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"Integrated Cafeteria Management System Using Rfid"

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Abstract: *The problem statement that we started out with at the beginning of the semester is to design and implement an RFID based cafeteria management workplace. The aim is to come up with a cost efficient RFID reader and access channel that could be installed at the entrances of cafeteria or near counter of cafeteria of the workplace.These access channel would also be the nodes of a local network with a central server that would facilitate two-way communication between the central server and each of the counter machine. We have been successful in achieving all the above-mentioned goals, the technical details of which we discuss in the next few sections.*

Keywords *- Hardware Design, RFID, System Analysis, ,Software Design, wireless transceiver*

I. Introduction

In our colleges campus canteen facility is provided. Students, college staff or university staff uses this facility. In older system cash payment is the only option for making the payment. The main draw back of cash payment system is that user always needs to carry the cash. Canteen owner writes order details of students on daily basis. This method has limitation and draw backs of maintaining paper based records but In this canteens students or employees pay their bills by their passive RFID Card. It provides improved efficiency and accuracy in managing the college canteens Also manage day to day operations and simplifies the accounts of individual students and faculties of organizations. College identity card of each employee can be used for this system. The System accounts for the consumption of cost and generates daily, periodically and monthly reports of at Institute level, Unit Level, Department levels. This also assist in managing the Canteen Vendor.

The system provides the employee in the cafeteria to recharge card, make purchases the food, add and remove order and generate bills. He is made aware by the system when the item finishes. The system allows to manage the database of the student, staff. Every individual will be having a card and a Unique Id corresponding to it. RFID tag will also be attached to each and every student's ERP account. It is very useful for the hostel students. The manger need not be taking an entry in register. This problem we can avoid in this system. The overall data of students will be saving in WEB server.

1.1 Evolution of RFID

The success of RFID technology primarily based on the advent of radio frequency technology. The developments in radio technology were a prerequisite to harness the essence of RFID technology. There is significant growth over the past couple of decades in this technology. RFID technology is widely used in modern industries that demand data integrity and high efficiency of the system. This technology is used for tracking vehicles and goods, courier services . Other applications include animal tracking, secure toll payments, inventory management systems, access control mechanisms, etc.[10]

1.2 What is RFID ?

RFID is Radio Frequency Identification. Basically a RFID system contains 2 parts: A Reader, and one or more Transponders, also known as Tags. The systems (RFID systems) to automatically identify and track products and people is evolved from barcode labels.[3]

1.3 Components of RFID

Various components that an RFID systems has, are connected to one another by a devoted communication path. The list of components is as follows:

Tags – an object that is attached to any product and uses a unique sequence of characters to define it. It comprises of a chip and the antenna.

Antenna – containing radio waves that can be used for the transmission of information between the reader and tag.

RF Transceiver - The RF transceiver is the source of the RF energy used to activate and power the passive RFID tags[10]

1.4 How RFID works?

In every RFID system the information is contained by the transponder Tags. This information can be as little as a single binary bit, or be a large array of bits representing such things as an identity code, personal medical information, or literally any type of information that can be stored in digital binary format. The Tags are classified into two types: Active Tags and Passive Tags. Active tags have its own source of power where as Passive tags have no power source of their own and instead derive power from the incident electromagnetic field. The heart of each tag is a microchip. To access the internal memory and transmit stored information the tag is able to draw enough power from the field as soon as it enters the generated RF field .[6] When the transponder Tag draws power , the resultant interaction of the RF fields causes the voltage drop in value at the transceiver antenna. Tag utilizes this effect to communicate its information to the reader. The amount of power drawn from the field can be controlled by the Tag and by doing so the voltage sensed at the transceiver can be modulated according to the bit pattern it wishes to transmit.

KEY BENEFITS OF RFID

RFID- enabled systems help college cut costs, improve subscriber service, reduce manpower, increase accuracy in the system, Other benefits of RFID technology are as listed below:

***No line-of-sight contact necessary**

The major advantage of all kinds of RFID system is that they work contactless and require no line of sight.

***Robust system**

Transponders can be read through a whole number of substances, e.g. snow, fog, ice, paint, dirt, and in difficult scenarios where barcodes or other optical reading technology not able read information.

***Speed of an RFID system**

RFID transponders can be read at high speed even in worst conditions, and in most cases reader respond in less than 100 or 110 milliseconds.

