

A Comprehensive Survey of RFID in IOT

Jagpal Singh, Mr. Pawan Agrawal

¹Compucom Institute of Information Technology & Management, Jaipur

²Compucom Institute of Technology & Management, Jaipur

Abstract— *The Internet of things (IoT) is used as per an umbrella keyword for merging and hiding the main features associated to the allowance of the Internet and Web into the somatic domain, through means of huge arrangement of spatially disseminated strategies that holds entrenched documentation, identifying and/or motivation abilities. IoT delivers a prospect in which digital somatic objects may be associated or linked with related info and communication technologies, to actuate a entire new class of applications and services. The RFID system consists of a transponder or tag, interrogator, and a back-end host system. The mobile RFID service combines the RFID system with the mobile communication system for the mobile service so that the user can use the RFID application service using smart phone.*

Keywords—IOT, RFID System, IoT Architecture, RFID Applications.

I. INTRODUCTION

In our everyday life, including our homes and workplace, gadgets have become an imperative part of our life. We are moving towards “anytime anywhere anyone connected to anything” connectivity. With the emergence of advanced technologies like IoT, we are in a “connected” mode to the things around us. Some improvements have sneaked into our regular survives very strongly. Through IoT, real world things are a part of the Internet, seamlessly combining physical and digital world. With all this, without a second thought, we can say that IoT is the “Future of Internet”. Benefits of IoT are indisputable in every part of life.

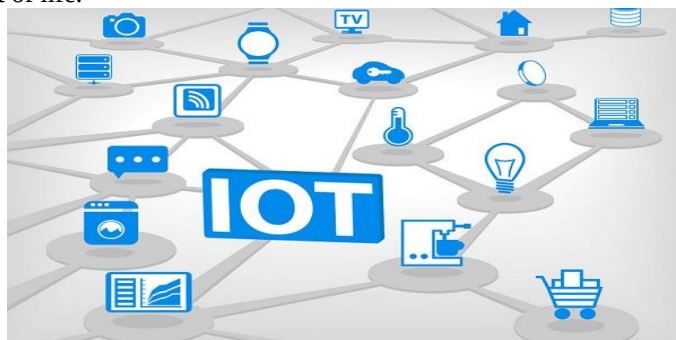


Fig. 1. IoT Generic Application Areas.

Development of IoT in current environment foresees many advances in smart cities, smart homes, digital health and other areas as shown in Figure 1. IoT boosts connectivity and increases the popularity of mobile communications. IoT is a structure that provisions huge range of uses using disputing requests and combined apparatuses. IoT uses contain smart substructure, smart healthcare, smart domination, smart freedom of movement, smart technology, and so on. Amidst all these benefits, IoT services needs to be secured and reliable for day to day applications. Technologies like Bluetooth, ZigBee and Radio Frequency Identification Technology (RFID) enable security in IoT. Overwhelming procedural tasks needs by estimation of IoT explanations. With all the advancements in technology, IoT is surely a step ahead of the ancestor technologies in every sphere of life wherever technology is involved.

This survey paper presents an overview of IoT architectures and RFID concerns based applications of IoT and are positioned for wide novice audience to give an insight into several features of IoT. [1]

II. RFID TECHNOLOGY

RFID is a wireless communication technology using an electromagnetic field, and it is one of the core technologies in IoT application as a technology to acquire information without any physical contact to a target device. In order to provide the IoT service, the location information and the identification information about the object should be automatically exchanged through the Internet. RFID is one of technologies that can effectively transmit information for identifying and managing objects by utilizing the electromagnetic characteristics of radio frequency.

RFID technology includes HF RFID technology, which is led by the NFC Forum and standardization, and UHF RFID technology, which is standardized by ISO and EPC global. HF RFID technology, called NFC, is mainly used in financial and medical fields. UHF RFID is mainly used in logistics management, location tracking, and authenticity verification.

In general, tags used in RFID technology are classified as passive, semi-active, and active types. These tags consist of integrated circuit, chip, antenna and memory. In the case of active tags, a battery can be added to generate power from the electromagnetic induction. Semi-passive tabs have an aboard control cause to deliver a broader range of appreciation handling.

