STORAGE AND RETRIEVAL OF DATA USING RFID TECHNOLOGY

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ABSTRACT

Near Field Communication(NFC) is an emerging wireless Short-Range communication technology that is based on existing standards of the radio frequency identification application scenarios for contactless transactions, in particular services for mobile payments and over the air ticketing. The intension of this paper is to describe basic characteristics and benefits of the under laying technology, to classify modes of operation and to present various cases. Both existing NFC applications and possible future scenarios will be analyzed in the contest. Furthermore, security concerns, challenges and present conflicts will be discussed eventually .This technology has been only implemented in smart phones so far. An RFID system has readers and tags that communicate with each other with radio. RFID tags make it easy and cheap to apply all kinds of things that people would like to identify or track. RFID can tell you what an object is ,where it is and even condition ,which is why it is integral to the development of the internet of things. Security attacks like eavesdropping ,data corruption and modification .Interface attacks and theft, are the most dangerous for the costumer who is using his/her smart phone for payment purpose. In this paper we present the Comparison of NFC with Bluetooth and security analysis of NFC.

Keyword - *RFID tags, NFC, Arduino board ,MF RC522chip,Host Controller ,Magnetic inductive coupling.,*

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1. INTRODUCTION:-

RFID (Radio-Frequency Identification) is a technology for automated identification of objects and people. Human beings are skillful 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 labeling objects to facilitate their "perception" by computing devices. Most histories of RFID traces 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 mission at night because planes were harder for gunners on the ground to the target and shoot down. Of course, the German also took advantages of the cover that darkness provided. Early Identification Friend or Foe(IFF) system made it possible for Allied fighters and anti-aircrafts systems to distinguish their own returning bombers from aircraft sent by the enemy. These systems,

and their descendants today, 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.

Shortly after the war , an engineer named Harry Stockman realized that it is possible to power a mobile transmitter completely form the strength of a received radio signal . his paper "Communication by Means of Reflected Power" introduced the concept of passive RFID system. Work on RFID system as we know them began in earnest in the 1970s. In 1972, Kriofsky and Kaplan filed a patent application for an "inductively coupled transmitting-responder arrangement. The system used separate coils for receiving power and transmitting the return signal. In 1979, Being filed a new application for an "identification devices" that combined the two antennas; many consider his application to be landmark RFID application because it emphasized the potentially small size of RFID devices.

1.1 Objective

The main objective of the project aims to provide an understanding of RFID which is a board and somewhat vague concept used to refer to technologies that enable data collection , through use of contactless election tags and wireless transmitters(readers), for identification and other purpose. The second section focuses on information security and privacy issues related to RFID that are already present or likely to be raised in a three to four year time-frame as well as on possible solutions to address them.

RFID is seen as a subset of sensor-based computing, their paper does not address this broader category that also encompasses other technologies collecting information from the environment without tag devices. Nor does the paper examine issues that may arise when RFID becomes ubiquitous, is used in a manner that is not anticipated today, or in connection with other sensor-based technologies . these issues will be a topic for future work.

1.2 Organization of the report

The report is divided into 4 parts and each part deals with the different aspects of the system.

(i)System Design: This part talks about the existing system, how they are designed and the issues associated with them. Furthermore, it describes the features of the system proposed and the requirements for operating it.

(ii)Module Description: This part describes each module implemented in the system, i. e., how the data is processed in each and what are the steps involved from the user's point of view . Each module is diagrammatically represented so that there is a clear understanding about what happens at that particular step.

(iii)System Implementation: This part deals with an overview of the platform for which the system is developed for. It also talks about the parameters needed for running the system and provides a sample of code used, along with screenshots of the output.

(iv)Conclusion: This part concludes the report and discusses the possible enhancement that can be implemented in the future improve the quality.

2.Existing System:

- Passive tags are relatively inexpensive and, with some types, you can peel them off and stick them on various items, either manually or with an automated application system. Each has its own unique serial number. However they don’t have some of the advantages of active tags.
- Active tags are more expensive because they are more complex. They comprise a microchip, a radio transceiver, an antenna and have a battery.
- The read range of a passive tag is similar to that of a barcode. However the active tags are smart and more powerful, and can transmit and receive over a greater distance. While they cost more, you may still save overall, depending on the application.
- May be difficult to troubleshoot if you have problems with the RF link
- There are various ways to minimize these risks, including making sure that charges can’t build up in the first place, or if they do, they are discharged in a controlled way that doesn’t stress the microchip.

