A PROJECT REPORT

ON

"RFID BASED AIRPORT LUGGAGE CHECKING AND TRACKING SYSTEM"

SUBMITTED TO THE SAVITRIBAI PHULE UNIVERSITY OF PUNE

IN THE PARTIAL FULFILLMENT FOR THE AWARD OF THE DEGREE

OF

THIRD YEAR OF ENGINEERING (SEM-2)

IN

ELECTRONICS AND TELECOMMUNICATION

BY

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UNDER THE GUIDANCE OF

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGG

SMT. KASHIBAI NAVALE COLLEGE OF ENGINEERING

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[2018 - 2019]

STES'S

Smt. Kashibai Navale College of Engineering, Pune

Department of Electronics & Telecommunication Engineering

CERTIFICATE

This is to certify that the project report entitled

"**RFID BASED AIRPORT LUGGAGE CHECKING AND TRACKING SYSTEM**"

Submitted by

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is a bonafide work carried out by them under the supervision of **Prof. Kavita Jadhav** and it is approved for the partial fulfillment of the requirement of University of Pune for the award of the Third year of Bachelor of Engineering (Electronics and Telecommunication) This Mini project and Seminar report has not been earlier submitted to any other Institute or University for the award of any degree or diploma.

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Place: Pune

Date : 26 April 2019

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Abstract

In the proposed system we are going to use latest technology RFID (Radio Frequency Identification). The RFID technology is used everywhere in which the main factor is Uniqueness. The unique property is provided by creating unique number for every RFID Tag. In this Tag we can store certain amount of data which are used in identification. The data in the Tags are read via RFID reader. In our proposed system we are going to implement passive RFID for luggage identification.

In every luggage we are going to give a RFID Tag with the passengers detail in it. The main aim of this paper is that to trace and check the luggage at different security stages at the airports and inform the passenger about the status of his/her luggage every time the luggage passes each stage.

Every luggage attached with an RFID card with unique number. That number is given to the passenger at the entrance of the airport. If this RFID tag make in communication with the RFID reader at the each stage, the data passes to the LCD and checks for any prohibited items like metals by using metal sensor contained in the luggage. This checking of metals in the luggage was done by the metal sensor. If the metal detected, the system gives alarm and inform by displaying unique RFID number on LCD display.

CHAPTER 1

INTRODUCTION

INTRODUCTION

"Airport Luggage Security System using Radio-frequency identification (RFID)" is designed and develops to assists the needs of today where a lot of luggage has been lost at the airport. It is a very useful device and able to be used at the airport as a security concern in order to maintain their quality and performance.

- **Project Background**

RFID include the use of radio waves to identify people and objects automatically by allocating tags on them. Compare to others system such as barcode technology, RFID is withstand handling, easy to use and flexible. In this project, 125 kHz RFID reader and tags were chosen instead of high frequency RFID because of budget constraint in order to implement this project. The development of Airport Luggage Security System using Radio-frequency identification (RFID) is an electronic device installed on the check out door at the airport to make sure the passenger is check out with their luggage respectively.

The main objective for this project is used for security purposed and to avoid luggage lost including mishandling, stolen, left and left with intention such as crime purpose. This project will use an RFID as airport luggage security system to trace an authorized person with their luggage. RFID tags will be provided to all passengers and their detail will be key in to the system. RFID reader will read the unique RFID number from the RFID tags.

- **Problem Statement**

Nowadays, airports are overcrowded, passenger might be issues with the luggage lost and the lost including mishandling, stolen, airport system, left and left with intention such as crime purpose. The cost generate by luggage loss are very high for both the airlines and the airports. In this project, Radio Frequency Identification (RFID) technology has been implement and it has become well-known technology for many type of security identification system. By using RFID, it will help the system to work faster, convenient and effective for other user that using this system.

- **Project Objectives**

The main objective for this project is to design and develop a system by using RFID technology for airport luggage security system in order to prevent and avoid luggage lost including mishandling, stolen, left and left with intention such as crime purpose. It means that by using RFID system, registered user is automatically identified by the system and will be registered in the system every time registered user enters or leaves the system.

- **Scope Project**

This project involves with study the RFID based airport luggage security system. RFID is a fast and reliable means of identifying just about any material object. Primarily, the two main components involved in RFID system are the RFID tags and RFID reader. RFID tags that used in this project is passive type with frequency of

13.56Mhz.The maximum read distance about 1.5meters but with a constraints of budget, RFID 125 kHz tag and reader are used and it is affordable for this project.

