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INTELLIGENT STATION IDENTIFICATION AND PASSENGER ALERT SYSTEM IN INDIAN RAILWAYS USING RFID READER

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Abstract:

In this modern world, Technologies plays a major role in transportation especially in railways. Most common problems faced by passengers while travelling in train is that they find some difficulty to know whether they have reached their destination station or not. Though Google maps can be used to find location, it seems difficult in the absence of network. This project helps them to overcome those difficulties. A prototype model is designed. Using RFID reader and Tag, passengers are informed about the location 1km before reaching the station. Raspberry pi3 gets information from the reader and the signal is passed to the speaker. Thus, passengers can easily identify the station.

Keywords: RFID reader, raspberry pi3, train, speakers.

1. INTRODUCTION:

Transportation plays a major role in modern technologies. Especially, a huge transformation has been occurred in railways i.e. from steam engine to flight rail. The most common problem for passengers in train is that they face some difficulty to find whether they have reached their destination station. As the technology has been grown, passengers use Google maps to locate their location but it is difficult to locate in all situations. This problem can be overcome by informing about the arriving station before 1km in every compartment through the speaker. RFID reader and microcontroller are used in this system. RFID reader is placed 1km before the station. By using the information from RFID, the microcontroller processes the information and sends the signal to the amplifier. Then the signal is

amplified using an amplifier and sent to the speaker in every compartment. Three speakers are placed in one compartment. Speakers are located in front, middle and backside of the compartment. This could help the passengers to easily know their destination point.

2. LITERATURE SURVEY:

Anish NK proposed an Intelligent Location Identification and Passenger-Alert System in Indian Railways using GPS Receiver in this work they developed a system which senses the location of the train and calculates the trains speed. It will announce the destination of passengers before the station arrives by help of the speaker. For this the GPS is used for location identification [1].

Karam Hwang in his work on Ferrite Position Identification System Operating With Wireless Power Transfer for Intelligent Train Position Detection in this the location of the train is identified by the source coil segment. Information of the train's location is given by ferrite blocks [2].

L. T. Lee in their work on Active RFID System for Railway Vehicle Identification and Positioning in this they introduced the passenger alert system using the RFID tags. RFID reader is used for the system every RFID reader will receives the tag information based on its information passenger can find their exact location or their destination [3].

Nirit Datta in their work on Eradication of Elephant Mortality and Injury Due To Railway Accidents through Automatic Tracking and Alert System in this they uses the GSM and GPS system for identification of location [4].

Kim Fung Tsang worked on IEEE802.15.5/ZigBee RFID Tags and Readers for Vehicle Identification and Location Tracking System in Light Rail System in Hong Kong in this they used RFID for identification of railway vehicles the central computing units will collect the information and send it to RFID reader [5].

3. PROPOSED SYSTEM:

3.1. BLOCK DIAGRAM:

The fig.3.1.1 clearly shows the overview of the proposed methodology.

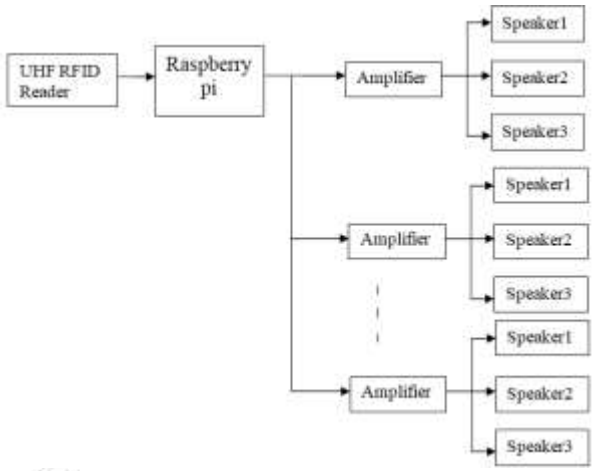

Fig.3.1.1. Block diagram of the prototype model.

RFID tag is placed 1km before the station. RFID reader is placed along with the microcontroller in the train. Whenever the train crosses the pole with RFID tag, reader reads and processes the information using microcontroller. The controller identifies the location based on the information stored in RFID and each ID having its own unique location information. So whenever the train crosses the pole with RFID tag, the RFID reader present in the train reads the RFID tag and the location will be easily decoded as string by the controller. Then it converts the input string of location into the corresponding voice output and the information is conveyed through speaker using Raspberry-pi3. Thus the passengers can easily identify the location when they are close to the station.

3.2. SPEED OF THE TRAIN:

The operational speed of the train various with respect to its type. The fig given below shows the various operational speed of the train:

Type of train	Operational speed	Average speed
High Speed	300 – 350 km/h	250 km/h
Semi-High Speed	160 – 200 km/h	110 km/h
Express Trains	110 – 140 km/h	60 – 90 km/h
Passenger	50 – 70 km/h	30 – 40 km/h

Fig.3.2.1. Operational speed of various types of the train.

As this project is designed specially for passenger train, in real time UFHRFID can be used. This could read the RFID tag which is placed in the pole at the passenger train's operational speed.

