Prevention of Railway Accidents by Automatic Gate Control and Fire Detection using IoT

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Abstract--**The present work is based on developing an automatic closing and opening of gates near railway crossing. Generally railway gates are manually handled by gate keeper. The gate keeper will get the information about whether the train is coming or not, from the nearer station. Once the train leaves the station, the station incharger will gives the information about the arrival of train to the nearest gate keeper and alert him to get ready to close the gate. This human intervention can be avoided by using this system. If the arrival of the train is late due to some reason, this information will not send to the gate keeper instantly.hence the gate will remain closed until the train arrives this delay will causesthetraffic problem near the gates and makes the people get into the trouble. This will be prevented by using this system. In this system infrared sensors are used to detect the arriving and leaving of train near the railway level crossing and ArduinoUNO is used to control the operation of opening/closing of gates by using mini servomotor which is placed near the gate. Another objective of this system is to eliminate the delay in order to detect the fire attack inside the compartment by using Node MCU and GPS technology.**
Keywords—**IR sensors, ArduinoUNO, Mini Servomotor, Node MCU, GPS, IOT platform.**

I. INTRODUCTION:

The railway transportation is the cheapest mode when compare to othermode of transportation in India. This railway transportation facing many problems. Closing and opening of railway gate with human intervention will causes lots of accidents due to inaccuracy. To avoid the errors caused by humans during opening and closing of gates, this system introduces the concept such as railway gate automation. This project also includes the detection of the fire attack in compartment . Because fire on running train is more dangerous , it will spread the fire very quickly to the other compartments also. This will causes huge damages. By using this system we can reduce the loss caused due to. fire accidents. Fire attacks in each compartments is detected using fire sensor which is placed in each compartment and buzzer is used to alert the passenger about fire attack and actuators which works as a water sprinkler. Blynk software is used in this project to store the history of the data.

II. MOTIVATION OF THE PROJECT:

This system will help to improve the safety of railway management and reduce the chances of the accidents due to inaccurate opening and closing of gates. Security is the major concern for everyone. In a recent days fire accidents are more due to carrying some flammable fuels or due to smoking inside the train. This is occurred due to the lack of knowledge in people. When these accidents are occurring in the area where there is no proper network for communication or during night times the chance of loss or damage will be more. In this system the delay in identifying the fire accident will be eliminated and notifying the concerned authorities, loco pilot and passenger with in no time..

III. PROBLEMSTATEMENT:

For Gate Control: They have used 8051 Microcontroller, Stepper motor and Sensors of low sensing range for

automatic Gate Control. For Fire Detection: They have used GSM and Zigbee for communication, LPC1768

IV. PROBLEMSOLUTION:

Gate Control: In our project we are using Arduino UNO, Servo motor and IR sensors. Fire Detection: ESP8266 Wi-Fi module and GPS. Another feature we have added is blynk android app which can be installed in our smartphone which has memory.

V. LITERATURESURVEY

Gate Control

YapingLei, "Research on alarm system of railway gate controlling based on GPS and GSM", 2005. This paper proposes a design of a new railway crossing warning systems using GPS and GSM for railway safety.In this GPS is used to trap the location of the train and GSM to send the information.

S.HemaLatha,"Automatic railway gate controlling and signaling", 2005. This paper proposes an automatic railway gate control system using 8051 Microcontroller to avoid accidents that occur near railway Gate.And also to reduce the time from manual gatekeeper while opening and closing gate. In this paper they have adopted automatic gate opening and closing using motor. They have used IR transmitter to detect the arrival of train.

Roman, khoeblal, "Railway level crossing gate control through GSM", 2006 .This paper also deals with the monitoring of railway gate open and close through SMS sent using GSM. GSM is interfaced with the microcontroller. When locopilot sends the SMS the microcontroller sends the output to the motor ,and the motor will open the gate or close depending on SMS.

Fire detection

Maneesha Singh, "Development of automatic fire detection and rescue system using GSM", 2007. Wireless sensor network for continuously monitoring and surveillance the range from temperature and gas sensor.GSM is to send information about the fire to near bystation .In this their main aim to design the model with cost effective and also inform the main server about fire accident immediately.

Bhubaneshwar, R Deepika "Automatic Railway System Using Wireless Sensor Network",2015. In this they are mainly concentrating to avoid the train crossing the obstacle .And also to control the gate operation using stepper motor in real time. It needs the advanced digital image processing in order to detect the suspect images. Ultrasonic sensor is used for obstacle detection.

KGT Rajeaswari "Fire safety and alerting system in Railways" 2018.In early systems due to high temperature the sensor will detect and it will wrong information to locopillot about that fire is detected so this system came into existence. In this they will set the temperature if it exceeds greater than that it will indicate the fire and send the

message through GSM. There are many suction ducts will be present at each compartment of train along with C02 fire extinguisher for fire compression.

