

INTELLIGENT TRANSPORTATION SYSTEM USING RFID

K.Sivaraman

Assistant Professor, Dept. of CSE, BharathUniversity,
Chennai, Tamil Nadu, India,
sivaraman2006@gmail.com

Abstract: Radio frequency identification (RFID) need ended up an hot subject sentence in the fields. The point about this paper will be to provide a thorough perspective about present provisions and new possibilities to logistics and transport system furthermore transportation system and the differing qualities of the standard Furthermore level for granularity.

RFID innovation organization need been known to a chance to be a standout amongst the foremost meeting advances of the twentieth century. Those engineering organization could a chance to be connected done large portions fields. However, this paper concentrates on the provision of the engineering in the transportation business.

The late progresses for RFID the table limitless chances for research, advancement and improvement to transportation. The provision about RFID clinched alongside Intelligent transport System (ITS) may be picking up notoriety with its board utilization in the field of toll administration and the management of the general transport segment. There are A large number RFID provisions accessible in the business for example, RFID contactless savvy card regularly utilized Previously, Busses What's more LRTs, programmed vehicle ID number (AVI), electronic toll accumulation (ETC), keen Parking, Also clogging zone estimating. It utilizes a two-way encryption system for the data security. A product application is created in Microsoft Visual Basic.Net for clarifying the usefulness of transport administration framework.

Index Terms:Radio Frequency Identification, Intelligent Transportation Systems, Public transport, Tag, Reader, My card.

1. Introduction and History

RFID innovation is a critical innovation that has discovered its application in many spots. In any case, its application in the transportation is one of the best framework applications. The innovation is connected in the vehicle part to perform different assignments[1,3], for example, vehicle or item

distinguishing proof amid transportation, security, wellbeing and operations. The framework works utilizing a tag that is put on the vehicle or item to be tracked. The Tag conveys fundamental data concerning the vehicle or item character and area that is exchanged to the remote peruser[2,4,5].

RFID (Radio-Frequency IDentification) is a technology for automated identification of objects and people. Human beings are skilful at identifying objects under a variety of challenge circumstances. A bleary-eyed person can easily pick out a cup of coffee on a cluttered breakfast table in the morning, for example. Computer vision, though, performs such tasks poorly. RFID may be viewed as a means of explicitly labelling objects to facilitate their "perception" by computing devices. Most histories of RFID trace the technology back to the radio-based identification system used by Allied bombers during World War II. Because bombers could be shot down by German anti-aircraft artillery, they had a strong incentive to fly bombing missions at night because planes were harder for gunners on the ground to target and shoot down. Of course, the Germans also took advantage of the cover that darkness provided. Early Identification Friend or Foe (IFF) systems made it possible for Allied fighters and anti-aircraft systems to distinguish their own returning bombers from aircraft sent by the enemy. These systems, and their descendants today[6,7], send coded identification signals by radio: An aircraft that sends the correct signal is deemed to be a friend, and the rest are foe. Thus, radio frequency identification was born.

2. Element of RFID Technology

RFID Systems in a general sense comprise of four components: the RFID tag themselves, the RFID reader, the reception apparatuses and decision of radio qualities, and the PC organize network (assuming any) that is utilized to interface the reader[8,9].

The RFID tag consists of an integrated circuit (IC) embedded in a thin film medium. Information stored in the memory of the RFID chip is transmitted by the antenna circuit embedded in the RFID inlay via radio frequencies, to an RFID reader. The performance characteristics of the RFID tag will then be

determined by factors such as the type of IC used, the read/write capability, the radio frequency, power settings, environment, etc.

RFID tags are categorized as either passive or active depending on whether they have an on-board power source or not. Passive tags do not have an integrated power source and are powered from the signal carried by the RFID reader. Generally, these tags are powered by the reader antenna through an antenna located on the tag. The reader's transmission is coupled to the specially designed antenna through induction or E-field capacitance which generates a small voltage potential. This power is then used by the IC to transmit a signal back to the reader or reflect back a modulated, encoded identification.

- Semi-passive tags have an on-board power source, such as a battery, which is used to run the microchip's circuitry. However these tags utilize a battery but still operate using backscatter techniques. Tags of this type have greater range than totally passive tags and have the ability to monitor sensor inputs even when they are not in the presence of an RF field [10,11,12].

- Active labels consolidate a battery to transmit a flag to a peruser receiving antenna. These labels either emanate a flag at a predefined interim or transmit just when addressed by a reader. In any case, the battery gives the ability to RF transmissions, not an inductive or capacitive coupling. Accordingly of the inherent battery, dynamic tag can work at a more prominent distance and at higher information rates, in return for limited life, driven by the life span of the inherent battery, and higher expenses. For a lower cost of execution, latent tags are a more alluring arrangement. The data put away in a RFID chip is characterized by its read/compose attributes [13,14].

