
Development of Effective Plate Dispenser Using RFID

G. Shailaja¹, D. Sandeep²

¹PG Scholar, Electronics and Communication Engineering,
Vignan Institute of Technology and Science,
Telangana, India

²Assistant Professor, Electronics and Communication Engineering,
Vignan Institute of Technology and Science,
Telangana, India.

gilakathulashailaja@gmail.com

Abstract: *We propose a plate dispenser system is security to the essential material. The design is implemented using ARM 7 microcontroller as central controlling device and RFID Technology for access. RF readers that "read" and in some case modify the information stored in the IC memory. The objective of our project is to develop a plate dispenser. The hardware design consist of electronic system and mechanical system. The electronic system the RFID reader reads the information about the person from RFID tag. The server stores predefined information of various food items and calculated work. The mechanical system consisting of conveyor belt, DC motor drive, as a result. The plate is dropped on the conveyor belt which through forward moment dispenses the plate at the outlet. So that it can be collected by the authorized person. After calculating the estimated cost this information is passed the mobile phone through GSM technology. commercially we can use this project for security purpose.*

Keywords: *RFID Technology , ARM , GSM , Dc Motor, Conveyor Belt.*

1. INTRODUCTION

Authentication is important factor in many fields. The authentication gives identity to a person as an individual and also to an organization as a group. Authentication also provides security to the material. Using basic idea of providing identity and security to the essential material we are using RFID technology .which is most appropriate for this particular need. Here in this project we are implementing a RFID based plate dispenser. where a person can access to a plate based upon his/her identity. Here we also provide security to the basic material by giving access to the authorized person and rejecting the fake or unauthorized persons. Another idea implemented this project is giving an account of the material dispatch. Which is very important for a calculated work.

Radio-Frequency Identification tags are used to identify and locate items using radio signals. They consist of a microchip and an antenna which transmit a signal to a 'reader'. RFID tags have been suggested as replacements for barcodes in some areas because they use radio waves, RFID tags can be 'read' out of the line of sight and at distances ranging from a few centimeters to over 100 meters. They also enable individual items to be given a unique identification number, rather than just a product code. RFID tags are currently used in a wide range of applications, including in prepaid 'smartcards', for monitoring livestock, keeping track of passenger baggage at airports, and in pharmaceuticals and event tickets as an anti-counterfeiting measure. However, the most widespread usage is by retailers and wholesalers, who use RFID to track pallets of goods between stores and warehouses. Some retailers have also used these tags on individual items, to make sure stores are alerted to dwindling stock levels.

2. RELATED WORK

Radio Frequency Identification (RFID) is a technology for wireless information exchange over short distances. Even though the technology itself was invented about 50 years ago, recent development in the field of low cost RFID devices began to finally show its potential. The possibility of adding

(minimal) computing capabilities to everyday's objects will support the development of ubiquitous computing in the near future. Applying RFID transponders to consumer goods will be common, creating an ever present computing environment spanning all parts of everyday's life. Today RFID commerce already constitutes a vital and ever expanding market. Judging by evidence from recent years, RFID industry will continue its rapid growth during the following years. In such a developing market security and privacy become increasingly important. An appropriate definition for security is given by Avizienis et al. [2]. They define security as a composite of the attributes confidentiality, integrity and availability (also called CIA). In this context, confidentiality means the absence of unauthorized information disclosure. Integrity describes the absence of improper (meaning unauthorized) system and underlying data alteration. Availability in the security context is defined as continued readiness for authorized actions. Hence, a system with appropriate security should maximize the balance of the three attributes' concurrent existence. Moreover, privacy is defined as a subset of confidentiality and integrity. In other words, consumers have the right to be sure that their data is not disclosed.

As we stated in the introduction, it is becoming increasingly difficult to ignore the importance of security and privacy aspects in research and industrial appliance of RFID . Nevertheless, to the best of our knowledge, there are surprisingly few literature review on RFID in a security and privacy context. Juel's survey gives a good introduction and overview on some of the central topics in RFID security. Lehtonen et al. limit the scope of their examination to product authentication and a discussion of the trade-off between complexity and security in different RFID authentication methods. Moreover, there are publications on state-of-the art in RFID privacy preservation, as well as numerous reviews on security and privacy concerning health care, e-commerce and data mining. The latter two are especially interesting, as essential privacy questions in these fields, like "What data is collected?" and "How is data secured during transmission?" apply to RFID as well. The central factor underlying these topics in e-commerce is trust [2, 10], a topic that can easily be anticipated in an RFID context. When RFID tagged objects hit the end-user market at a large scale, consumers' willingness to provide data will likely depend on individual perceptions of trustworthiness, just as it does in e-commerce. Such perceptions will be directly based on the security and privacy provided.

