A warning and passenger safety system for railway compartment using WSN

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ABSTRACT

Railway industry plays a critical role in transportation and transit systems attributed to the ever-growing demand for catering to both freight and passenger. 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 in charger 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 cause the traffic problem near the gates and makes the people get into the trouble. This will be prevented by using the system. In this system we are using relay driver to control the gate through WSN. The objective of this system is creating a safety for women if they abused by someone, theft their things and illness of passenger in the compartment by pressing the emergency request to send information through zigbee to communicate in nearer station. In this system we are implementing the RFID reader to avoiding the fraud of passenger to travel without taking a ticket. This project helps us to avoid the hindrance happens from the passenger in the compartment and shows the information in the PC user of the railway station.

Keywords — PIC Microcontroller, RFID reader, Emergency request, Zigbee, Door control, Relay driver and Railway gate control.

1. INTRODUCTION

The railway transportation is the cheapest mode when compare to other mode of transportation in India. This railway transportation facing many problems. Closing and opening of railway gate with human intervention will cause 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 compartment also. This will cause huge damages. By using this system, we can reduce the loss caused due to fire accidents. Fire attacks in each compartment is detected using temperature sensor which is placed in each compartment and buzzer is used to alert the passenger about fire attack. Therefore, the objective of the research is to design and develop a prototype model based on IOT that includes the revealed features for automated door accessing system to aid and insert visually impaired people. In order to attain the objective, the existing literature has been reviewed to understand been reviewed to understand the required features that should be included for developing such a system for visually impaired people and develop a prototypical system based on IoT that includes the required features.

2. PROPOSED WORK

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 day’s 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 chances 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 within no time.

The arrival and departure of train is sensed by the sensors and transmitted to the controller. There’s a loop that keeps running in the controller that always checks the sensor output. If the sensor outputs the signal, the controller instructs to close the gate using zigbee and play the buzzer to alert the users. Same process happens if the train is coming from another side. The delay between sensed signal and closing of gate is kept small here (500 ms). But in real life the delay is kept more.

3. HARDWARE USED
3.1 PIC Microcontroller
The microcontroller employed in our project is PIC 16F877A. The microcontroller is used for entire control. The core controller is a mid-range family having a built in SPI master. 16F877A have enough I/O lines for current need. It is capable of initiating all intersystem communications. The master controller controls each functions of the system with a supporting. Also responsible for reception of commands from the host and taking necessary actions. PIC16F877A is an 8-bit fully static EPROM/ROM-based CMOS microcontroller. It employs RISC architecture with only 35 word/single cycle instructions. All these instructions are single cycle (1ms) except for program branches which takes two cycles. The PIC16F877A products are supported by a full featured macro assembler, a software simulator C compiler etc.

![Fig. 1: Pin diagram of PIC microcontroller](image)

3.2 Zigbee
A wireless network which combines driver’s display unit and signal transmitter is considered to be one of the reliable applications. This network is composed of micro sensor nodes which have the ability to calculate. These nodes can monitor collect information of different locations in the coach.

Zigbee is low-rate, low-cost and low-power kind of short-range wireless network communication protocol. Compared with other wireless technologies, Zigbee techniques has provide important of unique advantages are safe and reliable in data transmission and more flexible network configuration, low cost for equipment and long-lasting batteries. By applying a wireless sensor network based on Zigbee to a warning and passenger safety system for railway compartment, information such as RFID reader, emergency button is placed at any part of the railway compartment covered by the network could easily be collected and analyzed at any time. In addition, the system can be extended significantly, the cost of equipment maintenance could be reduced and the whole system could be optimized.

![Fig. 2: ZigBee](image)

3.3 Relay Driver
A Relay driver IC is an electromagnetic switch that will be used whenever we want to use a low voltage circuit to switch a on and off which is connected to 220V mains supply. The required current to run the relay coil is more than can be supplied by various integrated circuits like op-amp, etc. Relays are the switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show when a relay contact is normally open, there is an open contact when the relay is not energized.

![Fig. 3: Relay Driver](image)

3.4 RFID reader
Radio Frequency Identification (RFID) refers to a wireless system comprised of two components such as readers and tags. The reader is a device that has one or more antennas that emit radio waves and receive signals back from the RFID tags. RFID tags that contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader. The reader then converts the radio waves to a more usable form of data. Like barcode technology, RFID scanner recognizes locations and identification of tagged items but instead of reading laser light reflections from printed barcode labels, it leverages low-power radio frequencies to collect and store data.

![Fig. 4: RFID Reader](image)
4. SOFTWARE USED
4.1 Embedded C language
Embedded C is a generic term given to a programming language written in C, which is associated with a particular hardware architecture. Embedded C is an extension to the C language with some additional header files. These header files may change from controller to controller.

5. CONCLUSION
In this system, we use the advanced features of PIC microcontroller and ZigBee communication technique, proves to be effective in achieving the objects. It is applicable at every aspect of the railways for uninterruptible service. The proposed system ensures sophisticated security for the passenger in trains which achieved by continuously monitoring the automatic train system for WSN. Using advanced digital image processing, the system can be made to detect suspects whose images are previously accessible in the database. And a prerequisite can be provided for the coach to get locked when the urgent situation switch is triggered, thus keep away from the illegal person to escape.

6. REFERENCES