

# Major Railway Track Damage Identification Using Raspberry Pie and Internet of Things

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**Abstract**— The main objective of this paper is to make a simple, effective and portable robot for the identification of major railway track damages using Raspberry pie and Internet of things. It also uses a GPS system to get the exact location of the damaged track. A robot will move across the railway track with IR sensors placed on it to detect flaw on the track. Its location will be traced and will be transmitted to the main server. Many projects have been already done on this topic earlier using image processing but this paper mainly focuses on identifying the demarcated areas of track circuit on which there is no such arrangements are done to detect any flaw in the track with the help of latest technologies. It will also reduce the responsibilities of manpower to manually check the track for damages.

**Keywords**-Raspberry pie;Internet of Things;GPS system;Sensors

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## I. INTRODUCTION

Railways are the principal mode of transportation for freight and passengers in India. Railways also make it possible to conduct multifarious activities like business, sightseeing, and pilgrimage along with transportation of goods over longer distances. Apart from an important means of transport the Indian Railways have been a great integrating force for more than 150 years. Railways in India bind the economic life of the country as well as accelerate the development of the industry and agriculture. But today I have to say with a grave sense of disappointment that this system is full of conventional stereotypes that have existed since the advent of railways in 1948, one such being the gruesome state of the employees who play a pivotal role in the lucid management and safety of this huge network. India may have risen up the ranks on terms of quantity(of passengers and revenue) but sadly not in technological advancements.

One caustic fact is that whole of railway network is largely dependent on man force rather than machines for track review and flaw detection in the tracks. No matter how deft there eyes are, humans do err, significantly more than machines. Moreover, the conditions in which these “gang-men’ have to live are quite grim, being constantly under the threat of wild animals during the nightfall at odd locations in addition to falling prey railway mishaps themselves. So this “Major track damage detection system” is an effort to ameliorate the present day scenario.

## II. OBJECTIVE OF SYSTEM

- Major Derailments occur in Railways due to track damage.
- So it is necessary to trace the exact location of the crack so as to notify it to the various stations

- Sometimes station fails to monitor certain part of their track circuits.  
So there is a need to make certain devices which can overcome these issues.

## III. BLOCK DIAGRAM

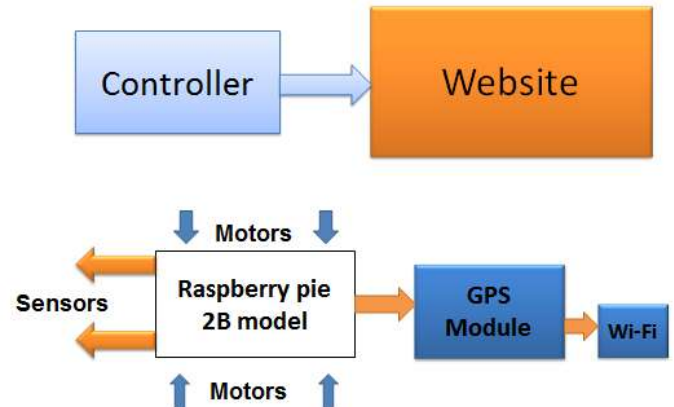


Figure: Block Diagram

## IV. WORKING

The mechanism works on a simple principle i.e. the robot will move on the railway track continuously and as soon as the IR sensors gets the input signal low, it will stops the robot and sends the exact location to the server via Internet.

For doing so, a client and server are to made where robot act as client and the person who is monitoring the locations will handle the server side. Therefore for connecting the robot to the Internet a USB Wi-Fi Dongle is connected to the raspberry pie which sends the location data over the Internet.

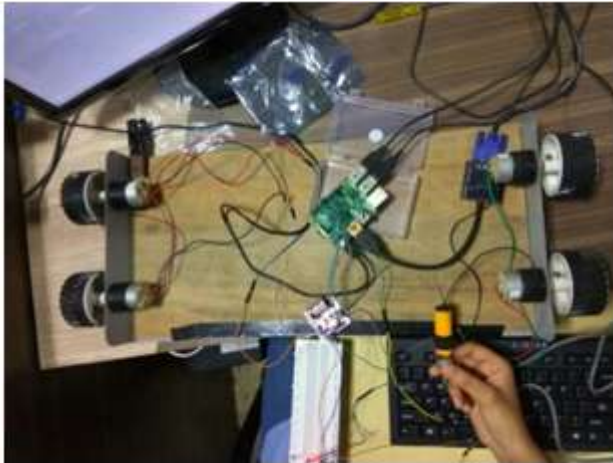


Figure: Actual Robot with IR sensor

#### V. SYSTEM COMPONENTS

The system contains both hardware & software components which are given as following:

##### Hardware Components:

###### A. *Raspberry pie*:Raspberry pie 2B model

- Broadcom BCM2837 Arm7 Quad Core Processor powered Single Board Computer running at 900MHz
- 1GB RAM
- 40pin extended GPIO
- 4 x USB 2 ports
- 4 pole Stereo output and Composite video port
- Full size HDMI
- CSI camera port for connecting the Raspberry Pi camera
- DSI display port for connecting the Raspberry Pi touch screen display
- Micro SD port for loading your operating system and storing data
- Micro USB power source

###### B. *Global Positioning System (GPS)*:GlobalSat BU353 S4 USB Receiver

###### C. *Industrial IR sensors*:Capactive PNP Sensors

###### D. *USB WiFi Dongle*:Edimax ew-7811un

###### E. *Motors* :Dc Geared 300 RPM Motors

###### F. *Motor Driver IC*: L298N H-Bridge IC

###### G. *Robot*: Picture is given below



##### Software Components:

- A. *Raspberry pie OS*:Raspbian Jessie operating system .
- B. *Programming language*:Python
- C. *Website*: HTML based website for displaying locations.
- D. *Putty Software*

#### VI. ADVANTAGES

1. Track status will be available online on website.
2. Dependency on manual work will be reduced.
3. Robots embedded with temperature sensors can be useful to know the atmospheric conditions of certain location.

#### LIMITATIONS

This Concept is not fully functional on dense railway tracks.

#### VII. CONCLUSION

Digitalization of railway track has a large scope and have various applications like monitoring the environment during fog conditions which are also the main reason for derailments.

This project provides a unique approach towards observing the railways tracks in real time and sending the same data in short span of time with the help of advanced technologies.

#### VIII. ACKNOWLEDGMENT

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