3. PROJECT DESCRIPTION

In this project we have developed a plate dispenser system .The main aim of this project is to automate the process involved in the maintenance of mess or canteen. The project implementation involves the operation of both electronic and mechanical systems .initially each authorized person is given an RFID Tag usually 900MHZ(UHF Tag).With this tag he/she gets access to the RFID Reader to communicate with radio wave signals. The RFID Reader (EM-18) reads the information about the authorized person and it connects to the ARM7 microcontroller i. e UART1 which is a transmitter signal is activated i.e input signal after the authentication is successful and it controls whole process of the controller. Here we are using three +12v dc motors one is connected to the lock system and another to two dc motors. This dc motors are intended to drive the conveyor belt from which the plate is brought out through the plate outlet i.e., the lock will be open then the plate can be collected by the authorized person. In this way a plate can be accessed through the system at the same time the predefined information i.e., estimated cost is stored in the server of the microcontroller. each plate cost is calculated for authorized person and it can be send to the mobile of the organizer through GSM. The GSM modem is connect the UART0 of the controller i.e., 34th pin. The ARM7 Controller is connected to the +5v external power supply. The receiver signal (UART0) is activated then it sends the messages through the GSM. The GSM operates at 900 MHz frequency band.

Each time the plate is accessed the counting starts which is done by the Microcontroller simultaneously. The total count of the plates data is stored in the server. Where the server based upon the number of total plates calculates the total billing based upon the predefined information. After calculating the estimated cost this information is passed to the mobile phone through GSM technology.

BLOCK DIAGRAM

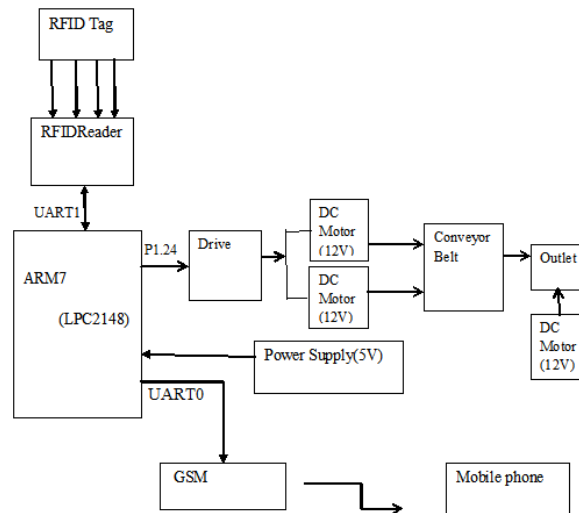


Fig 1. Block Diagram

4. HARDWARE IMPLEMENTATION

4.1 Arm Processor

The LPC2148 is based on a 16/32 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, together with 128/256 kilobytes (kb) of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb. Mode reduces code by more than 30 % with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4-channel 10-bit ADC, PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for automotive and industrial control applications as well as medical systems and fault-tolerant maintenance buses. With a wide range of additional serial communications interfaces, they are also suited for communication gateways and protocol converters as well as many other general-purpose applications.

4.2 RFID

RFID or Radio Frequency identification is a technology that enables the tracking or identification of objects using IC based tags with an RF circuit and antenna, and RF readers that "read" and in some case modify the information stored in the IC memory. Radio frequency identification (RFID) is a general term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object wirelessly, using radio waves. RFID technologies are grouped under the more generic Automatic Identification (Auto ID) technologies.

The RFID system it consist of RFID reader and RFID tag. Fig 4.1 shows the working principle of RFID system.