Common Problem with manual working

This section concludes the common problems which are occurring with using manual manner as seen in many of the cases in the current system. Since many of the processes are completely done through manual mean therefore it exhibits the common problem manual works. First manual working are less sufficient . For example, processes such as staff retrieval or payment are slow and time-consuming .Second ,manual workings tend to generate incorrect outputs due to mistakes done by human ,especially mathematical calculation .Besides, manual system is having difficulty in generating useful reports or order by restaurant report which are helpful and essential in decision making . more importantly most of the critical information such as order and sales are kept in physical document and the consequence will be severe to have lost these valuable information

II. Related Work

Radio frequency identification (RFID) is a wireless technology which is used to develop the access control system. It has been disclosed that various processes from industries to home to home control has reported the use of RFID technology .There is a boom in the industry to use RFID technology in the recent years. Research and development in this field has made this technology to be used in supply chain management, Attendance management, library management, automated toll collection etc.[1]. There are multiple RFID standards being used in the industry. These multiple standards which are exist , helps the users to choose between various standards of this technology and select the approach which best suits them and implement it for communication between an interrogator (RFID reader) and the RFID tag.

III. Problem Statement

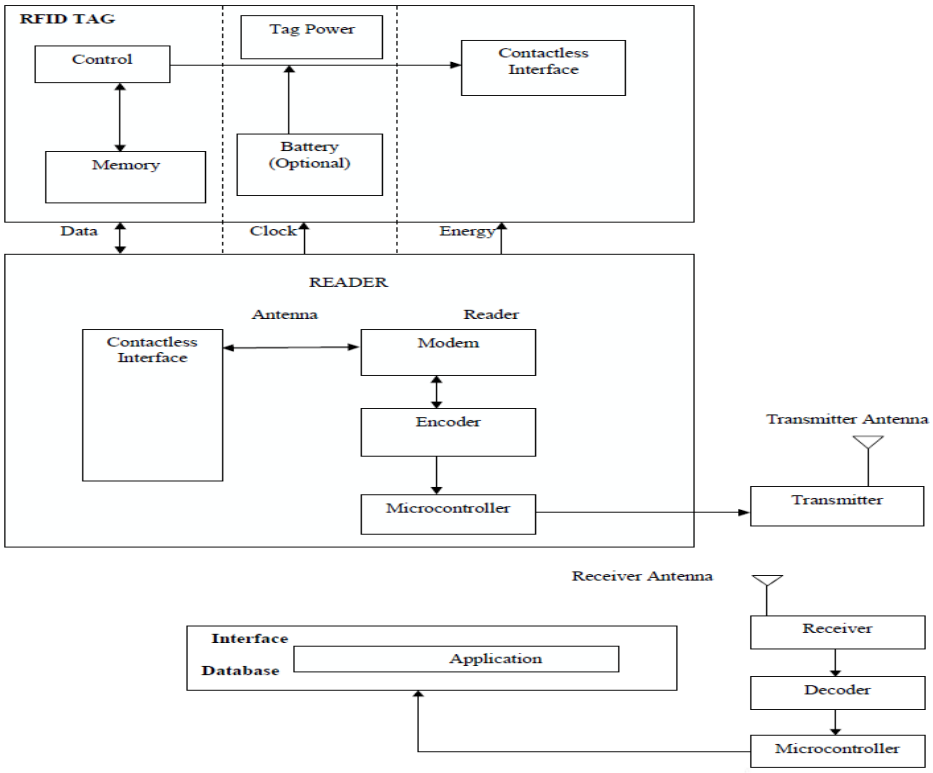
The objective of our project is:

1. Our proposed system will be helpful in not only granting access in campus but will also be helpful in tracking the location of particular person.
2. Our system will also be helpful in tracking the number of students present in canteen during lecture period.
3. To Design Complete real time RFID based System .
4. To Design new RFID module which does not require PC (personal Computer).
5. Scaling the same with all types of RFID readers available .
6. To design more user friendly KIOSK system and easy to setup .
7. Complete system is connected to internet all time .
8. To design the portable unit of the IOT RFID reader for authorization/identification on remote places.