This project will focus on RFID interface and RFID hardware. RFID interface will be programmed by using visual basic programming to trace the passenger and luggage is authorized or unauthorized. This system will use Microsoft access as a database to insert all the details of passenger and their luggage. RFID will interact with the database and come out with the output either the passenger and
luggage is authorized or unauthorized.

FIG.1.DESIGN

CHAPTER 2

LITERATURE SURVEY

LITERATURE SURVEY

The development of global associations and dual transfer flights increases the passenger and baggage volumes creating big challenges to airports and airlines. Existing baggage handling system relies on an aging Barcode system with high error percentage.[5]

In this system, transport operation is conducted at very low speed and precision. For reading and control of barcodes, barcode readers need to carefully read barcodes in direct sun light. Current bag tags include a bar code. These bag tags are printed using thermal or barcode printers that print on an adhesive paper stock. This printed strip is then attached to the luggage at check in. This allows for automated sorting of the bags to reduce the number of misrouted, misplaced or delayed bags. The limitations of this technology were apparent when a fully automated cart-based system significantly delayed the airport's opening. While the inability to reliably read all barcode tags in the installation was a part of the problem, it was one of several technical reasons for the delayed opening. [1]

Nevertheless, automated sorting of baggage using laser scanner arrays, known as automatic tag readers, to read bar-coded bag tags is standard at major airports. Bar codes cannot be automatically scanned without direct sight and undamaged print. Forced by reading problems with poorly-printed, obscured, crumpled, scored or otherwise damaged bar codes, radio-frequency identification (RFID) chips embedded in the tags can be very useful.[3]

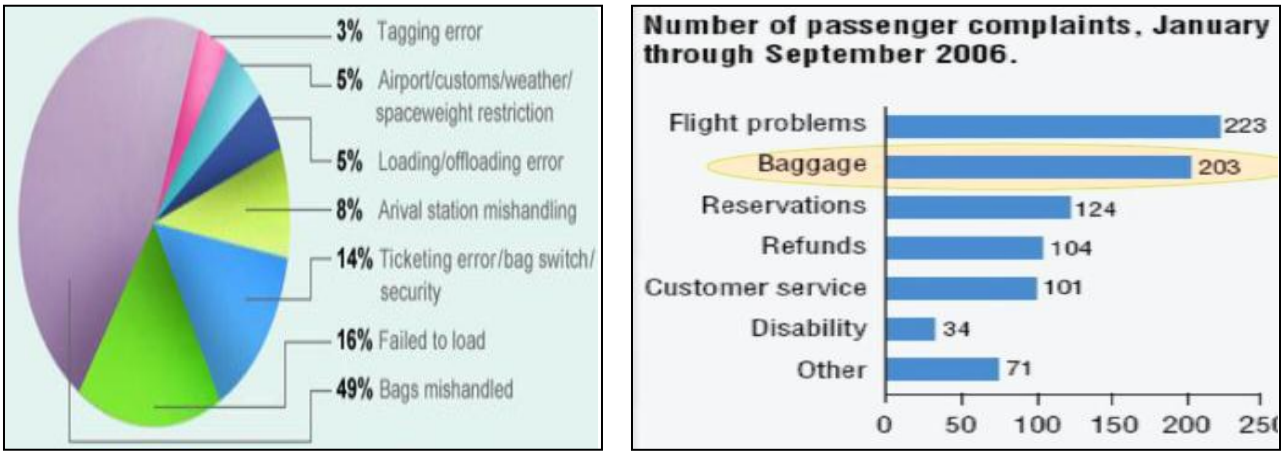


FIG.2.MAIN CAUSES LUGGAGE DELAY & NO OF PASSENGER COMPLAINTS

Thus airline requires a highly efficient method to handle the increasing passenger and baggage volumes and thus the trending RFID technology has drawn the attention of the airline. Barcode reading problems cause 9.7% of all mishandled baggage and failures to receive a baggage status message contribute to a further 11% of mishandled baggage.[2]

CHAPTER 3

LITERATURE REVIEW

LITERATURE REVIEW

RFID stands for Radio Frequency Identification. Quite simply it describes the method by which a subject can identify itself, on request, by the transmission of identification information through the medium of radio waves. The subject can be either Animate: such as Humans, Dogs or farm animals etc., OR Inanimate: packaged foods, cars, or consumer goods.