2.1Proposed System:

- Minimizing the hassles of wire utilization during data transmission is the use of Radio Frequency Identification technology or RFID. With the progression of time, there have been an increasing number of electronic devices which utilizes RFID technology and commonly included in the list are radio, television, and wireless telephones.
- In addition, electronic devices do not merely obtain and experience the various benefits of using RFID technology. Even a wide array of business companies utilizes radio frequency identification in keeping an update in their assets.
- Radio frequency identification technology can be considered as a fully automated data capture as well as an effective analysis system especially when it comes to tracking business inventories and equipments . Fortunately, radio frequency identification is a stable kind of technology which continually evolves for the better, particularly aiming for more accessibility and availability among business entrepreneurs.
- Fortunately, radio frequency information technology possessed an electronic memory which is beneficial for the storage of information especially with regards to assets, inventories, and even equipment.

2.2 Advantages of proposed system:

• Tag detection not requiring human intervention reduces employment costs and eliminates human errors from data collection,.

• As no line-of-sight is required, tag placement is less constrained.

• RFID tags have a longer read range than, e. g. barcodes,

• Tags can have read/write memory capability, while barcodes do not.

• An RFID tag can store large amounts of data additionally to a unique identifier

• Unique item identification is easier to implement with RFID than with barcodes

• Its ability to identify items individually rather than generically.

• Tags are less sensitive to adverse conditions (dust, chemicals, physical damage etc.)

• Many tags can be read simultaneously

• RFID tags can be combined with sensors

•Automatic reading at several places reduces time lags and inaccuracies in an inventory.

3. MODULES:-

MF RC522 is applied to 13.56MHz contactless communication highly integrated chip card reader , is NXP for the "Three Tables" application launch of a low-voltage, low-cost, small size and non-contact card reader chip ,smart instrumentation and portable handheld devices developed better choice. MF RC522 using advanced modulation and demodulation concept completely integrated in all types of 13.56MHz passive contactless communication methods and protocols. support 14443A compatible transponder signals .The digital part handles ISO14443A farming and error detection .in addition ,support fast CRYPTO1 encryption algorithms, terminology validation MIFARE products.MFRC522 supports MIFARE series higher speed non-contact communication , two-way data transfer rates up to 424bit/s.

Fig-1 RFID Components

Number of Modules:

- **Building of components.**
- **Tag reader and writer.**
- **RFID chip storage.**
- **Transfer of data.**
- **Controller.**

3.1 TAG READER AND WRITER:-

Introduction

The RFID Read/Write Module can be used in a wide variety of hobbyist and commercial applications, including access control, user identification, robotics navigation, inventory tracking, payment systems, car immobilization, and manufacturing automation. The RFID transponder tags provide a unique serial number and can store up to 116 bytes of user data, which can be protected to allow only authorized access.

Fig -2 Reader and Writer Tag

Description

The NFC capable device operates as active reader as writer. As soon as it gets close enough to a passive RFID transponder tag or a passive smart card, energy is transferred to the passive tag via magnetic inductive coupling . After the tag being powered , a contactless communication can be established . The NFC device is then able to not only read information stored in the tag, but also to write data to the memory of the tags, respectively the smart card. Typically such NFC tags can off up to 4 bytes of memory. During rewriting applications, the antenna of the reader acts as a relay device in the reverse direction, the reader communicates a message through its antenna, which transfers and store the new data to the activated transducer via its antenna.

3.2 Communication:-

Introduction

For the transfer o huge amounts of data at high speed or over a large distance between initiator and target the described capabilities of the NFC technology might not be sufficient. In theory however, NFC also provides a mechanism or a connection handover to and other wireless technology with higher data like WIFI or BLUETOOTH .In general, the establishment of such data communication requires a lot of configurations effort .The simple touch and connect principle of NFC though can be used in order to exchange the required configuration parameters. Following a technical specification provided by the NFC Forum in this way the negotiation sequence for activating a new communication channel can be achieved via NFC hence enabling an easy connection handover.

