

# A Railway Locomotive Monitoring System Using IoT

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## ABSTRACT

The explosively growing demand of internet of things (IoT) has rendered broad scale advancements in the fields across sensors, radio access, network, and hardware/software platforms for mass-market applications. A cost-effective IoT solution consisting of device platform, gateway, IoT network and platform server for smart railway infrastructure. The IoT solution applied for the smart railway application makes it easy to grasp the condition information distributed over a wide railway area. One of the important issues for railway operators is maintenance of their railway systems. The railway system consists of various entities including train vehicles, tracks, facilities (i.e. tunnels and bridges), catenary and electrical devices in trackside. It is essential for the railway operators to guarantee that every entity of the railway system operates in good condition. Any operational faults are supposed to be strictly prevented, because an unexpected fault may threaten the safety of massive passengers. The proposed railway locomotive monitoring systems as the facilities like estimation of the fuel consumption & distance covered by train, to detect unwanted objects on tracks & any cracking in the tracks and also provide health services to the passengers.

**Keywords:** Internet of Things, Smart railways, Fuel Consumption, Object Detection, Tracks cracks.

## I. INTRODUCTION

Railway has been playing a fundamental role of public transportation from 19<sup>th</sup> century, in which a steam locomotive began to be run. From that moment, the railway was regarded as a core method to transport massive population moving along the determinant paths within and between metropolitan cities

The industrial “internet of things” has had a major impact on the transportation industry, with the advent of autonomous vehicles and improved cargo management. One area that has seen less coverage is the connected railway. The fact that trains operate at such high speeds through tunnels and extreme

weather conditions, presents real challenges when it comes to deploying IoT systems. However, advances in networking have made smart trains a possibility, and one that could provide significant benefits when transporting goods, providing comfort for passengers and increasing operators’ return on investments.

In fact, train management systems in which trains become interconnected communication hubs, transmitting data among themselves and to network control centers, and receiving instructions from control centers, is gradually replacing legacy infrastructure. Machine-to-machine communication, with some help from the cloud, enables operators to utilize equipment, tracks and stations more efficiently, while dramatically reducing safety risks.

## II. OBJECTIVES

Railway system is the most commonly used transportation mode in India. It is also one of the modes of transport that faces a lot of challenges due to human errors such as accidents, collision etc. Railways are performing fault detection by means of manual inspection so it is better to go for advanced system where railway track damage status monitoring by using sensors and transfer related informed through wireless sensor.

The objectives of our railway monitoring system are:

1. To estimate the fuel consumption.
2. To provide health services to the passengers.
3. To detect cracking in railway tracks.
4. To detect unwanted objects on the Track.

## III. SYSTEM DESIGN

The aim of our project is to develop a railway monitoring system-using IoT. The Figure 3.2 shows architecture of our proposed system. The system has been designed using Raspberry Pi microcontroller, two IR Sensors, Pi Camera, Heart Beat sensor and a power supply. All these things are connected with IoT server and the output can be seen on mobile or PC.

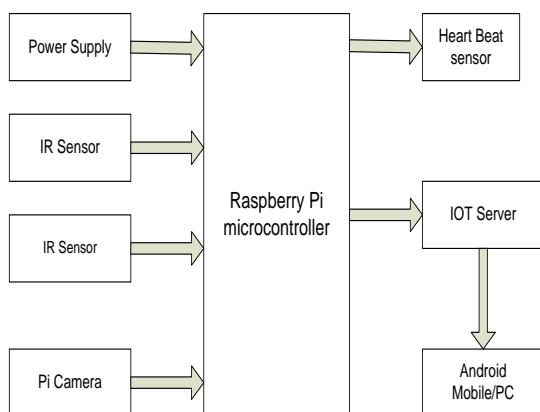


Figure 3.1 Architecture of railway monitoring system

The IR sensors are used to detect cracking in railway tracks & to detect unwanted objects on the Track. If cracks or unwanted objects are present on the tracks then that information will be send to driver as well

as to the controlling unit and train will be stopped immediately.