- **History of RFID**

RFID was first discovered and used in the Second World War to allow the British to differentiate between friendly and enemy airplanes. The British warplanes were fitted with a transponder that woke up when a British Radar signal was detected and then transmitted a friendly signal back towards the source, indicating that the plane was friendly. Though invented in wartime, in more peaceful times RFID research and development has been driven forward by the promises of significant cost reduction and a multitude of exciting value added services. In its early commercial manifestations each item to be tagged had a small electronic assembly (a transponder) fitted to it that would respond with a burst of radio frequency (RF) carrier modulated identification data when interrogated by a RF signal (on a different frequency) from either a hand-held scanner/reader, or one mounted, say, in a doorway. This burst of identifying data was intercepted by the scanner, decoded and used to both identify the tagged item and for it to be counted. The early RFID tagging means were battery powered (so called active devices). These were not only costly, but also relatively bulky. Since then RFID use, and potential, has greatly increased in large part due to the unit cost, size and power needs, of the essential 'tag' having decreased by many orders.

- **Introduction to RFID**

RFID (Radio Frequency Identification) is a technology which is used to identify or detect an object. The communication is between a reader (interrogator) and a transponder (tag). There are two types of tags which is active tag or passive
tag. Diagram of RFID system is shows in Figure

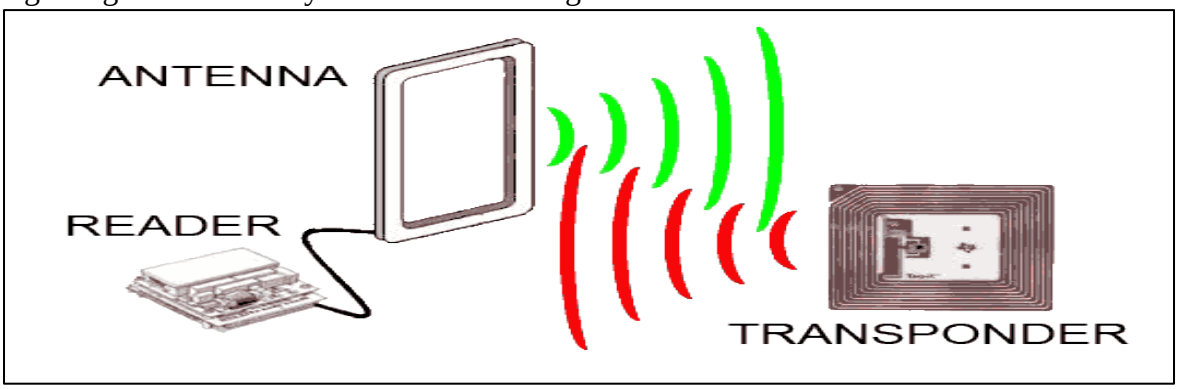


FIG.3.1.RFID SYSTEM

When the tag enters the reader reading field, the tag will be activated by the electromagnetic wave from the reader. The passive tag converts the electromagnetic field to power up its internal circuits. Then the circuit in the tag will modulate the waves and

transmit back the stored information. After that, the reader will decode the data and send it to CPU for processing.
RFID system is consist of two components:
• The transponder, which is located on the object to be identified.
• The interrogator or reader is a device to scan the tags which may be a read or write/read device that depending upon the design and the technology used.
A reader typically contains a radio frequency module (transmitter and receiver), a control unit and a coupling element to the transponder. In addition, many readers are fitted with an additional interface (RS 232, RS 485, etc) to enable them to forward the data received to another system (PC, robot control system, etc).
RFID system has effective characteristic in identification system compared to others technology. Table shows the advantages of RFID system by comparing some system parameters.

- **Type of RFID Tag**

The tags communicate to a RFID reader via radio frequency. There are many types of RFID tags. These types are :
• Passive tags
• Semi passive tags
• Active tags
Below are details of each type of RFID tags.