- Read-only: For read-only tag, the information stored must be recorded during the manufacturing process and cannot be typically modified or erased. The data stored

normally represents a unique serial number, which is used as a reference to lookup more details about a particular item in a host system database. Read-only tags are therefore useful for identifying an object, much like the "license plate" of a car.

- Write-once: These vary from read-only labels in that they permit the end-client to master program the tag's memory. In this manner, as a thing advances down a transport, for ex- adequate, an end-client can encode a compose once tag with the thing's serial number or part number which can't be deleted

- Read-write: for a read/write tag, information can be composed and eradicated on request at the purpose of utilization. Since a rewriteable tag can be refreshed various circumstances, its

reusability can lessen the quantity of tags that should be obtained, and include more prominent adaptability and knowledge to the application. Moreover, information can be included as the thing travels

through the inventory network, giving better traceability and refreshed data. Propelled highlights likewise incorporate locking, encryption and debilitating the RFID tag. RFID systems are designed to operate at a number of designated frequencies, depending on the application requirements and local radio-frequency regulations. Four main frequency ranges exist:

- Low Frequency (125 kHz)
- High Frequency (13.56 MHz)
- Ultra High Frequency (860-960 MHz)
- Microwave (2.45 GHz)

The RFID reader sends a pulse of radio energy to the tag and listens for the tag's response. The tag detects this energy and sends back a response that contains the tag's serial number and possibly other information as well. In simple RFID systems, the reader's pulse of energy functioned as an on-off switch; in more sophisticated systems, the reader's RF signal can contain commands to the tag, instructions to read or write memory that the tag contains, and even passwords. Historically, RFID readers were designed to read only a particular kind of tag, but so-called multimode readers that can read many different kinds of tags are becoming increasingly popular [15,17].

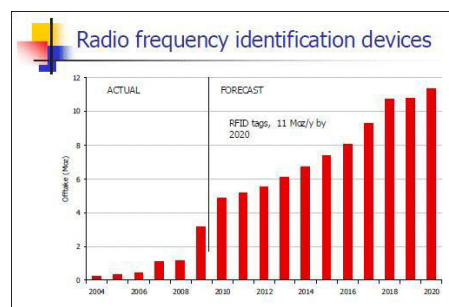


Figure 1. Graph for RFID devices according to year



Figure 1.a

3. Research and Analysis

The greater part of the zones of RFID execution are identified with auto thing recognition in shops, libraries and contactless installment, and so on. There are numerous RFID application identified with vehicles like programmed toll court, RFID following framework for vehicles and so forth. Different research and studies has been done in this field. For instance, Prof. A. A. Pandit et al., (2009) created RFID based following framework for vehicles. They examined three issues identified with vehicles, for example, activity flag timing, robberies of vehicles and clogs of vehicles on street. The framework introduced RFID tag on every vehicle and RFID perusers on different intersections of city. Customary movement flag is static however framework gives dynamic activity

signs and it is controlled on the premise of movement information. For instance the speed of vehicles will be more on high congested street to conquer the road turned parking lot. Vehicles are followed at different intersections and log record is kept up to keep the robbery of vehicles. RFID tag that can likewise be utilized for programmed expense finding at auto stopping or toll squares was specified by Pala et al., (2007). Every vehicle has an associated account. The amount will be deducted from this account only. Customers have to refill their account at the beginning of the month. It is a secure and efficient way for fee collection. Similarly system deducts the toll tax. There is no need to stop the vehicle at barrier. Reader will scan the tag and search for the associated account. If there is enough amounts in the account then vehicle can move uninterrupted through the toll otherwise it will not be allowed through the barrier located a head to toll collection center. Manfred Aigner et al., (2011) have done a research on new applications of RFID. Research is basically related to use of RFID in open environment. The system is capable to gather the climate change information. Special kinds of UHF RFID tags and readers are used. This project is named as "BRIDGE." It stands for "Building Radio Frequency IDentification Solutions for the Global Environment". Research explained that use of RFID was limited to organizations only. So the aim of the BRIDGE is global implementation of the RFID. Tags must be able to share information between dynamic coupled organizations. This will reduce the cost of implementation of RFID for the organizations due to shared architecture.

