

Review on RFID-based System for Enhancement of Transportation Safety

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Abstract — This paper proposes a system to monitor traveler from any source to any destination to enhance the safety of travelling. People and object tracking could be done using RFID tags. The proposed system will be based on the versatile technology of RFID (Radio Frequency Identification) to provide facilities like people tracking for a more safe transportation system. The aim of the proposed system is to address issues like misleading passengers, charging high amount to traveler. It also stresses on concerns of children safety. The proposed system comprises of reader, tags. Reader reads the tags when they come under the influence of RFID reader. Here, RFID tags would be allotted to people. RFID reader shall be placed strategically in appropriate location to capture the information of passengers as to from where they are travelling. The captured information shall be further processed to identify further aspects.

Keywords— *RFID, children safety, safe transportation, RFID reader, RFID tag, object tracking.*

I. INTRODUCTION

Given present situation of globalization, there is no place which is local. People travel from one place to another place. However, whenever people travel they do confront the situation where they get bad experiences. These experiences cause people to develop a wrong mindset against the city or specific place. In India, we are promoting, 'Athithi Devo Bhava', which is a campaign launched by government of India. The campaign targets all the foreign travelers to a specific location. The campaign also emphasizes visitors travelling from abroad. These visitors form to be a part of our economy. However, whenever a passenger visits the place the situation is something different. The problems faced are mentioned below:

- i. Travelers are overcharged, as they are new to location.
- ii. This maligns the image of people and the city where they reside.
- iii. Children security is another prime question arises at this point.

The proposed system aims at addressing the aforementioned issues using RFID technology. The rest of the paper is

organized as follows; Section II reviews the related work of the proposed system. Section III deals with the system design of the proposed system. Section IV deals with the proposed architecture of the proposed system. Finally, section V concludes the paper.

II. RELATED WORK

This section deals with the related work to the issues which are addressed by this paper.

In [1], a system is proposed to monitor the daily bus pick-up/drop-off of children to enhance the overall safety of the daily bus transportation to/from school. The system here automatically detects when a child enters or exits the bus. It, additionally, sends a message when a child does not enters or exits the bus to reduce the parents' concerns about using the bus for the daily transport of their children which ensures the parent doesn't have to take care of their child being lost or forgotten. The problem with this system is that it depends on microcontroller based system to interface RFID system with the computer terminal. Here the dependency rises on microcontroller based system which doesn't seems effective, as being hardware based system, the system would tend to failure after certain period.

In [2], the system incorporates the use of sensors to provide the intelligent transportation system. Here the system problems might arise due to dependency on hardware sensors. In [3], the system uses the combined technology of Global Positioning Satellites (GPS), Assisted GPS (AGPS) and Radio Frequency Identification (RFID). Here, the system incorporates usage of multiple technologies. The dependencies rises on input and output of multiple technologies which could hamper the performance of system, provided one of the component of the system doesn't works appropriately. In [4], the system is comprised of RFID with Automatic Train Identification System (ATIS) to track moving locomotive. In [5], the system uses Multi-Hop RFID scheme for Intelligent Transportation System (ITS).

III. SYSTEM DESIGN

The proposed system could be implemented using versatile technology of RFID. RFID comprises of RFID tags also called as transponders and RFID readers also called as transceivers. Transponders, as in, they transmit and respond to the signals sent by RFID readers. Transceivers are so called because they are capable of transmitting and receiving the signals.

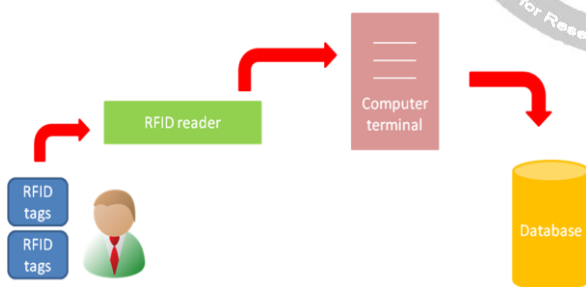


Figure 1: Communication between RFID and Computer

RFID reader transmits electromagnetic waves around its circumference. Whenever an RFID tag comes under the coverage of these waves of reader, it sends back unique id which is contained within the tag. The reader itself is not able to process the information sent by tags. It needs support of a intelligent device, which is computer. Computer processes the information received by reader and further

stores the information into database. In order to transmit data, the reader can connect with the computer network through a standard interface, and transmits the read data to the computer through the network to analysis and process [6]. The middleware application fetches the records as per the requirement from the database.

