



OPEN ACCESS INTERNATIONAL JOURNAL OF SCIENCE & ENGINEERING

SMART RAILWAY SYSTEM FOR SAFE TRANSPORTATION

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Abstract: In day to day life it is necessary to develop a railway safety monitoring system by which human being having fallen onto the tracks from a platform and obstacles in the level crossing can be detected. We propose a method for detecting a stationary or moving obstacle by the technology which employs the Infrared Radio frequency obstacle detection and the technology to fuse these techniques. Our method is designed for detecting obstacles on the track in the range ahead by using IR Sensors mounted on a track and for railway gate is to be controlled so that the road traffic is to be predicted. The railway gate is to be closed when a train is passing by the way. The opening and closing of the gate is to be done using DC motors and this DC motor is controlled by Android App. The signalling of the train is also controlled depending upon the gate position. So in this project the railway signalling includes the gate control is done using microcontroller. The opening and closing of the gate and also the signalling which depending on the gate position that will be controlled by the android app.

Keywords –Security, Integrity, Protection, Data description languages, Data manipulation languages, Query languages, Query processing

I INTRODUCTION

IoT is the ability to transfer data over network without required human-to-human or human-to-computer interaction. In India, the number of accidents resulting in injury or death on station platforms is increasing at a higher rate than ever before. We are currently developing obstacle monitoring system, for detecting obstacles on tracks via sensors. It also provides safety to road users by reducing the accidents that usually occur due to carelessness of road users and errors made by the gatekeepers. This system is designed using microcontroller to avoid railway accidents happening at railway gates where the level crossings.

Safety and reliability are highly notified in all transport systems. Nowadays, with the development of high speed railway, speed and capability of the trains constantly increased, and traffic density gets more and more serious. High speed train operation with high reliability and safety requirement enhances increasingly. However, safety of high speed railway extremely depends on its surrounding environment. To overcome these issues smart railway system for safe transportation is come forward.

At present many accidents are occurring in railways due to which many people are losing their lives. The reason for accidents is obstacles on the railway track, broken railway

tracks and sometimes human intervention. Railways are one of the primary medium of transport in India. Everyday approximately 10.8 million passengers traveling by train. So, the safety of the passengers has to be ensured.

II SYSTEM ARCHITECTURE

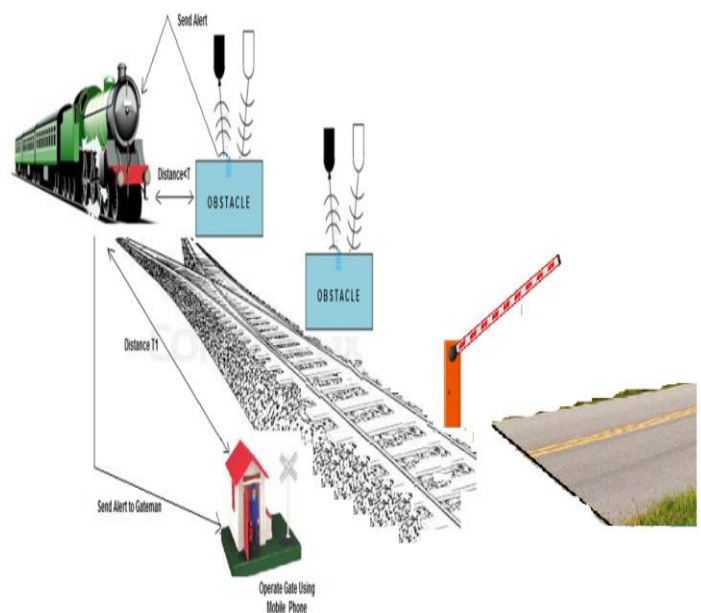


Figure 1 System Architecture

The obstacle detection system is designed for safety applications in railway. A train is the popular conveyor of the people next to Bus. Railways are important part of a country. The automation of train is important as a mishap makes more damage to its travellers and the department. In order to achieve increased flexibility automated trains would be a promising step ahead.

A. Tracking the train using GPS

GPS is a device used to track anything in which it is embedded. The main aim of our system is getting the train location with the help of GPS technology. It helps us to provide satellite localization information to track, locate and calculate the speed information about the train like latitude, longitude and altitude in real time. Nowadays most of the android mobile phones have a built-in GPS tracker. Initially the engine driver needs to switch on the GPS location in his mobile phone.