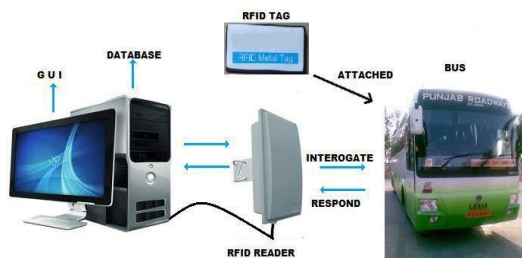


Figure 2. RFID System

4. Project Module

The System coordinates the RFID equipment and host PC by utilizing an application created in VB.Net. This application is named as Transport Management System. Application gives an alluring and simple Graphical User Interface (GUI). There are fundamentally two principle forms: Check In and Check Out. Check In happens at passage entryways R1 and R2 while Check Out happens at leave doors R3 and R4. Ultra High Frequency perusers are utilized. Registration Process: When a transport will enter the transport stand then reader will read the label appended to it. On the off chance that record of

the transport officially display in the database then essentially makes a section of clean in Entry dining area generally System will store the transport data in database (see Fig. 4(a)). Registration Process: This procedure will be done at the leave door. There are two perusers set at the OUT-Gate[16,18,19]. So when a transport exists the transport remain all through Gate its tag will be checked by the peruser. The framework will figure the stay time of transport at transport stand, on the off chance that it is over 8 hours then deduct expense for 24 hours generally charge for just a single trek. There is no compelling reason to stop the transport at the boundary if enough sums is there in the record and if not then transport won't be permitted to experience the hindrance until manual payment is made.

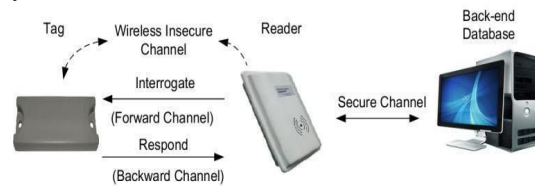


Figure 3a. Conceptual design

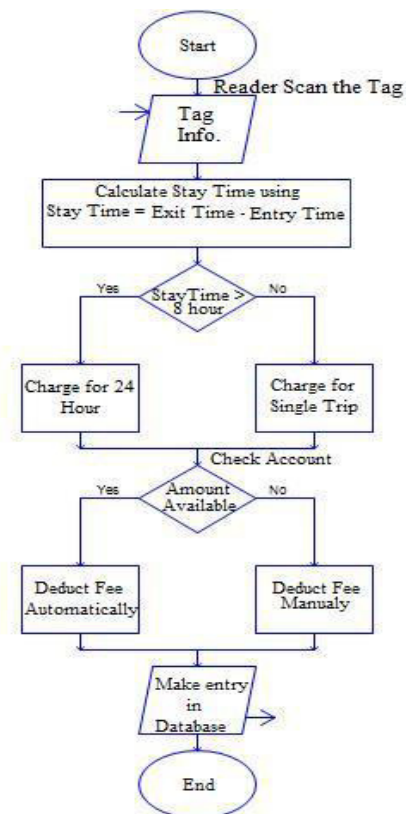


Figure 4a. Flow chart of check-in process.

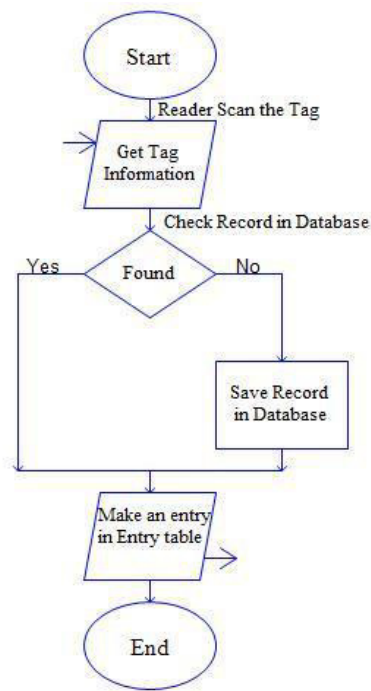


Figure 4(b).Flow chart of check-out process.

5. Security Implementation

Every RFID tag consists of two memories Read OnlyMemory (ROM) and Read Write Memory (RWM). ROMmemory consists of TID number which is done by themanufacturer and this cannot be modified. [8] RWM will beused during reader application communication. 32 bits datawill be stored on the tag (see Fig. 5).