- **Passive**

No internal source of power is needed. The minute the electrical current induced in the antenna by the incoming radio frequency signal provides just enough power for the CMOS integrated circuit in the tag to power up and transmits a response. The antenna has to be designed to both collect powers from incoming signal and also to transmit the outbound backscatter signal. The response of the RFID tag is not just an ID number the tag can contain non-volatile EEPROM for storing data.

FIG.3.2.PASSIVE TAG

- **Semi Passive**

Everything is similar to passive tags except for the addition of a smaller size

battery. This battery allows the tag IC to be constantly powered which removes the need of an aerial to be designed to collect power from the incoming signal. As semi passive tag is pre-energized, they can be read more reliably in this more difficult environment.

- **Active**

Active tag has their own internal power source which is used to power any ICs that generate the outgoing signal. They are more reliable (fewer errors) due to the ability for active tag to conduct a session with a reader. Because of their onboard power supply also transmit at higher power level than passive tags, allowing them to be more effective in "RF challenged" environments such as water, metal or at longer distances. A battery can live up to 10 years and have practical ranges of hundred of meters. Types of tags that were used in the RFID system are ISO card, clamshell card and also soft label. The typical reading distance for this card is 15cm to 90 cm but still depending on the reader, the one sending electromagnetic wave to energize the RFID tag.

CHAPTER 4

IMPLEMENTATION

IMPLEMENTATION

Implementation include :-

I. HARDWARE IMPLEMENTATION
II. SOFTWARE IMPLEMENTATION

A. HARDWARE IMPLEMENTATION

- **BLOCK DIAGRAM:-**

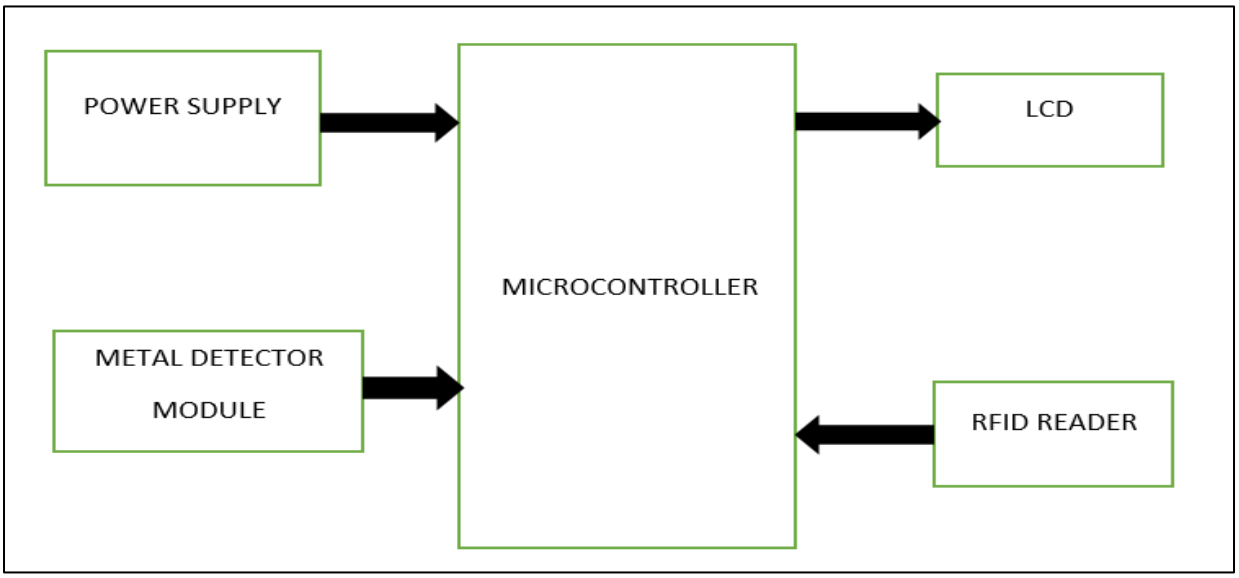


FIG.4.BLOCK DIAGRAM

- **WORKING DISCRIPTION:-**

System demonstrates a RFID based airport security system. For this purpose we use RFID module along with metal detector sensor, LCD display and microcontroller for controlling the system working. We used LCD to display status of baggage at different security stages. The display will indicate the security status weather the metal is detected or not ,and also display luggage unique ID. If metal is detected then buzzer is ON which is present on metal detector module. It gives the alarm and id which is present on baggage and display on LCD.