Maximum mobile RFID structures contain transponders or tabs, bibliophiles or researcher, and back-end crowd organisms. Many studies have been carried out to secure the security of the wireless channel between the reader and the tag. Nevertheless, the RFID tag uses a hash-based XOR function in communication to enable simple and cost-effective security control. This is because most RFID tags are passive and resource for processing is limited.

The mobile RFID network is constructed by connecting an existing mobile communication network and an RFID network. Previously, RFID network was used to manage the distributed or moving items, but recently it has focused on providing various application services to individual or dedicated users. This is because it is possible to provide various independent services using a personal terminal such as a smart phone or a tablet. [2]

III. IOT ARCHITECTURE

IoT architecture addresses essential factors like Quality of Service (QoS), confidentiality, reliability, integrity, etc. In this section, we will briefly look into the basic and service oriented architecture of IoT. The basic layered architecture of IoT is proposed and shown in Figure 2 below [3]. Each architectural layer is briefly described as: The perception layer consists of sensor devices via, RFID, ZigBee, Quick Response (QR) code, etc. to deal with overall device management and to collect specific information by each type of sensor devices. The network layer onwards info from perception layer to greater layers and saves complex data personal from sensor campaigns.

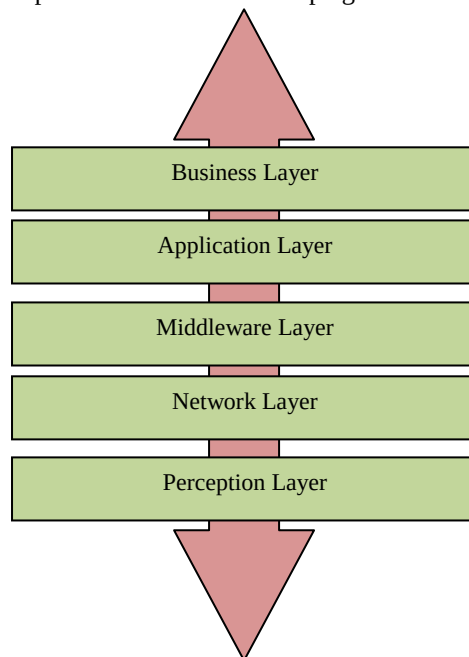


Figure 2. IoT Basic Layered Architecture.

Functions of middleware layer are service management and storing lower layer information into the database. The application layer manages IoT applications such as smart health, smart transportation, etc. The business layer covers entire IoT applications and services management. [4]

IV. LITERATURE SURVEY

Pasquale Dapont et.al. [2018] at the moment, IOT example denotes a scientific task concerning the dimension uses which usages Internet for dimension records communication and their administration. This paper grants a complete review, where the IoT is (or, pleasant) a essential for size uses. Consideration is remunerated to smart transport systems, smart and associated health, smart vigor, atmosphere, building, and industries. [5]

R.M.Gom et.al. [2018]The Internet Of Things (IoT) was initially called as “Internet of Everything”. IoT objects have identifiers which are unique. They have the capability to refer the data finished a network interrelating somatic and simulated effects lacking demanding human-to-human or human-to-system communication. It provides the effective way of learning and interaction among internet connected devices that include sensors, actuators, services and other internet connected entities. The IoT can be definite like things or entities related to the internet than persons. The IoT system’s middleware can be described as intermediary software system between the IoT devices and applications. The IoT aim is to unite everything in the world under common infrastructure. The key impartial of this paper is to deliver a study on IOT, forms of designs, and the machineries that are recycled in our daily life, smart environment. However, this paper gives a good idea for new researches on Internet of Things. [6]

Jyoti Mante Khurpade et.al. [2018] As the IOT is gaining popularity there is a requirement for a technology which can support large amounts of data transmission efficiently and at very high bandwidth (BW). In the close prospect, that is ensuing information IOT campaigns, such major objects or demands that want to be addressed are improved ability, enhanced info level, reduced invisibility. The development of next generation wireless mobile communication technology namely, 5G which promises to fulfill the needs of complex IOT architectures. This paper focuses on the requirements which can be fulfilled by 5G and enlightens architecture, merits and demerits of 5G network. A detailed survey on 5G enabled IOT devices, the research on this type of network have been conducted in various places around the globe. [7]

