Research Paper   Engineering

Analysis of Application of RFID Based System

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ABSTRACT
RFID is a technology which uses radio waves to transfer data from an electronic tag which consist semiconductor chip inside it, called RFID tag, attached to an object, through a reader.. In this study, An RFID based system has been built to analyse the various applications of RFID based management system. This system consists of two main part which include: Hardware & Software. The hardware consist of three basic module which are RFID module with RFID reader, GSM module & microcontroller. For design the software, c programming using arduino is used. .We designed a system to describe the application of RFID system in school/universities/ industries for attendance monitoring, bank security, toll collection & car parking. However RFID have many application areas such as in military, sports, security, animal farms, and healthcare. Use of GSM & Bluetooth enhances its application to get details of access in "any time anywhere" through android phone.

KEYWORDS : RFID reader (EM 18), RFID tags, GSM module, Bluetooth (HC05), DC motor, RFID applications, Microcontroller ATMEGA328, RTC.

INTRODUCTION:

RFID stands for Radio frequency identification, that uniquely identify the serial no. of tag. RFID system consists of three components: RFID tags, RFID reader & RFID antenna. The basic concept behind RFID is to access information from the transmission of radio wave energy. In RFID system , RFID system reader send a pulses of energy, so that a Tag can listen these energy and responds to it. It transfer information to the middleware (microcontroller) for further processing. In our designed system when tags come close to the RFID reader radio wave energy range, system will compare the unique ID with the registered ID & Gate will open.LCD will display the real timing of gate opening & send this information to microcontroller to store this & to initialize the GSM to send message to the authority. We can get this information on androids phone through Bluetooth also. RFID system can be used asa security system, healthcare, supply chain management, Industries for production & for inventory control.

The designed system, consist of two parts : Hardware & software

The hardware part include GSM module, DC motor, Bluetooth (HC05), android phones, LCD, Microcontroller ATMEGA328, RFID Reader etc. RFID reader connected to the microcontroller. The use of GSM enhances oits area of application.GSM module is used to send the SMS to the owner. So that the owner can get information of access at any time. since GSM network ability is very strong. In this system the RFID reader operate at low frequency (125 kHz). However we can enhance it detection range upto 10 cm by increasing its frequency or by using upper frequency range tags. In software part we used c language for programming. And it will transfer to microcontroller through arduino.

Another application area of RFID system is to get information through Bluetooth, by just scanning the Bluetooth card on over reader to enable the Bluetooth. It is a very cheap method to get details of RFID system far away from it. Since GSM will Charge per SMS, however Bluetooth is free of cost.But this method requires an app to be installed in android phone. By enabling this app owner will get all information of accesses, just pressing the user id.However this method have limitation, since Bluetooth works in a limited range.

RESEARCH DESIGN FOR A SYSTEM REVIEW:

We searched online data base to identify the advancement in the field of RFID.We categorized RFID application and analysed these applications. We collected E-data from various publications & from Google search engine, Wikipedia. We have set " RFID technology", RFID applications" & " RFID Issue" as a keywords for search literature. From these studies we get to knowthat the RFID technology was implemented first time in second word war by US army to detect & track the aeroplanes of friend and foe. US army implemented RFID technology not only to Identify the planes but also to identify own weapons and container. But RFID technology get pupularization & commercialization in 2005 after Wal-marts adoption .After wal marts innovative footsteps hit the worls many scholars shows their interest to understand and develop RFID technology. From the studies of various Publication we analysed that government categorized the RFID applications in three areas, which are : Agriculture & live stock, defence and security, environmental applications, health care and welfare, identifications & transportations:

RFID general refers to various way of using RFID technology in different sectors simultaneously.

Fig 1. Descriptive Statistics of literatures by application
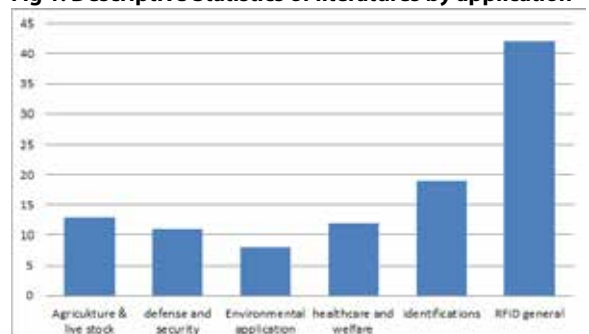
APPLICATION AREAS :

DEFENCE & SECURITY: RFID Technology is used by US army to indentify friend and foe planes. It also prevent terrorist attack

IDENTIFICATIONS: RFID technology is used to identify the user by unique used ID no, which stored in a semiconductor chip of tag. An electronic passport were adopted by USA government after 9/11 at-

tack. Biometric attendance system are used in many offices to identify the employee.

ENVIRONMENT APPLICATION : In south corea, ministry of environment introduces a RFID based waste management system specially in medical waste management.

TRANSPORTATION: RFID based electronic toll collection technology is one of the oldest and widespred.In RFID system driver can scan card from a distance of 10 cm for toll deduction.

HEALTHCARE : US government uses RFID tag in monitoring the drug industries. Singapur govt used RFID to track the SARS virus in a patient.

AGRICULTURE: RFID can be used in Animal disease tracking, providing navigation for appropriate pesticide, agriculture risk mamagment.

