is Arduino. The main objective of the project is to define any railway track fault using this system, which can be implemented in

by Railway. The proposed of this project is simplify the railway line maintenance and easy to find the fault. The main design of the autonomous track detection vehicle and Arduino software related to it are very simple and can be easily adopted by the present system. The current system has railway laborers walking on the railway tracks and detecting the fault manually. This requires a lot of time and labor. In some countries railway crack detection is carried out using LDR sensors. In its placed we are using IR sensor for railway track crack detection.

When the vehicle is Powered On, it moves along the model track. The IR Obstacle sensors monitors the condition of the tracks. When a crack is detected by the IR sensor the vehicle stops at once, and the GPS receiver triangulates the position of the vehicle to receive the Latitude and Longitude coordinates of the vehicle position, from satellites. The Latitude and Longitude coordinates received by GPS are converted into a text message which is done by Arduino. The GSM module sends the text message to the predefined number with the help of SIM card that is inserted into the module. Once crack is detected the message has been successfully sent to the number, the vehicle stops its movement.

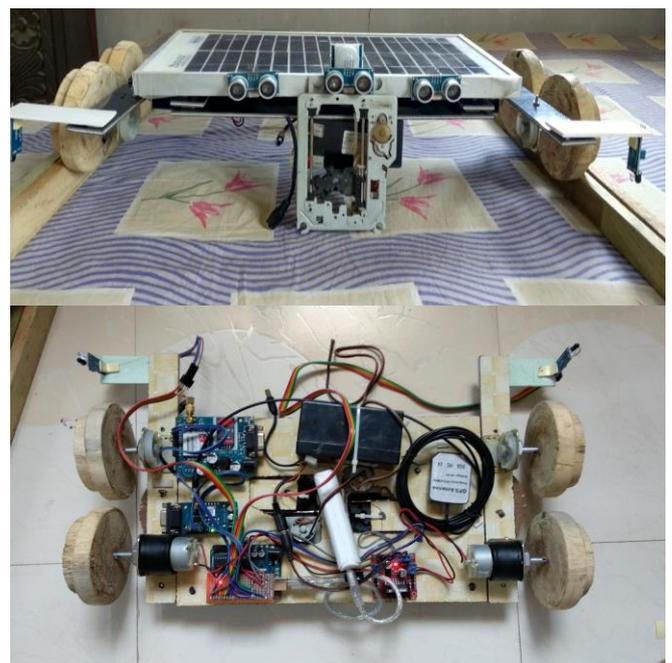


Fig-3: Model of railway track fault detection system

4. RESULTS

We are implementing simple autonomous vehicle for detection of railway tracks crack. But here we can see the sensing speed of sensors is less accurate. So, some time it will be failing to detect the crack. Overall speed of our autonomous vehicle is also less. In rainy season and any different atmosphere is not working properly and fail to detect the crack. The design is expected to be robust and cost

effective and will also function efficiently. This method will be helpful in regular track checking as it is more convenient than the handheld checking system. Also, chances of error are less as Global Positioning Satellites are used to determine the exact location of the crack. The robot will move over the rail sleeper beds lay at the center of the rail track. Robot consists of two arms like structure on either side of the system. On that arm we are connecting IR sensor for detection of track crack. In this system we are also using a solar panel for power supply. So, it is very energy efficient system.

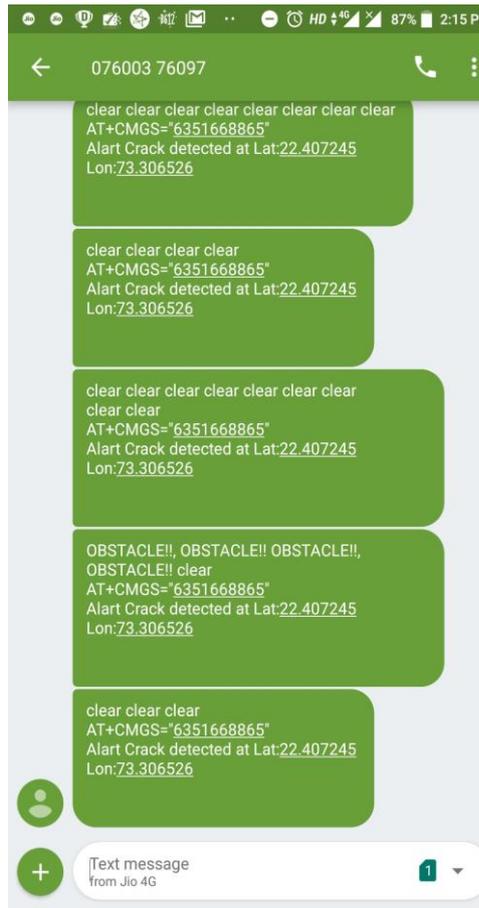


Fig-4: Screenshot of location of railway track fault detected

5. CONCLUSION

As per our project idea the main purpose of autonomous vehicle is to find the railway track fault and it is also useful for railway maintenance department for inspection of railway track. By using this vehicle, we can also reduce the accidents of railway. We can also find fault location by using this device and location information is send to the pre-defined phone number. This will help in maintenance and monitoring of railway line. By using solar this device required very low power consumption. We can also say that it is a free energy vehicle.

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