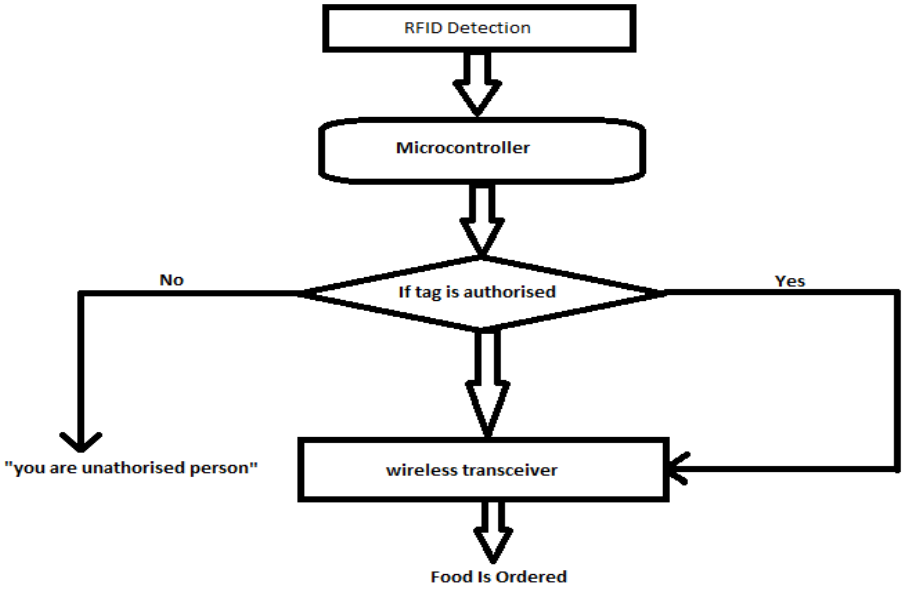
IV. Methodology Of Use

When the RFID tag gets detected by the RFID reader/writer module, then the microcontroller recognized the person is valid user or not using installed data . It results that the user can access his/her account and get facility of ordering food one can collect it very easily. During this process if user having insufficient balance in ERP account, it display the message "Refill your account".With the help of wirelss transceiver , signal will be send to the cafeteria kitchen system for preparing the ordered food.

Block Diagram :



Flow Chart:



COMPONENTS

The system consist of the following components:

1}RFID READER:

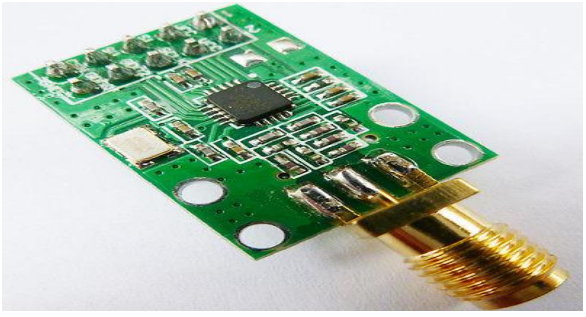
It communicates with the tags through an Radio Frequency (RF) channel to obtain information. Depending on the type of tag, this communication may be a simple or maybe a more complex. In environments with many tags, a reader may have to perform an *anti-collision* protocol to ensure that communication disagreement don't occur. Anti-collision protocols permit readers to quickly communicate with many tags in serial order.

2}RFID tags:

These are the tags that have a magnetic coil within them. This RFID are used to generate radiofrequency waves. This tags are passive in nature i.e. they can be read up to a small distance of 10-15 cm, so the system is static and user-friendly. A passive tag is an RFID tag that does not contain a battery or any power supply; the power is supplied by the RFID reader which has been connected to the PC. When radio waves from the reader are encountered by a passive RFID tag, the coiled antenna within the tag forms a magnetic field. The power is drawn from tag and energizing the circuits in the tag. The tag then sends the information saved in the tag's memory. The tag is particularly much less expensive to manufacture. All tags have unique identification number i.e each tag have UID (15 characters long) which is quite useful and these tags can be re-used in various application.[9]

3}CC2500Wireless Transceiver :

RF transceiver is a small size and low poer consumption module.CC2500 having very low cost with a frequency 2.4GHz. CC2500 transceiver is designed for low power wireless applications.The module integrated many RF functions thus you can use it conveniently and reducing your development time



4} LCD Display:

Alphanumeric displays are used in a wide range of applications, including palmtop Computers, tablets ,word processors, xeroxmachine, point of sale terminals, medical instruments, mobile phones, etc. The 16x2 intelligent alphanumeric dot matrix display having capacity of displaying 224 various characters and symbols.

4} PIC18F452 Microcontroller:

PIC18F452 Microcontroller is powerful 10 MIPS and easy-to-program. The PIC18F452 has some of the features as 'C' compiler friendly development environment, Self-programming, to capture and compare PWM functions,8 channels of 10-bit Analog-to-Digital (A/D) converter, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and Addressable Universal Asynchronous Receiver Transmitter (AUSART).

V. Advantages Of The System

The implementation of RFID technology in college cafeteria will definitely faster than the entire process of cafeteria management. Manual Process of cafeteria taking and ordering food and payment will be totally removed which will save time, labour work requirement and it provides very authenticate output. RFID technology saves huge amount of time and also greatly improves the operation efficiency, as compare to the time consumption in data entry for different technologies. Also with the adoption of this technology the process and product quality can be improved, due to reduction in entry errors by manual human operations. Manpower cost is reduced to perform the value added functions.

VI. Conclusion

It is an important step towards smart college campus so it's necessary to install this high quality of Cafeteria using RFID everywhere in the country. This project aims at developing a stable, most reliable and efficient system for the people The system uses radio frequency identification to differentiate between valid and invalid users. It will overcome the issues related to traditional canteen management system and provides scalable and reliable canteen ordering.By this we can change the entire canteen system. RFID technology definitely promises an increased effectiveness and improved efficiency for business processes [5].

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