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AN ASSESSMENT ON THE APPLICATIONS OF RFID IN CLOUD COMPUTING

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Abstract— RFID is a generic technology in accessing for various applications in the real time environments. RFID implemented by various applications for Library Management, Exhibition, Toll Plaza, Car Parking, Hospital management, Tracking System and Security Sector. Therefore, it brings both opportunities and challenges to RFID researchers. In this paper, we provide an assessment on how to apply RFID technology in latest Domains at Cloud Computing, IOT, Wireless Sensor Network, and suggest some opportunities in RFID applications.

Keywords—RFID applications, cloud computing, RFID system on road, WSN.

I. INTRODUCTION

Radio Frequency Identification (RFID) is a generic term and it used to track the human being or any other objects in the world. RFID used to Radio frequency for its communication purpose. RFID consider to three parts 1. Tags 2. Reader/Writer 3. Computer or Processor. RFID Technology similar to Bar Code System[1], [2].

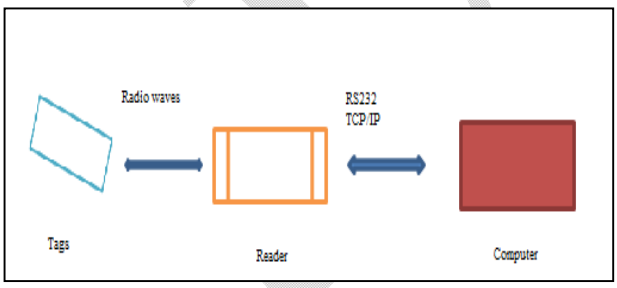

Fig 1 : RFID components

Tags are broadly categorized into two categories Passive and Active Tags. The Active tags are highly expensive and larger than compare to Passive tags. Active tags are acting like that Read/Write operation, but Passive tags are only done during the Read operation. In our traditional application are used only Passive Tags[3],[4].

Is RFID working in different frequency, and frequency is allocated to individual government. Internationally, there are different frequencies are allocated in RFID application based on the ISO Standard.

Three frequency ranges are generally used in RFID applications are

Table 1 : Frequeny Bands and Applications

Frequency Band	Characteristics	Typical Applications
Low 100-500 kHz	Short to medium read range Inexpensive low reading speed	Access control Animal identification Inventory control
Intermediate 10-15 MHz	Short to medium read range potentially inexpensive medium reading speed	Access control Smart cards Library control
High 850-950 MHz, 2.4-5.8 GHz	Long read range High reading speed Line of sight required Expansive	Railway vehicle monitoring Toll collection systems Pallet and container tracking Vehicle tracking

RFID has found in 1948, and it used to 1950's. In 1960's a lot of techniques and prototypes are implemented in the RFID Technology. The number of applications is extended in the different areas in 1980's[5], [6]. RFID application and its rapid growth in 1990. In the 20th century, many industry and security sector are realizing the RFID Technology and its market growth. RFID Technology is widely deployed and it becomes a part of everyday life.

II. RESEARCH FOCUS ON RFID

Now a day RFID implemented by the wide variety of latest domains. That they are 1. Cloud Computing, 2. IOT 3. Wireless Sensor Network and so on.

2.1 Cloud Computing

Cloud Computing has been developed for Next Generation Information Technology for Enterprises. Cloud Computing

provide the on demand Services, Location Tracking System, Ubiquitous Network access. Cloud Computing is act to centralize data storage medium and distributed data into the clients and users [7],[8]. It provides the data storage management and Security to the users.

RFID Technology also implemented in Cloud computing. RFID can be generating the information based on Reader/Writer. This information all are stored in the Cloud Server and access the corresponding location of the particular objects[9],[10]. In Cloud Computing has been used to Cloud Location Algorithm (CLA) for the RFID and also its used for location Tracking Algorithm (LTA), Link Quality Identifier (LQI) for the RFID Technology.

2.2 IOT

The Internet of Things (IOT) Technology is a latest Technology and it's developed in the last few years. IOT is helpful to identify the Data Storage and objects in the unique manner. Radio Frequency Identification Tags and sensors, actuators and Mobile phones are pre requirements are connected to the lot of physical objects through unique address.

2.3 WSN

Wireless Sensor Network (WSN) is a one of the most famous Technology in the network. In WSN provide a lot of services and its applications; RFID is a one of the one of the examples of WSN Services.

RFID implemented based on the requirements of user criteria. RFID in WSN can be implemented by Indoor and Outdoor Services, Indoor services are accessed in the Hospital Management, Student attendance, Patient Detail Management, Goods Tracking and movement's people and objects[11]. In the Outdoor applications are vehicle Tracking, Logistics, Location Tracking, Transport, Mobile Identifications etc.

III. APPLICATIONS OF RFID

The different applications are implemented by the RFID tracking system, that are Location Tracking System, Toll Plaza, Logistics, Ticket, Healthcare, Security and Identification System. In this section briefly review on different applications.

3.1 Toll plaza

Toll Plaza using RFID Technology to facilitate the electronic collection is widely deployed, especially in highway and car parking. The RFID Toll Plaza system enables vehicle to check in and checkout automatically under a fast, contactless secure and convenient environment. The RFID based Toll System can be relative the traffic jam problem caused by the long queue in the human manned toll plaza.