Mrs. Snehal Deshmukh et.al. [2017] IOT is composed of several technologies, which provisions innovative facilities in several use fields. Security and privacy are a very important aspect for IoT application domains. These uses require information discretion, validity, and honor and access control inside the IOT n/w. For users and things, security is achieved by enforcing the security and privacy policies. Whereas the several principles and communication stacks elaborate in traditional safety explanations, it cannot be openly useful to Internet of Things technologies. In IOT number of interrelated campaigns is predictable to increase enormously therefore scalability is the major task for IOT improvement. This survey paper presents the available security protocols at respective IoT layers. An association of this data is completed by relevant to several safety features and research slits are recognized. [8]

Akansh Saxena et.al. [2018] in this paper, a model of digitally controlled outing system is presented. The structure is an use of the IOT which workings on RFID (Radio-Frequency Identification) technology. The system can replace the traditional way of maintaining the records for the entries of the students or workers in an institution or organization. It's an effort to digitalize the traditional way which is not so much reliable and efficient. This paper presents the design and implementation of a low cost and flexible outing system based on hardware devices like Raspberry Pi, Node MCU, and MFRC552 Card Reader and software tools like Django, SQLite and Python scripts. This paper presents the efficient working of the system. [9]

Radek Krejčí et.al. [2017] With the increasing usage and impact of the services based on data from Internet of Things (IOT) networks, securing the sources as well as the transport of these information is essential. In this paper, we extant our study of the safety of the 4 broadly recycled IOT protocols: Bluetooth Low Energy, LoRaWAN, ZigBee and Z-Wave. We discuss various vulnerabilities in the protocols and how the protocols evolved from the security point of view. The survey is a base for our future work on a secure gateway for IoT networks. In this project we are going to detect security incidents in IoT networks at the gateway connecting the IoT devices with the application servers. [10]

Minela Grabovica et.al. [2016] Internet of Things includes generating network of normal objects entrenched by electronics, software and network connectivity. So operators are enabled using probability to interconnect using campaigns, in sequence to control them or recover required data. Information security in IOT is one of considerable problems. It paper discovers safety protocols delivered using transmission technologies recycled in IOT like: RFID, Bluetooth, Wireless network and ZigBee. Similarly, it grants concerns which can ascend in real use. Lastly, we provide synopsis, instant and contrast of benefits of defined technologies. [11]

V. A DEVELOPMENT OF MOBILE RFID APPLICATIONS

A. Application Scenario

In the mobile RFID service, the user must be able to acquire the RFID tag information at an arbitrary place by using his / her RFID terminal and obtain desired result through connection with the mobile communication network. To this end, additional service information mapped with tag information should be stored in the service server.

The RF tag is attached to the object used for the service, including the EPC code. EPC information is stored in the application service server in conjunction with the logistics management system at the production stage of the object.

A user who wants to use mobile RFID service executes an application program in a smart phone equipped with an RFID reader. When the application runs, the RFID reader is activated and acquires EPC information from the tag. The EPC information obtained from the tag is transmitted to the mobile communication network through the application of the terminal and transmitted to the application service server. The application service server transmits the history information of the object to the user terminal based on the EPC. The user terminal displays the information on the screen and additionally starts a procedure to check whether the object is authentic.

An authenticity check on an object utilizes a password stored in a specific area within the tag. The mobile application transmits the password information received from the server together with the EPC information through the RFID reader to the tag. The tag compares the stored EPC information with the password information and responds to the RFID reader. The mobile application displays the result of the response sent from the tag so that the user can check it.

B. Verification of Mobile RFID Service

RFID reader for the mobile RFID service is implemented according to a micro SD standard specification to be mounted on smart phone. When mounted to an actual smar tphone, the link loss of RF transmission signal is approximately due to

smart phone case and the other element. The loss parameters were reflected in the performance test process for designing a RFID reader. As shown in Fig. 3, it is confirmed that stable tag recognition is possible at 3 centimeters distance.

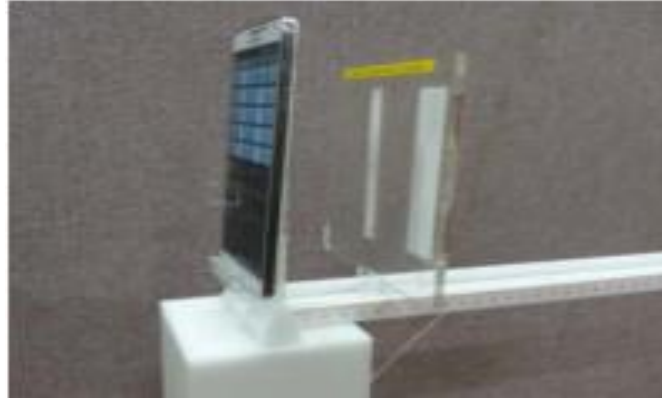


Fig. 3 Tagging Distance Test.