Pi Camera is used to capture the people on the platform in a particular station. It helps to study the density of the people in a particular station so that driver will know how much seconds/minutes train can be stopped.

In our proposed has facility to monitor health conditions of the passengers who travel in train, Using Hear beat sensor the passenger health medications will be done. If passenger health condition is not proper, immediately message will be send to doctor of nearest station, so that passenger will be provided with proper medication.

## IV. RESULTS

The following are the few snapshots and results of our project. Figure 4.1 shows conFigureuration of PuTTY software, which is used to connect user to Raspberry pi board.

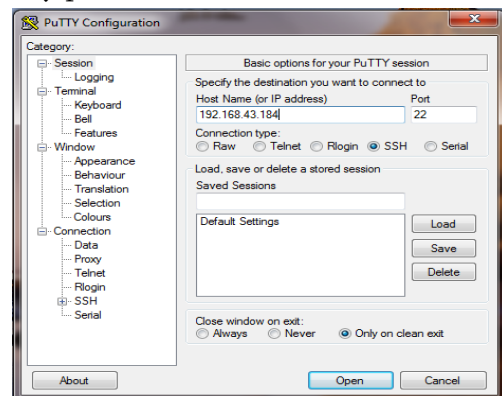
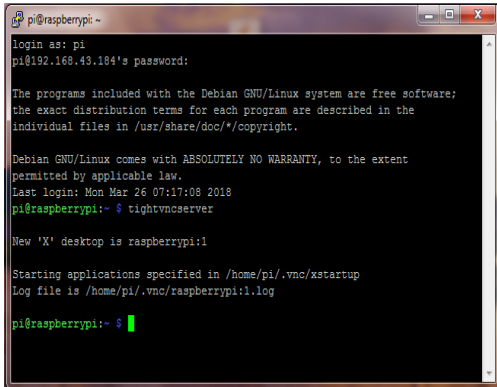


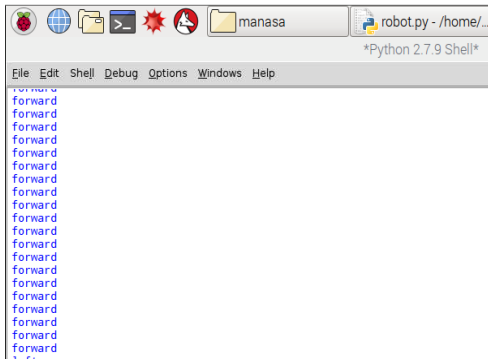
Figure. 4.1 PuTTY ConFigureuration

Figure 4.2 shows connecting to VNC Server by using IP address.



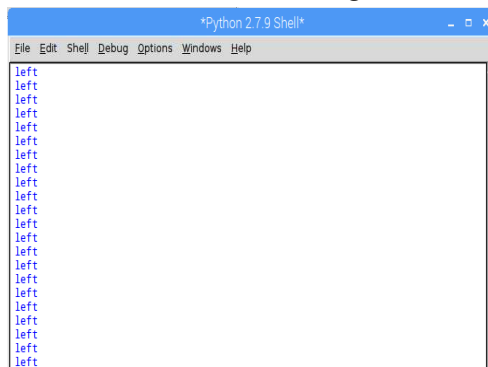
**Figure. 4.2** Connect to the server

Figure 4.3 shows snapshot of when there is no object on the track. if there is no object found on the track. It gives the message to the Driver to move the Train forward.



**Figure. 4.3** when there is not object on the track.

The presence of any unwanted objects will be detected, our model also identifies whether object is in right or left track as shown in Figure 4.4.



**Figure. 4.4** shows the object placed on the track.



**Figure. 4.5** Patient Health Monitoring.

## V. CONCLUSION

In our project, we aimed to provide a monitoring system for railway using IoT by including many features like estimation of fuel consumption, detection of cracks and objects on tracks and provide health medication to the passengers.

## VI. ACKNOWLEDGEMENT

A Successful project is a dream comes true for any student and to fulfill this dream, efficient teamwork is required. I am thankful to many people who are directly and indirectly involved in this project.

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