3.2 Logistics

Supply chain in a one of the most famous RFID application. The Reference Tags are attached to the goods, items (or) objects in the supply chain and all the items are tracked by with the help of readers from manufacture to point of sale. The Motorola RFID plan to its supply chain management can be applied to the top company.

The RFID provides the grate product delivery. We could track the handling process and current location of the product from pickup to delivery with Reference Tag attached it. It helpfully avoids the wrong delivery, and also minimizes mankind's mistakes. RFID doesn't require one to one line of sight reading which is required for barcode, it's helpful reduces the time and cost of reading tags for a large batch of goods. RFID System provides inventory visibility of and enhances the customer shopping experience.

3.3 Healthcare

Healthcare needs accurate drug distribution and handling the process. Institute of medicine (IOM) reported that the human carelessness is one of the major causes of medical errors. The RFID technology could aid the medical staff in performing their duties and reduce medical error. RFID in healthcare center is the access control of staff and patient, RFID card distributed to each of them for their access permissions.

RFID Tags are used to monitor the patients and restricted zone. Some Hospital also provides the Refinance Tag for new born baby for their security and ensures their identification. Based on the RFID tag information is helpful to monitor and manage the patient details and drug information, stock management in the Hospital.

3.4 Tickets

The small size of RFID tags are can be used to e-tickets for, Stadiums, Theme-Park, Exhibitions, and Entertainments. Compare with ordinary tickets, the e-tickets are more secure to fake tickets and facilities contactless automatic identification. Moreover, it provides extra functions, such as flow controlling, seat allocation etc[12],[13].

The Ticket holder information stored in the RFID Tag like that Name, address, phone number, email address and photos. It helpfully avoids the fake ticket. RFID enjoys advantages in speed, accuracy and continent over traditional tickets. Therefore, RFID tagged e-tickets will gradually replace traditional tickets and facilities applications in Exhibitions, Games and Theme-Park.

3.5 Identification and Security

Personal identifications and security applications, in RFID Tags are embedded in ID Cards, and are another one major application of RFID. Now a days Students ID cards, and Employee ID card are adopting in RFID Technology[14]. This RFID Tags are providing the security and store the information and it's reliable to compare the magnetic strip. RFID Cards are providing the different levels of security and access level grand to the card owner.

IV. RFID SYSTEM ON ROAD

The RFID System on Roads (RSR), which is a cloud RFID Tag deployed on roads and RFID readers are installed on a vehicle, is an essential [15] platform for a future transportation system; it can provide the unique features that are road traffic control information, vehicle distance estimations, analysis the behavior of real time driving, and so on.

Based on this feature, we can implement the different novel vehicular application, which is helpful to improve transportation safety and efficacy.

4.1 Application of RSR

RSR provides a different application of the Radio Frequency Identification some of them described to here, 1. RSR Navigation System, RFID Tags are aware of their own locations, and a vehicle estimates its position by acquiring the tag. The information are valuable for drivers include: Traffic detection, Speed Limit and Event Notification. 2. RSR Electrical Traffic Control, it can be implemented to provide correct and near real-time traffic control information for drivers. 3. RSR for Vehicle Distance Estimation, it provides the real time awareness of the distance to the vehicle in front, a driver can take a corrective action such that safe distance can be maintained etc.

4.2 Security

RFID System on Road implemented and provided for accurate information about road on Drivers[16]. It provides major issues on how to protect the data on unauthorized access to the secure data. RSR provides lots of security and access control to the real time application.

V. PERFORMANCE ANALYSIS

5.1 Scalability

Scalability is a one the important aspect of RFID system, because it usually has a number of RFID tags in the field. Scalability fully depends on the location of the volume server, such as bandwidth, memory, CPU.

5.2 Security

Security is another most important issue fir the location tracking system because people are unlikely to use the tracking services unless the services unless service accessibility is limited to authorized users. The access based on the certain scenario and a predefined process.

5.3 Protection of Privacy

Privacy is a another important and critical issue for the location tracking system, it may disclose the location information of a person.

VI. OPPORTUNITIES FOR RESEARCH

RFID Technology is simple, but with a very large market value. RFID Technology provides a different development process based on the customer needs [17],[18]. Now a days RFID used for Tracking item and collecting data without intelligent. In this section briefly surveyed on several intelligent RFID Technology and suggest to its feature intelligent application.

6.1 Retail

In the retail industry, RFID is usually used to collect customer data. By tracking this data, one may have real time visibility on the stock of products.

6.2 Exhibitions

Tickets embedded with RFID tags are used to speed up identifications. And also provide access control on the ticket holder and provide the individual information [19]. These e-tickets help to provide services to all the ticket owner and assured to all of them should be getting the services through e-tickets.

6.3 Identification

Those above intelligent RFID applications can collect the customer data and tracking the data on the real time. It is helpful to easily interact with the customer and track their needs.

VII. CONCLUSIONS

RFID has a lot of advantages, such as simultaneous collections of large quantities of data with high level accuracy, contactless etc. RFID Technology has an increasing influence of to our lives and wipe out the barcode, in the supermarket and logistics management. RFID provides the different services are monitoring and managing the different environment such as Hospital, Government Organization, and Private Sector etc. It provides the security among all the areas. RFID used for online and offline, so it provides the reliability of service. RFID implemented by real time application, but till it has some drawback and complicated to access that service, and logging in somewhere because still it has implementation is too complicated for implementation. These problems are overcome to in the future and it needs to deep research work and dedications.

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