B. Indication to Engine Driver

When any obstacle is detected on the railway track using IR sensors, then signal is send to the engine driver. After that Engine driver will control the train.

C. Controlling the gate using application

The microcontroller in the railway gate receives the command from the smart phone. The microcontroller is the low power and high performance microcontroller. This microcontroller controls the railway gate in both clock wise and anti clock wise direction based on our program.

III LITERATURE SURVEY

[1]A multi-sensor obstacle detection system for the use on railway track was specified, implemented and tested. The applied look-ahead sensors are: Video cameras (optical passive) and LIDAR (optical active). The objects delivered by the sensors were fused, classified and their description is sent to the central vehicle unit. It has been shown that the fusion of active and passive optical sensors and a railway track data base lead to very robust system performance. The overall detection performance has shown to be comparable to that of a human driver.

[2]This is a cost effective yet vigorous solution to the problem of railway track geometry survey utilizing a method that is unique in the sense that while it is simple, the idea is completely novel and up till now untested. The project discusses the technical and design aspects in detail and also provides the proposed multi sensor railway track geometry surveying system. This project also presents the details of the implementation results of utilizing simple components inclusive of a GPS module, GSM Modem and MEMS based track detector assembly.

[3]Railway is major part of India and it is being the cheapest way of transportation today. Daily newspapers show different accidents in the railway track. Railway accidents caused by

obstacles are the most important issues that should be solved. There are many methods used to detect obstacles in the railway track. This paper gives an idea about various methods of obstacle detection in railway track.

[4]Railways are one of the primary medium of transport in India. Everyday approximately 10.8 million passengers travelling by train. So, the safety of the passengers has to be ensured. The proposed railway system is fully automated using RFID, Bluetooth, GPS, Wi-Fi and Live Video Streaming.

[5] Autonomously driving trains are under development for future systems to enhance public passenger traffic. However, the safety level for this application has to be the same as in conventional systems. Therefore, very capable sensor systems are considered which should detect all obstacles in front of the train. For this reason, a multi sensor system containing radar and video technology is under investigation for this challenging application.

IV MATHEMATICAL MODEL

Input: It is get from platform and obstacles using Sensor.

Output: Controlling the gate position and accidents avoidance.

Success Conditions: If all obstacles detected successfully.

Failure Conditions: If the sensor Fails to get input.

Let S be complete System: $S = \{I, F(x), O, \text{success, failure}\}$

Where I= Input set, $F(x)$ =set of functions, O= Output set of system

$$I = \{TL, IR, thr1, thr2\}$$

TL = Train location credentials,

IR = IR sensors

T= threshold values

$$T = \{thr1, thr2\}$$

$$O = \{DA, GP, NC\}$$

DA=Driver will get alert from sensor once obstacle detected

GP = Gate position control

NC = Normal condition

$$F(x) = \{OD, D\}$$

OD= Object Detected

D=distance

$$D = \sqrt{(x2 - x1)^2 + (y2 - y1)^2}$$

$(x1, y1)$ =coordinates of train location

$(x2, y2)$ =coordinates of sensor location

$$p \rightarrow d$$

p=obstacle detected

d=distance calculation from sensor to train location

$$q \rightarrow s$$

q=distance is less than or equal to threshold value 1

s= send alert to train driver

$$\sim p \rightarrow n$$

$\sim p$ = obstacle not detected

n= normal condition

$r \rightarrow w$

r=distance is less than or equal to threshold value 2

w=send alert to gateman

$\sim r \rightarrow n$

$\sim r$ =distance is greater than threshold value 2

n= normal condition

Success =Driver will get alert from sensor once obstacle detected

Gateman get alert once train cross min limit distance Failure = No Alert Receive

V CONCLUSION AND FUTURE WORK

It is the need of the hour to safeguard the people from railway accidents and ensuring the safety throughout the journey. There are many people are using trains as their mode of transportation and train can carry many passengers at a time. The growing population needs more trains for the transportation where in which safety is the main criteria. The developed communication system can pass reliable information to the train well in advance. The engine driver can control the train based on the information passed by the communication system. The Digitalization of railways and ensuring safety features using fast and reliable communication system makes railway a better mode of transport than the others.

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