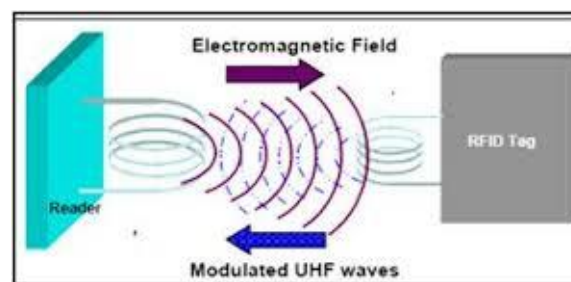


Fig.4.1. RFID System

Here RFID system consists of RFID reader module and Tag and both are internally contain the copper coil. Whenever power up the reader module the electromagnetic field will be generated in the coil and it will be transmitted around the reader about 6 to 10 cm. at 125 khz. Here when the RFID tag comes

in to the field, due to fall of field on tag it will generate power and return the unique number stored in the memory inside tag

4.3 DC Motor

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

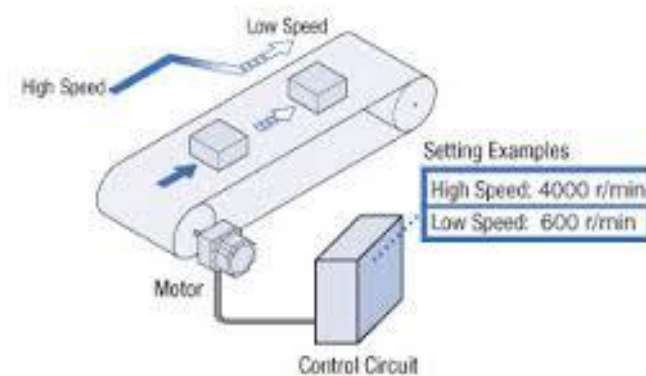


Fig.4.2. DC Motor conveyor belt setup

The DC motors can be used to rotate the conveyor belt as shown in the Fig.4.2. where the automation is required.

In the proposed system the 12V DC motor with 100 RPM is used to rotate the conveyor belt which will work as a plate dispenser. in the proposed prototype system the 1 meter length conveyor belt is used.

4.4 GSM

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band. It supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service).

In the proposed system SIM900 GSM module is used to send the billing information to the authorized persons in the form of short message service(SMS).

5. RESULT ANALYSIS

In the proposed project by the effective working of the processor and other components such as LPC2148 Processor, RFID Tag, RFID Reader, DC Motors, conveyor belt, GSM, Drive, we have successfully implemented a plate dispenser system. Unlike the earlier proposed projects this system provides complete security, authentication as well as effective building mechanism as we have implemented this system with ARM7 LPC2148 Processor. The speed of accessing the plate is increased compare to the earlier projects implemented by basic processors because of the real time emulation and embedded trace support the ARM Processor effectively calculates the bill and further transpose the information to the mobile system through GSM Technology. The proposed Plate dispenser system is as shown in the Fig 5.1.



Fig.5.1. *Proposed System of plate dispenser*

By this project we are developing RFID based electronic equipment with mechanical system to dispense plate and maintenance process is automated. It helps to do the work fast and it provide security.

6. FUTURE SCOPE

In this project we are developing an RFID based Electronic Equipment with Mechanical system support to Dispense plate and Billing system based upon server. Commercially we can use this project for security purpose. In future, this project is implemented using Biometric system to enhance the authentication.

7. CONCLUSION

The system DEVELOPMENT OF EFFECTIVEPLATE DISPENSER USING RFID is successfully designed and tested, which will accurately control the conveyor belt and dispense the plates for only authorized persons and accurate bill calculation and fast billing information to the authorized person.

REFERENCES

- RFID Journal. "What Is RFID?" 2012. <http://www.rfidjournal.com/faq/16/49> (accessed February 21, 2013).
- Association for Automatic Identification and Mobility, http://www.aimglobal.org/technologies/rfid/what_is_rfid.asp.
- Texas Instruments, <http://www.ti.com/rfid/shtml/apps-waste-management.shtml>
- Tiago Alves and Don Felton. TrustZone: integrated hardware and software security. ARM whitepaper, 2004.
- Steve Furber. ARM System-on-Chip Architecture. Addison-Wesley, 2nd edition, 2000.
- David Seal. ARM Architecture Reference Manual. Addison-Wesley, 2nd edition, 2000.