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RFID BASED IDENTIFICATION SYSTEM FOR TRAIN

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Abstract:

Now a day's in India most of the train accidents are occurs due to the human errors. It is very difficult to avoid to such train accidents because of the speed of train is very high and it requires some time to control it. In this paper the effective solution is present to avoid the train accidents by using Radio Frequency Identification (RFID). The primary goal of proposed system is to identify possible train collision ahead of time and to send the report to the main control room or driver before collision happens. Currently there is no solution to avoid train collision. Indian Railways have implemented solution based on ACD (Anti-Collision Device) system. Each locomotive is equipped with an automated surveillance system. The train tracks in railway network are divided into different frames and each segment has 10 km distance and given with distinct track numbers which are read by surveillance system inside the locomotive. Therefore the track id is needed to be given at 10 km distance on the train track. This track number will be shared with the base station by using Radio Frequency Communication system. The paper proposes specific way of numbering the train tracks in frames. Also a communication protocol is proposed to ensure data transfer among Radio Frequency transceivers of the systems under half duplex mode.

Keywords: RFID Tag, RFID Reader, GSM, ARM Cortex, RF Module, android device and LDR sensor.

1. INTRODUCTION

One of the most widely used and comfortable nodes of transportation system is train, but occasionally, accidents occur due to collision. It is very difficult to stop such collisions because of speed of moving trains, which needs a lead distance to stop. There have been many train accidents all over the world. As per the report from CNN IBN India dates Sept 2011 85% of the train accidents are due to human errors. The primary goal of our train collision detection system is to identify possible train collision ahead of time and to report these to the main control room or driver before collision happens. Currently there is no solution to avoid train collision. Indian Railways have implemented solution based on ACD (anti-collision device) system. They have inherent problems in Station section and near mountains due to its design concept of using GPS for track detection and have high cost of implementation. My system is used to eliminate train accidents by exploiting automated surveillance system, it is based on RFID, ARM Controller and GSM, which will help eliminate problems stated above. By implementing this automatic system which could avoid human error and problems with ACD. In this system each train track is identified by track id, every train reads and sends its track id to nearby trains. If two trains are on same track id then alert is send to main control room or to the train drivers. Radio Frequency Identification (abbreviated as RFID) has been an emerging technology in recent years. RFID technology can be effectively employed in number of applications due to its penchant for efficiency. Radio Frequency Identification (RFID) is a generic term for technologies that use radio waves to automatically identify and track product, animal, or person by means of using RFID tags that

are applied or incorporated on them. An RFID system consists of a tag, basically a microchip with an antenna and an interrogator or reader with an antenna. A fundamental system of RFID consists of two primary components: The reader circuit and tag. The RFID tag and the reader circuit set up communication via waves of electromagnetic nature.

2. LITERATURE SURVEY

The train tracks are divided into segments with individual track segment number. Whenever a train enters a segment of the track, the track number of that segment of track is read from the Radio Frequency Identification (RFID) tags present at the beginning of each segment of track. This track number read by the RFID reader is stored and then given to Radio Frequency (RF) Transceivers.

The RF communication is established among the adjacent trains, which are in the range through an algorithm (which is explained later), so that the track numbers are shared. Now the track number of its own from RFID reader is compared with the track numbers of other trains from RF Receiver. Upon detection of same track number the system will alert the motorman. With no further action (detected with the help of speed sensor) taken by the motorman after an interval of human response time, the system will override the motorman by braking the train, with the help of actuators.

In Indian railway system the train tracks are divided into different frames and each segment there is separate track id number. In the proposed system the Radio Frequency Identification (RFID) tags are attached at the beginning of each segment of track at 10 km distance. When the train enters in the specific segment, the track number of that segment of track is read by the RFID reader in the RF receiver. Then this number is stored in the memory of microcontroller then given to Radio Frequency (RF) Transceivers. The RF transmitter sends this track id to the base station. And the GSM module sends the SMS to the authorized person to take appropriate action. In this way the RF communication is established among the train and the base station. At the base station there is LED is present which is the indication of two trains at the same track.

3. RELATED WORK

RFID tags are the components which are uses for the purpose of identification. The tag has a sequential arrangement of metal pins. The most significant feature of this, is the uniqueness exhibited by each of them. Depends on the power source applied to the tag and the maximum range. The unique digital data of the tag is decoded with the help of RFID reader. The RFID reader transmits an electromagnetic wave which is the input to the tag. The unique arrangement of metallic pins is energized due to these electromagnetic waves. It results in the production of a confined magnetic field. The confined magnetic field has an interference pattern which is again unique to each metallic arrangement of the tag. This interference pattern which when read by a RFID reader would produce the unique number assigned to the RFID tag and thus the address of the tag is obtained . It should be noted that the address defers from each RFID tag and hence it offers complete resistance to duplication . With respect to the concepts of RF Identification discussed above, the use of the same technology in the ticketing system would induce an enhanced transparency and offer a suitable platform for preventing any fraudulent practices. Passengers entering into the railway station, they need to swipe the RFID tag to open the gate to entering into the concern platform. Once the tag is placed in front of the RFID reader circuit, the latter energizes the tag and reads the unique digital data stored it. Then the tag reveals relevant information to the reader circuit. The RFID reader will have the internal memory, which stores

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the information about the RFID tag and it also links it to the Common Database. The Display in the RFID reader will display the Source and balance information. When the customer reaches the destination, they need to swipe the card to leave from the platform. If the customer have low balance in his card, there may be a "Value Added Machine" available in that platform itself can added the value.