3.3. MFRC522 RFID READER:

MFRC522 is an RFID reader that works at a frequency of 13.6MHz. It is a contactless reader module designed by NXP semiconductors. It supports host interfaces such as SPI interface up to 10Mbits, I2C interface upto 400 kbits and serial UART interfaces. It is of low voltage and low cost as well as small sized. Operating current for MFRC522 is 13-26mA/DC 3.3V. MFRC522 RFID reader contains an RFID tag that matches the reader's frequency. Each RFID tag has its own unique ID which is dissimilar to each other. RFID tag should match the reader's frequency; else RFID reader does not read's the RFID tag.

Fig.3.3.1. Pinout of MFRC522 RFID reader.

3.4. Raspberry pi3:

Raspberry pi3 is a small credit card sized computer. It consists of quadcore 64bit ARM cortexA53 processor running at 1.4HGHz frequency. It contains 3.5mm jack for audio/video output. Raspberry pi3 plays as a typical computer. Raspberry pi3 also consist of CSI(Camera Serial Interface) port which enables the connection of small pi cameras and DSI(Display Serial Interface) port which is used to interface LCD displays. It is connected to the MFRC522 RFID reader. Raspberry pi and the RFID reader are placed in a train. RFID reader, amplifier and speakers are connected directly to the raspberry pi3 placed in front of the train's engine. RFID tag is placed in the pole one kilometer before the station.

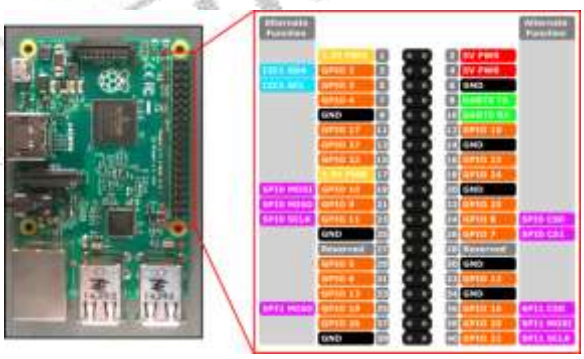

Fig.3. 4.1. Pinout diagram for Raspberry pi3

3.5. AMPLIFIER:

An audio amplifier is used to amplify the signal from the circuit. Raspberry pi3 contains the audio/video jack. Amplifier is connected to the Raspberry pi3 through an audio/video jack. The voice output from the raspberry pi3 is amplified and sent to the corresponding speakers connected to it. Thus, the

output from the speaker will be audible to the passengers.

3.6. SPEAKER:

A speaker is a device that converts incoming electrical audio signal to the corresponding sound. The amplified electrical signal from the amplifier is received by the speaker. At most 3 speakers are placed in every compartment. So that it is audible to the passengers. Speaker helps to inform the location to the passengers.

4. RESULT AND ANALYSIS:

The result of the prototype is given in the fig.4.1. When the rfid card is placed, the RFID reader reades the card and displays the information. RFID card contains unique Id. Each RFID card is assigned a separate place and placed in the particular place. Whenever the reader crosses the card/tag, the place is announced through the speaker and also the RFID card number and the assigned place are displayed on the screen if needed.

Fig.4.1. Result of the prototype.

The fig.4.1. shows the RFID card number and the place assigned to the card when the RFID reader passes through the card.

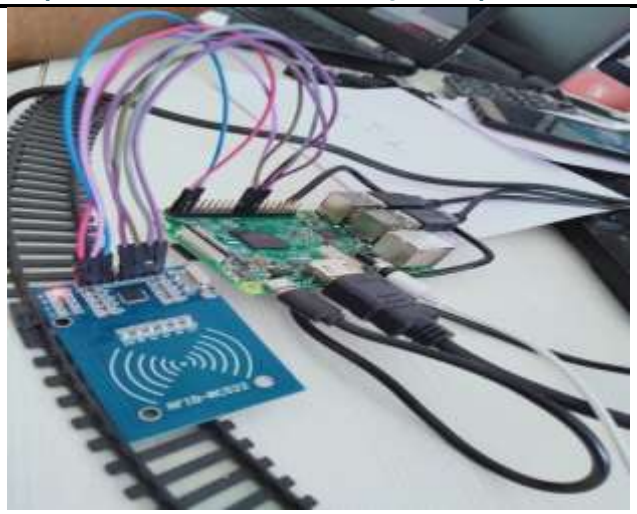

Fig.4.2. Prototype of the proposed system.

5. CONCLUSION:

This system provides an easy way to find the station for passengers inside the train. This prototype uses MFRC522 RFID reader. For real time implementation UHFRFID(Ultra High Frequency RFID) is used. UHFRFID mesures upto 10-12m and has a frequency range of 300MHz to 3GHz. It is the cheapest RFID reader for real time implementation. Through this system passengers can be alerted through speakers that help to identify the station. As the signal is amplified by the amplifiers the information from the speaker will be audible to the passengers. This system solves the problems faced the passengers in the train.

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