In this service scenario, the EPC information and the password in the RFID tag are managed by the application service server in the same manner, and the security of the RFID service can be improved by one by one. However, for more stable and static services, security for smartphone applications should be considered separately. [12]

VI. CONCLUSION

The clue of the Internet of Things (IoT) is evolving quickly on determine their method to our present life, targeting to improve the sensitivities of the life through associating many smart devices, technologies, and applications together. World has been changed completely due to Internet and Internet based application development. Interaction in all scenario becomes seems impossible without it. IoT will change everything drastically if implemented successfully. The Internet has remarkably changed the way we live, it connect the people over the network. Interaction between people is done over the Internet. The IoT has the possibility to add a new dimension which enable communication among smart object, it connect things over the network. IoT allow automation of every object around us.

In order to activate IoT service, spread of RFID technology is very important factor. In particular, it is important to provide mobile RFID service that enables RFID service to be used anytime and anywhere by smart phones that are rapidly spreading. This is because it can demonstrate that the service can be used in a wide range of fields by combining mobile communication technology with the existing RFID service which is activated in a secure way.

REFERENCES

- [1] Parul Datta and Bhisham Sharma, "A Survey on IoT Architectures, Protocols, Security and Smart City based Applications" 8th ICCCNT 2017 July 3-5, IIT Delhi, Delhi, India IEEE – 40222-2017.
- [2] Thomas Hanel, Alexander Bothe, Rene Helmke, Christoph Gericke and Nils Aschenbruck, "Adjustable Security for RFID-Equipped IoT Devices", University of Osnabruck Institution of Computer Science (CS) Wachsbleiche 27, 49090 Osnabruck, Germany 2017.
- [3] S. Kraijak and P. Tuwanut, "A Review on IOT Manners, Protocols, Uses, Safety, Secrecy, Real-World Execution and Future Movements", 16th International Conference on Communication Technology (ICCT), 2015.
- [4] Parul Datta and Bhisham Sharma, "A Survey on IoT Architectures, Protocols, Security and Smart City based Applications" 8th ICCCNT 2017 July 3-5, IIT Delhi, Delhi, India 2017.
- [5] Pasquale Daponte and Luca De Vito, "A Survey of Measurement Applications based on IoT" Department of Engineering, University of Sannio, Benevento, ITALY 978-1-5386-2497-5/18/\$31.00 ©IEEE2018.
- [6] R.M.Gom, G.Hari Satya Krishna, E.Brumanica and Y. Mistica dhas, "A Survey on IoT Technologies, Evolution and Architec" 2nd International Conference on Computer, Communication, and Signal Processing (ICCCSP 2018).
- [7] Jyoti Mante Khurpade, Devakanta Rao and Parth.D. Sanghavi, "A review on iot and 5g network" Department of Computer Engg. MIT Polytechnic, , Pune, Maharashtra, India IEEE 2018.
- [8] Mrs. Snehal Deshmukh and Dr. S. S. Sonavane, "Security Protocols for Internet of Things: A Survey" 978-1-5090-5913-3/17/\$31.00 c IEEE 2017.
- [9] Akansh Saxena, Mitul Tyagi and Pawan Singh, "Digital Outing System Using RFID And Raspberry Pi With MQTT Protocol" 978-1-5090-6785-5/18/\$31.00 © by IEEE 2018.
- [10] Radek Krejci, Ondrej Hujnák and Marek Švepeš, "Security Survey of the IoT Wireless Protocols" 978-1-5386-3073-0/17/\$31.00 c IEEE 2017.
- [11] Minela Grabovica, Srđan Popiü, Dražen Pezer and Vladimir Knežević, "Provided security measures of enabling technologies in Internet of Things (IoT): A survey" 978-1-5090-2957-0/16/\$31.00 ©IEEE 2016.
- [12] SeongSoo Park, "An IoT Application Service Using Mobile RFID Technology", Media R&D Center, SK Telecom 2018.