4. PROPOSED SYSTEM

The RFID reader circuit is installed at the entry point and at the exit of the platform gate . When the passenger enters the platform gate , the passenger should display the tag in front of the reader circuit placed at the platform gate. Similarly, the passenger, while getting down at the desired station, should display the tag in front of the reader circuit placed at the exit point. The platform door will open while entering and leaving from the platform.

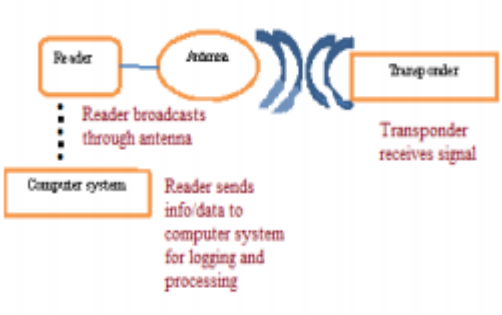

Fig.1. Architecture

The cost equivalent to the distance travelled by the user is hence calculated and the same is updated in the common database system. The passenger entering the platform should display/place the RFID tag in front of the reader). When the tag is placed before the reader circuit, the tag gets energized and the reader reads the unique digital data behind it. Hence the tag reveals relevant information to the reader circuit. The reader circuit stores this information in its internal memory temporarily and also links to the common database system which has all the details of the particular passenger. If the information's are correct then the door will open. If the user don't have the enough balance then the alert tone will be given by the buzzer. paper tickets are printed everyday on a large scale to meet the requirements. "Global warming" and deforestation is the primary reason behind it. The proposed model would greatly reduce these disadvantages and also would prevent the fraudulent practices which gives great losses to the government. Considering the advantages of RFID technology, the RFID tags have almost 100% read rate. It is known that the RFID tag and reader communicate via transmission of radio waves.

5. ANALYSIS

Corresponding to the distance travelled by the user . When the passenger displays the tag in front of the reader while getting down, the reader (which has previously stored the information regarding the same tag/user) equates the fare corresponding to the distance travelled by the passenger . Hence the fare corresponding to the distance travelled by the passenger is deducted from the user's account and the same is updated in the common database . The main aim of this algorithm is to achieve reliable communication between trains through half duplex mode. The algorithm follows a time division protocol without synchronised clock among the devices. Hence there is a susceptibility of data collision due to no synchronisation. This is removed by the introduction of randomness in the selection of instant for transmission.[4] This proposed algorithm is suitable for communication of small data which remains constant over a considerable period of time. In our proposal it is an 16 bit data, which remains constant

for a minimum of 1 minute to several minutes depending on the speed of the train i.e. as long as the locomotive remains in the corresponding track segment of 2 to 4 km. In areas where GSM network is poor then neighbouring trains compare track numbers through RF receiver and transmitter and inform the driver to take appropriate action.

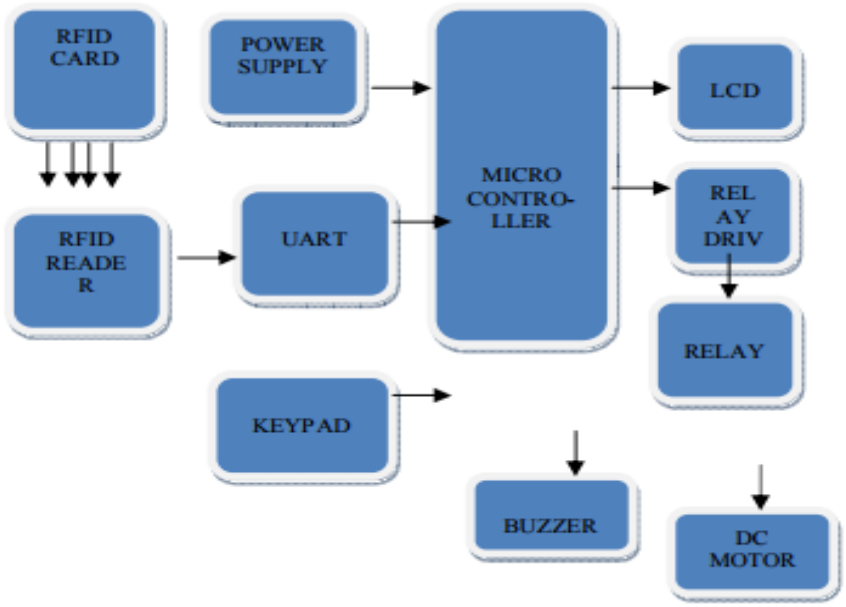

Fig.2.Principle

The following is the simulation results of the above mentioned algorithm shows the possibility of data collision at all the three instants of transmissions in each period (trial). It is understood from the results that over 28914 of the trials out of 30000 trials encountered no data collision at any of the three random instants of transmission. There are data collisions at one trial or sometimes at two trials in a period. But since they are immediately followed by successful data transmissions within the same period of transmission, those data collisions will have no impact on control action The primary goal of our train collision detection system is to identify possible train collision ahead of time and to report these to the main control room or driver before collision happens.

CONCLUSION

Currently there is no solution to avoid train collision. Indian Railways have implemented solution based on ACD (anti-collision device) system. They have inherent problems in Station section and near mountains due to its design concept of using GPS for track detection and have high cost of implementation. My system is used to eliminate train accidents by exploiting automated surveillance system, it is based on RFID, ARM Controller and GSM, which will help eliminate problems stated above. By implementing this automatic system which could avoid human error and problems with ACD. In this system each train track is identified by track id, every train reads and sends its track id to nearby trains. If two trains are on same track id then alert is send to main control room or to the train drivers.

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