Yashwanth K, "Automatic Fire Detection in Train with Disaster Management using IOT", 2019. In this if the fire is caught in fire sensor is placed to detect the fire and through GSM information is sent to nearby station and the buzzer to alert the passengers about the fire And the locopiolot gets the information about the fire and GPS to send the location and the IOT platform .[21]

VI.OBJECTIVES

- The aim and objective of the proposed project is to improve the safety of the railway system and to save human life.
- The key objective of this application is public safety.
- The main objective is:
- To automatic opening and closing of railway gates.
- To detect fire attack in train and control using buzzer.

VII.METHODOLOGY

In the proposed model we have various components like Arduino UNO, sensor IR, Red LED, Green LED, Mini servo motor.
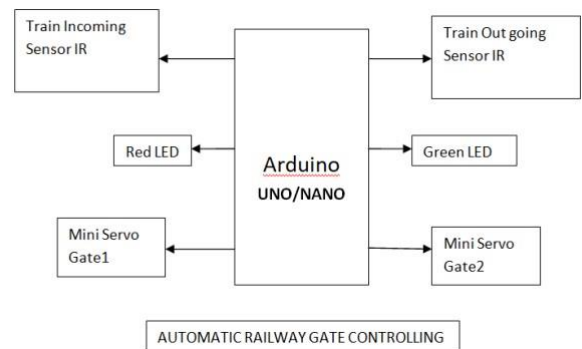
For Gate Control

Fig1:Block Diagram for Automatic railway gate control

In this paper we have used these component for automatic opening and closing of railway gate upon detecting arrival or departure of the train. The IR sensors are placed at each end of the gates that detects the train and controls the operation of gate. And also, the two led lights are provided the light has been provided to alert the loco pilot about the approaching of the train. The two IR sensors placed at the left and right side of the railway gate.

Four sensors are used in the project. These sensors are kept in the both side of level crossing gate as shown in the fig 1. All sensors are connected to arduino. When train arrives from any sides it first cross the first sensors after it crosses the second sensor, in this way arduino close the gate by sending the signal to servo motor. When train departure from any side it first cross the second sensor after that cross the sensor, in this way arduino open the gate. Servo motor receives the PWM signals from arduino and rotates the motor at fixed angle according to duty cycle of signal.

FOR FIRE DETECTION:

In this paper we have used the components like Node MCU, fire detection sensors, motors, power bank, buzzer. The circuit diagram consists of many blocks that we are using fire detection sensors called flame sensors this sensors will sense the fire in the travelling train if suddenly fire is caught by any one of the compartment then the fire detection sensors will be placed in each bogies those fire detection sensors will be immediately activated so this will help to save the passengers. We will be placing a water sprinkler in each compartment this water sprinkler will be activated when the fire is detected. And also buzzer is placed that will alert the passenger and loco pilot. This buzzer will produce a beep sound the notification is passed through IOT system for mobile to the nearest railway authority and engine compartments and the authority will take further actions to save the passengers
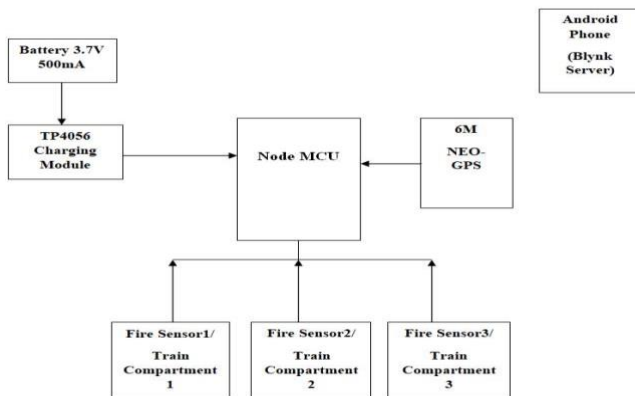

Fig2: Block Diagram for Fire detection and alert system

VIII. ADVENTAGES

- The system uses two IR sensors which helps to detect the train by opening and closing the gate.
- Low power consumption.
- Provide best safety and effective testing infrastructure.
- High performance and quick response time.

IX. CONCLUSION

- The main aim of the system is to automatic opening and closing of the gate which helps the railway system.
- It avoidsrailway accidents by automatic opening and closing of the gate.
- Reduce the death loss occurring due to fire accidents in train is presented.

X. RESULT

In this project we are using both hardware and software components. Two IR sensors are placed near the gate which sense the train arrival and departure.Mini servo motor which helps to automatic gate control. Node MCU, GPS module, Blynk software and fire sensor is used to detect the fire occurrence in the train. While the Buzzer will be used to alert the passenger and loco pilot about the fire.

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