SYSTEM DESIGN :
In order to implement RFID based Monitoring system with notification through GSM or to get detail on on android phone the hardware & software are discussed below:
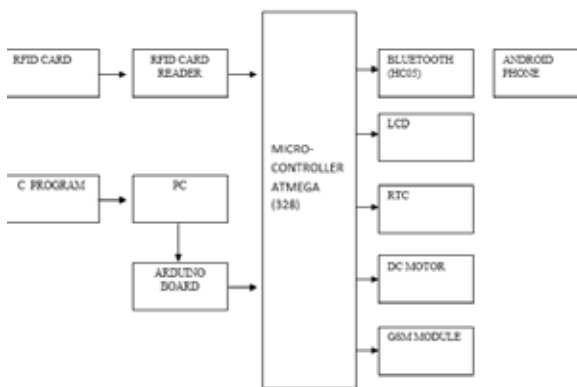

Fig 2. Block diagram of System

Hardware Design : This system is designed to describe the various application of RFID through one RFID moduel. We designed a system which describe the RFID applications in industries, school, university, security system, toll system & car parking. The user have to access RFID tags/cards on RFID system, the information is forwarded to the GSM after processing it through microcontroller Atmega328. If any invalid user try to acess, the gate will not open or it send notification of invalid access to the owner. Same system can also be used in bank security system. The hardware architecture is shown in below figure.This system has four tag i.e ID1, ID2, Bluetooth,erase.

Fig 3 :RFID tags

These tags are used as a identity card to response to the RFID reader. User identity is stored in RFID tags through a semiconductor chip.

ATMEGA328 microcontroller take input from RFID reader & process it to GSM module through max232 for storing access user record and for send SMS to owner through GSM module. The resultant hardware system is shown in fig. This system have EM-18 RFID reader, GSM SIM900 module, RTC, Bluetooth, LCD, AVR, Crystal oscillator, DC motor.
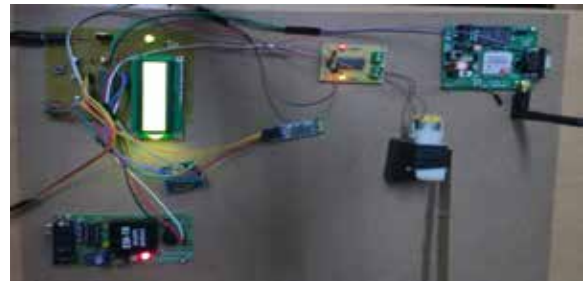

Fig 4: Resultant Hardware Diagram of SYSTEM

SOFTWARE DESIGN :
C Software is used for developing and compiling program in this project. Program is firs compiled in c an then burned into microcontroller through arduino board
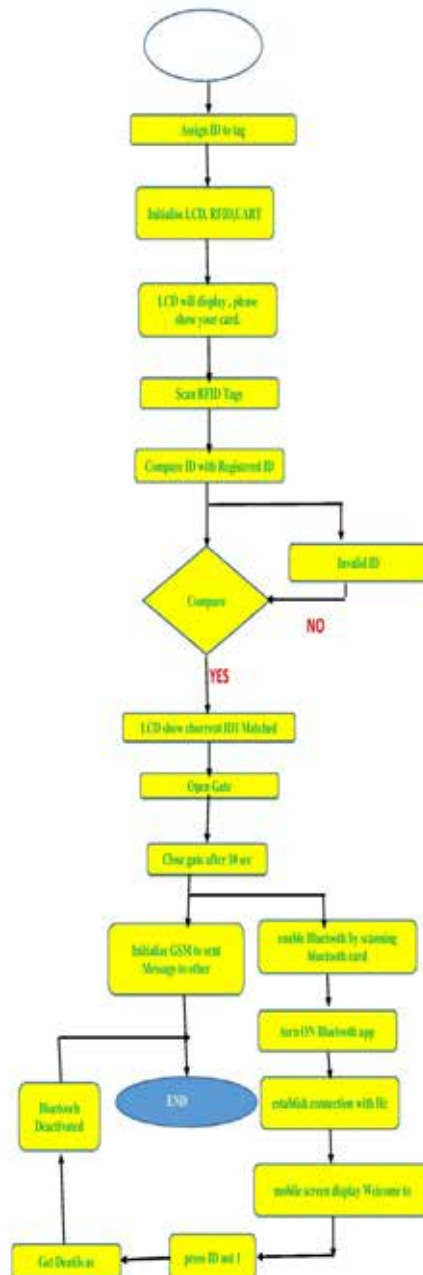
Flow chart of algorithm is shown in below fig:

Fig 5: FLOW CHART

Proposed system can be explained in following steps:

1. Initialize RFID
2. Initialized LCD
3. Initialize microcontroller
4. LCD will display " please show your card"
5. Sacan RFID tag on RFID reader
6. RFID send scanned data to microcontroller
7. Microcontroller compare the iD with stored Ids
8. Microcontroller compare the ID with stored id & allow DC motor to pen the gate
9. LCD will display ID matched and gate open & after some time delay LCD display gate closed
10. GSM module initialize to send msg to sender.
11. Scan Bluetooth card
12. Turn on Bluetooth app on android phone
13. Press ID to get details of user.
14. Press "Q" to deactivate Bluetooth

Fig 6 : Bluetooth output

FUTURE ENHANCEMENT:
In the proposed system we use microcontroller which used to store only 9 record. We can use high memory microcontroller which can store more data records.

We can add some new module like library system, payment system & GPS.

Range of RFID reader can be increased so that RFID Can detect & response from far Distance.

A webcam can be implement to detect who swap the card.To detect the face of invalid user.

CONCLUSION:
We can conclude that it is no as much complex as it shows. It is much simple.GSM can make authority to get information at any time. The first step include purchase all the items then make hardware as per ckt diagram by soldering. It also utilizes capability of Bluetooth system.

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