There are different kind of readers and tags. RFID readers are available as, single-tag reader and multi-tag reader. Similarly, RFID tags are available as active tags and passive tags. However, since active RFID tags are little more expensive than passive tags, currently their use is limited to many sophisticated applications such as: military application, medical application (ex. elderly care), distributed access control [7]. The system shall incorporate the components as per the implementation needs. As of now, multi tag reader with passive tags would be a suggested combination to implement the proposed system.

RFID provides an alternative to Barcode technology. The challenges faced by barcode are given below:

1. Barcode is simply a printed paper.
2. The information could get wiped away, washed away.
3. It could be easily tampered.
4. Duplicate barcode could be created by creating photocopies.
5. They are not weather (climate) resistant, as they are easily affected by water, excess heat.
6. Barcode requires a line of sight, for proper reading.
7. Any obstacle between barcode and its reader would make it impossible to read the information.
8. The technology is no longer reliable.

Features of RFID that overcome challenges of barcode:

1. RFID doesn't require line of sight.
2. RFID could read tags through the obstacle.
3. RFID is weather resistant, tamper proof.
4. RFID proves to be a reliable technology.

IV. PROPOSED SYSTEM ARCHITECTURE

The proposed system shall make the use of RFID to track the people which are travelling. The RFID reader shall be placed at the entrance of the terminals from where the traveler will board the bus/auto/taxi. The system will capture the details about the passenger who will be commuting from a source to destination.

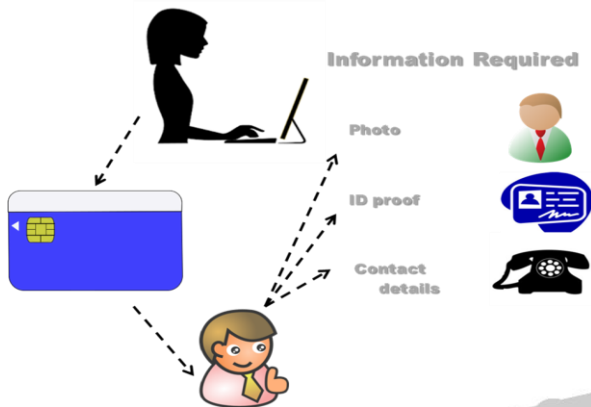


Figure 2: Information related to the traveler stored in tag

The proposed system will follow the given steps of sequence:

1. Traveler will board from a location.
2. System shall capture the information about traveler.
3. System shall also capture the source from where the traveler has boarded and the destination where traveler exited.
4. The traveler will pay at the destination terminal.
5. The information of traveler will be stored for further manipulation, which will help to keep track of passengers.
6. This information would be helpful in case of occurrence of unforeseen situation, if any.

The proposed architecture of the system is portrayed in Figure 3. As the traveler's information is captured by the system, it would prove helpful whenever certain unforeseen cases like kidnapping, misleading occurs. The system will also ensure that traveler need pay the amount directly to the driver. It could happen that driver would charge heavily for a very shorter distance of travel. This

could be eliminated by this system. System would make sure that payment of the travel is done, at the destination terminal of traveler's route.

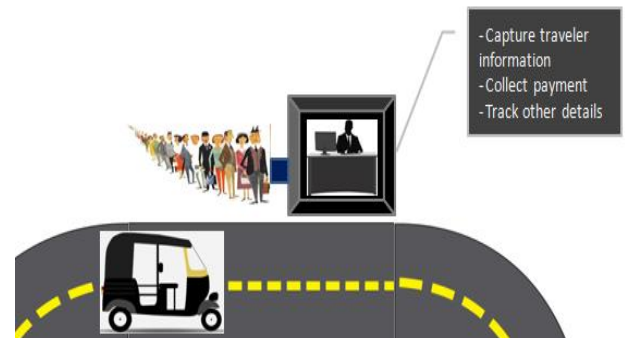


Figure 3: Proposed architecture of the system

The installation of a RFID infrastructure changes numerous established procedures and therefore makes it necessary to redefine all processes that are affected by the technology [8]. If the system is implemented, there would be a significant decrease in the numbers of unforeseen cases of misleading, kidnapping.

V. CONCLUSION

This paper presented an RFID-based system that aims at enhancing the safety of traveler during the daily transportation. RFID-based detection unit located at the terminals detects the RFID tags carried by the travelers. It then sends the relevant data to the system database. The system checks and detects which traveler boarded from source terminal and exited to destination terminal. In addition, the system captures the payment made at the destination terminal and updates the database. These details could be used later in case of unforeseen cases.

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