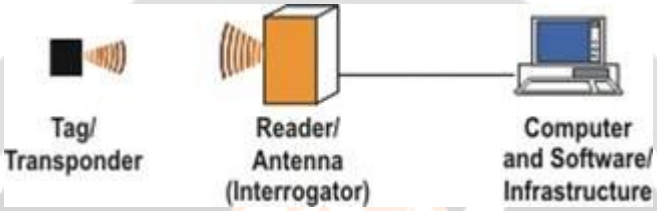

Fig-3 Tag communication

Description:

NFC device acts as a smart card so that other NFC devices can read from it. This operation mode is used in particular for payment or ticketing applications or for providing access control. The NFC device thereby substitutes a credit card, paper based ticket or an ID card, eventually leading to the eliminations of the need for the accordant physical object. During rewriting applications, the antenna of the eliminations of the reader acts as a relay device in the reverse direction, the reader communicates a message through its antenna, which transfers and stores the new data to the activate transducer via its antenna.

3.3 Chip Storage:

Introduction

As seen with the unique identifier, information can be stored in the RFID chip's memory. Due to the cost of tags and the communication throughput permitted by most standards, RFID chip memories are rarely larger than ten kilobits.

This is a long way off the storage capacity currently offered by the smallest flash drives. Nevertheless, it does allow the operator to store essential data. In any case, the data related to the object can be stored remotely in a database(Indexed by the unique identifier). Unlike the unique identifier, the data contained in the memory can be added to or edited at different stages in the life of the object. In contrast, changes to the data communicated by identification labels require a new label to be printed.

Fig-4 RFID chip

Description:

Chips for passive RFID tags had their size reduced to sub millimeter dimensions in order to optimize the cost of the component, thus increasing the number of chips per wafer. This, of course, creates technical problems when the chip, whose pads are now below the 100um size , needs to be connected to the antenna at high speed. To overcome this problem, pick and place equipment(PNP) manufactures have developed innovative technology enabling the attachment of the chip to the antenna roll using standard flip chip technology and dispensing of a quickly curing conductive adhesive at high speed, the process is quite simple and is capable of attaching about 10,000 components per hour, equivalent to about 70 million tags per year.

3.5 HOST CONTROLLER :-

INTRODUCTION:

The host controller acts as the heart of every mobile phone. This processer is not only necessary for executing mobile phone's operating system, but also manages the user interface and the GMS/UMTS modem and services as Application Execution Environment (AAE).It is the gateway for the other NFC components to the mobile phone's system itself and is therefore an essential part of the integrating NFC functionality into the handset.

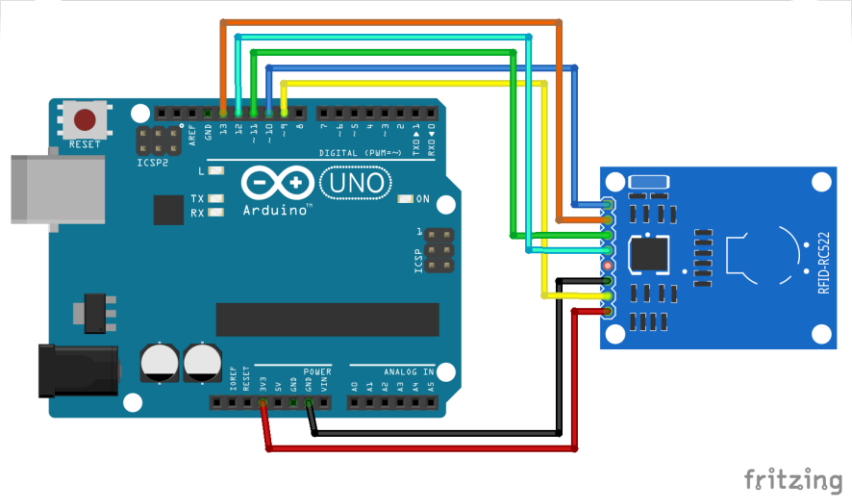

Fig-5 Ardino board

During rewriting applications the antenna of the reader acts as the relay device in the reverse direction , the reader communicates a message through its antenna ,which transfers and stores the new data to the activated transducer

through antenna. Chips for passive RFID tags had their size reduced to sub millimeter dimensions in order to optimize the cost of the component , thus increasing the number of chips per wafer. This creates technical problems when the chip whose pads are below the 100 micro meters. needs to be connected to the antenna at high speed.

Description

The antenna is a device that either reads data from tags or in some cases writes data to tags using radio frequency waves. Antenna's comes in all shapes and sizes depending to the environment or the required range. antenna's can be mounted on the floor, to sides of conveyor's on lift trucks or on building structures .

