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Advanced Railway Gate Security System

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***Abstract*: The advanced railway gate monitoring and control system makes use of WSN (wireless system network) along with an alerting system. The main aim of our project is to monitor and manage the control system of railway gate using the wireless communication. The proposed model has been designed using obstacle sensor and WSN based circuit to avoid railway accidents occurring at unattended railway gates. Here we use IR sensor to sense either the railway gate in the open condition or closed condition. This information is transferred to the train section which is near to the railway gate. The Loco-Pilot will send the signal to the gate to close the railway gate. Also, we detect the vehicle in between the railway gate. If no obstacle is found a green signal is given to the loco pilot of the train to pass; otherwise a red signal is given to slow down.**

***Keywords*: Control system, IR sensor, Obstacle detection, Railway gates, Wireless network.**

1. Introduction

Train is the popular conveyor of the people next to Bus. Railways are the lifelines of a country. The automation of train is essential as a mishap makes more damage to its travelers and the department. Currently there are two types of railway gates, one the interlocking and other is the non-interlocking gate. Interlocking gates have better safety since green signal is given only when the gate is closed else the signal stays as red by default, but there are nearly 600 non interlocking gates all over Southern railways, which solely depends upon the gate man. Since human error may occur we designed a setup to monitor the condition and to control it from the loco engine room itself. To defeat the issues in the unmanned railroad level intersection, this venture has been planned. It manages two things. To start with, it manages the lessening of time for which the gate is being kept shut. And afterward, to give wellbeing to the street clients by diminishing the mischances that for the most part happen because of thoughtlessness of street clients. This venture takes care of the issue happening in the unmanned railroad level intersection in a canny path, by utilizing a ZigBee indicate point correspondence. This strategy is utilized to recognize t before/after specific km from the gate to caution the street clients. The prepare module is settled in the front part of a prepare and it has a ZigBee transmitter that constantly sends an extraordinary coded information. A ZigBee beneficiary is put at the gate module. The gate module sits tight for the code number to be gotten. Once the flag from the prepare transmitter coordinates the put away information, the gate module realizes that a prepare is drawing nearer and it enacts the speaker and the status is known through the LCD show, after that engine driver sits tight for some time(ex:30sec) then it drives the engine to close the entryway. After the prepare crosses the correspondence run gate module stops the alarming speaker and entryway come back to its underlying state. By this framework the human blunder is disposed off. The issue of mishap dangers, at un-kept an eye on level intersections is subsequently tackled.

2. Existing system

Table 1
Literature survey

Title	Abstract	Year
1.Video analysis based railway and road safety system	The implementation of system involves monitoring the railways gates with video surveillance and alerting the vehicles at level crossing	2015
2.Automatic railway gate control using Arduino & IR sensor.	In this system, an IR sensor is installed before every railway gate so to detect the arrival of trains and to control the gate.	2018

3. Proposed system

In our proposed System, the railway gate is monitored and controlled by the loco pilot. The IR sensor will be used to check the railway gate condition, whether iut is in opened or closed condition. The ultrasonic sensor is used to find any vehicle blocked in between the railway gate. The Loco pilot will get all the information about the railway gate condition by using the wireless communication. Here the railway gate is controlled by the loco pilot.

Advantages: The loco pilot aware about the railway gate condition. We can reduce the accident.

4. Methodology

A. Gate section

In the Gate section, the railway gate condition is monitored by using the IR sensor. This will check either the gate is in open or closed condition. Also the ultrasonic will check whether any vehicle present or blocked in between the railway gate. The wireless communication will transfer the information about the railway gate condition to the loco pilot. Also it will receive the information from the train section to open or close the railway gate. The LED is used for the signaling the loco pilot. If any vehicle is present in between the gate, the red will glow inside train engine alerting to slow down the train. If not green is on.

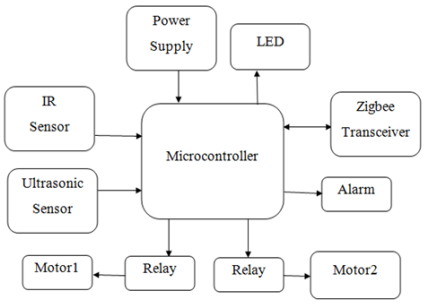

Fig. 1. Block diagram

B. Train section

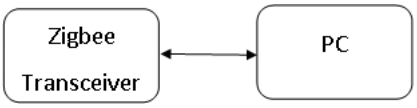

Fig. 2. Train section

The train section contains the zigbee to transmit and receive the information. Initially it will receive the information from the gate section about the railway gate condition. Also, the loco pilot will send the information to the gate section to open or close the railway gate.

5. Hardware Description

- Microcontroller
- IR Sensor
- Ultrasonic Sensor
- LED
- Zigbee Transceiver
- PC

A. IR Sensor

Operating Voltage : 3.0V – 5.0V
Detection range : 2cm – 30cm

Fig. 3. IR sensor

B. Current Consumption : at 3.3V: ~23 mA, at 5.0V: ~43

Active output level: Outputs Low logic level when obstacle is detected On board Obstacle Detection LED indicator.

C. Ultrasonic sensor

Power Supply : +5V DC
Quiescent Current : <2mA
Working Currant : 15mA
Effectual Angle : <15°
Ranging Distance : 2cm – 400 cm/1″ – 13ft
Resolution : 0.3 cm
Measuring Angle : 30 degree
Dimension : 45mm x 20mm x 15mm

Fig. 4. Ultrasonic sensor

D. Arduino uno

Fig. 5. Arduino uno

Microcontroller : ATmega328
Operating Voltage : 5V
Input Voltage : 7-12V
Input Voltage : 6-20V
Digital I/O Pins : 14 (6 provide PWM output)
Analog Input Pins : 6
DC Current (per I/O Pin) : 40 mA
DC Current (for 3.3V Pin) : 50 mA
Flash Memory : 32 KB (ATmega328)
SRAM : 2 KB (ATmega328)
EEPROM : 1 KB (ATmega328)

E. Zigbee transceiver

Fig. 6. Zigbee trans receiver

Standard : IEEE 802.15.4
Frequency : 2.4 GHz, 784 MHz, 868 MHz and 915 MHz (country specific)
Range : 10 to 100 meters (line of sight)
Data Rate : 20 kbps to 250 kbps
Network type : Mesh networking and device to device Communication.

6. Conclusion

The project proposes an idea of ensuring safety to greater extent at railway level crossings. Our monitoring system is

wirelessly operated so that relays and wiring cost are eliminated too. By this wireless monitoring the condition of the gate, human errors can be minimized which would otherwise may happen if it solely depends on gate keeper.

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