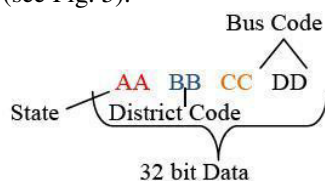


Figure 5.Data Structure

Every RFID tag consists of two memories Read Only Memory (ROM) and Read Write Memory (RWM). ROM memory consists of TID number which is done by the manufacturer and this cannot be modified. [8] RWM will be used during reader application communication[16,17]. 32 bits data will be stored on the tag (see Fig. 5). Fig. 5.Data structure. RFID tag, reader and server communications in the smart Transport management system can be represented as shown in Fig. 6. (Abbreviations: D- Decryption, E-Encryption, InfoInformation, K1 and K2- Private keys) Fig. 6.

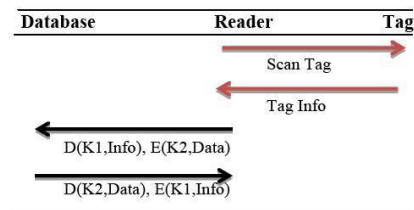


Figure 6.

Tag-reader-server communication processes.

Tag-reader server correspondence forms. Execution of complex cryptographic calculation prompts decrease the execution of the framework. STMS is a quick and solid framework for moving transports. Channel amongst application and database server is wired so it is minimal secure. A Caesar figure is sufficient to give the best security since key is neither open nor traded. So System utilizes two Caesar figure Algo with various keys. A. For forward Channel (Fig. 7(a)) Original Tag Data = Decryption (Key1, Tag Info) and Database Data = Encryption (Key 2, TMS Data) B.

Figure 7(a). Forward channel communication

For Backward Channel (Fig. 7(b)) TMS Data = Decryption (Key 2, Database Data) and Tag Data = Encryption (Key 1, TMS Data) Fig. 7. (a). Forward channel communication. Fig. 7.(b).In reverse channel correspondence. At the point when a label comes in the scope of the reader, it will be enacted and peruser will read the label data this is called Forward Channel Communication. This is likewise appeared in the Fig. 6. The data read by the reader is in encoded frame. Presently so as to make this data unique[20], it will be decoded with the assistance of key k1, and the first data will be appeared in the application. Change can be made in the data just here. Information will be again encoded with key k2 and after that put away in database. This is known as Backward Channel and is appeared in Fig. 7(a). Database contains an Entry table which will store the look at in and check points of interest of the transports. Amid forward and in reverse channel the framework utilizes an encryption instrument to secure the communication.

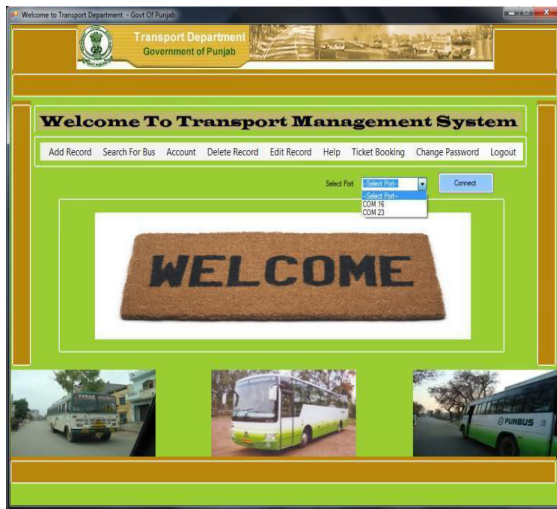


Figure 8(a).Main GUI.

Figure 8(b). Add Bus GUI.

	Bus_Type	Bus_Number	Arrival_Time	Tag_Type	Tag_Number
▶	PRIVATE BUS	PB057882	00:24:00	EPC	PB057882
▶	PRIVATE BUS	PB068273	09:06:00	EPC	PB068273
▶	PRIVATE BUS	PB109703	05:06:00	EPC	PB109703
▶	PRIVATE BUS	PB013456	21:06:00	EPC	PB013456

Figure 8(c). Check-out GUI.

6.Result

A. Processing Information

In switch channel communication. Exactly when a name comes in the extent of the reader, it will be ordered and reader will read the name information this is called Forward Channel Communication. This is in like manner showed up in the Fig. 6. The information read by the peruser is in encoded outline.

By and by to make this information special, it will be decoded with the help of key k1, and the principal information will be showed up in the application. Change can be made in the information simply here. Data will be again encoded with key k2 and after that set away in database. This is known as Backward Channel and is showed up in Fig. 7(a). Database contains an Entry table which will store the take a gander at in and check purposes of enthusiasm of the vehicles. In the midst of forward and in invert channel the structure uses an encryption instrument to secure the communication.

7. Conclusion

All of the goals have been effectively accomplished by the System. The transport data were effectively filtered what's more, spared in the tag and database. Additionally study should be possible to improve the execution and security of the framework.

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