The controller is the electronic device that receives the data from the antenna ,or transmits data to the antenna ,and usually communicates the data from antenna or transmits the data to the antenna and usually communicates this data to a host computer on PLC . The computer manages the information between the RFID products and the Host system . some controllers are equipped with programmable I/O points that can be used to male local decisions.

Fig-5 MFRC522

4.System Implementation:-

4.1 Introduction :

The system is developed using Arduino Sketch and can be operated on any computer that has version 4.2.1 or higher .It occupies roughly 10MB of the internal storage and can be operated without any issues on a device having a minimum of 128MB RAM and a 500MHz processor.

4.2 Overview of Platform :

Software programs called sketches are created on a computer using the Arduino integrated development environment(IDE).The IDE enables you to write and edit code and convert this code into instructions that Arduino board .The Arduino board is where the code you write is executed. The board can only control and response to electricity, so specify component are attached to it enable it to interact with the real world.

These components can be sensors which convert some aspect of the physical world to electricity so that the board can be sense it or actuators which get electricity from the board and convert it into something that changes the world. Examples of sensors include switches accelerometers and ultrasound distance sensors. Actuators are things like lights and LEDs speakers, motors and displays. There are variety of officials boards that you can use with Arduino software and a wide range of Ardiuno compatible board produced by members of the community.

You can get boards as small as a postage stamp, such as the Arduino Mini and Pro Min larger boards that have more connection options and more powerful processors ,such as the Arduino Mega and boards tailored form specific applications such as Lily Padfor wearable applications, the Fio for wireless projects and the Arduino Pro for embedded applications.

4.3 Interface:

The entire interface designed and implemented in an Arduino Sketch and the IDE enables you to write and edit code and convert this code into instructions that Arduino hardware understands. The IDE also transfers those instructions to the Arduino board. The Arduino board is where the code you write is executed. The board can only control and respond to electricity, so specify components are attached to it enable it to interact with the real world.

4.4 Implemented Details:

The applications requires a device running Arduino UNO or higher in order to work .So

We run the program on sketch 4.6.1 running 0 and having 1Gb RAM. Since the specifications are high on this device, the full extent of the applications can be seen, including the visual effects of material design Which is available on devices running Android 5.0 and above.

4.5 Integration Of Modules:

Integration is a process where all the individual modules are combined i.e ,all five modules are combined to make a working system .The integration process can be done two ways: bottom-up, top-down. These are the two approaches to integration. Bottom-up approach is the traditional strategy used to integrate components of a software system into functioning into whole.

4. CONCLUSIONS :

The proposed system provides various methodologies to design RFID system. Various components of RFID system infrastructure , RFID standards , privacy, legislation, and security have been discussed along with their advantages and disadvantages. Cryptographic algorithm for modification and restoring RFID privacy has been explained. There has shown details trusted agent and PKI method to provide the relationship and secure communication such as confidentiality, data integrity, non-reputation and authentication between entities. While reviewing the optical RFID tag system we find two major advantages such as better penetration of obstructing material and easier electronic manipulation. The study shows that circularly polarized metallic patch antennas feed structure with the probe feed are placed in between the antennas radiating patch and ground plane. The feed structure , a cone-truncated square patch antenna with a thick air-layer substrate , which can be excited with good impedance matching and good CP radiation characteristics. The study shows that the user interface RFID major application such as vehicle tracking, container tracking, object tracking, supply chain management tracking, asset tracking, library management , access control and environmental conditions monitoring.

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6. REFERENCES

[1] G. International Telecommunication Union (ITU), "It internet reports 2005: The internet of things, executive summary," November 2005, last visited on January 19th 2012. [Online]. Available: http://www.itu.int/osg/spu/publications/internet of things/Internet of Things summary .pd

[2] I. C. USA, "Idc - press release: Samsung takes top spot as Smartphone market grows 42.6visited on January 19th 2012. [Online]. Available:http://www.idc.com/getdoc.jsp?containerId=prUS23123911

[3] ——, "Idc - press release: smart phone outstrip feature phones for first time in western Europe as android sees strong growth in 2q11, wayside," September 2011, last visited on January 19th 2012. [Online].Avalable: http://www.idc.com/getdoc.jsp?containerId=prUK23024911

[4] J. Langer and M. Roland, Anwendungen und Technik von Near FieldCommunication(NFC). Springer, 2010.

[5] R. Want, "Near field communication," Pervasive Computing, IEEE ,vol. 10, no. 3, pp. 4 –7, march 2011.

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