- **MICROCONTROLLER**

  In our project we are using PIC18F4520 microcontroller.It is easily available and its has more features than 8051.It is operated at 5 volt supply.

Features

- 40-pin Low Power Microcontroller
- Flash Program Memory: 32 kbytes
- EEPROM Data Memory: 256 bytes
- SRAM Data Memory: 1536 bytes
- I/O Pins: 36
- Timers: One 8-bit / Three 16-Bit
- A/D Converter: 10-bit Thirteen Channels
- PWM: 10-bit Two Modules
- Enhanced USART: Addressable with RS-485, RS-232 and LIN Support
- MSSP: SPI and I²C Master and Slave Support
- External Oscillator: up to 40MHz
- Internal Oscillator: 8MHz

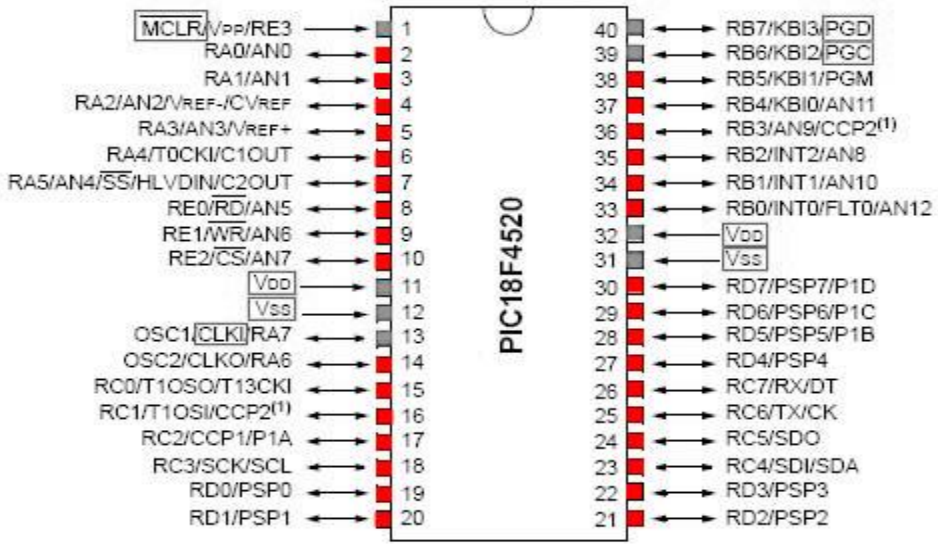


FIG.4.1.PIC MICROCONTROLLER

- **RFID MODULE**

  EM-18 RFID reader module uses a RFID reader that can read 125 KHz tags. So, it can be called as a low frequency **RFID reader**. It gives out a serial output and has a range of about 8-12 cm.

Features:-

- Size: (32x32x8)mm
- Operating frequency :125kHz
- Operating voltage range: 3.3V to 5.5V
- Current Rating < 50mA
- Reading distance :10-15cm
- Communication parameters :9600bps, 8-N-1
- Supported cards: Tags which work at 125kHz

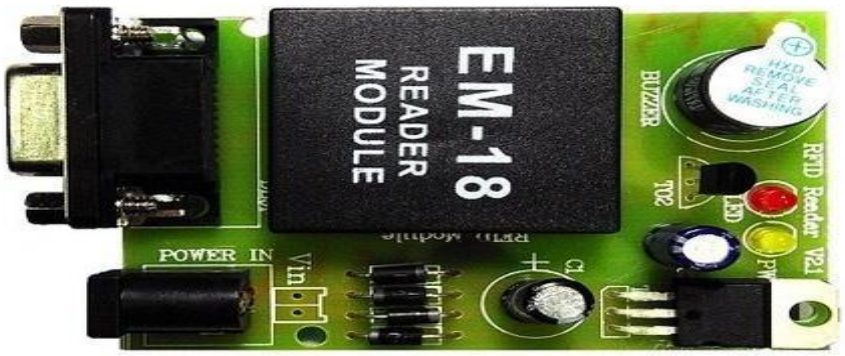


FIG.4.2.RFID MODULE

- **POWER SUPPLY**

The battery used here is 9 volt and 400-600mAh. For RFID, PIC18F and LCD display operating volt is 5volt so 9volt supply is regulated to 5volt by using 7805 voltage regulator IC.

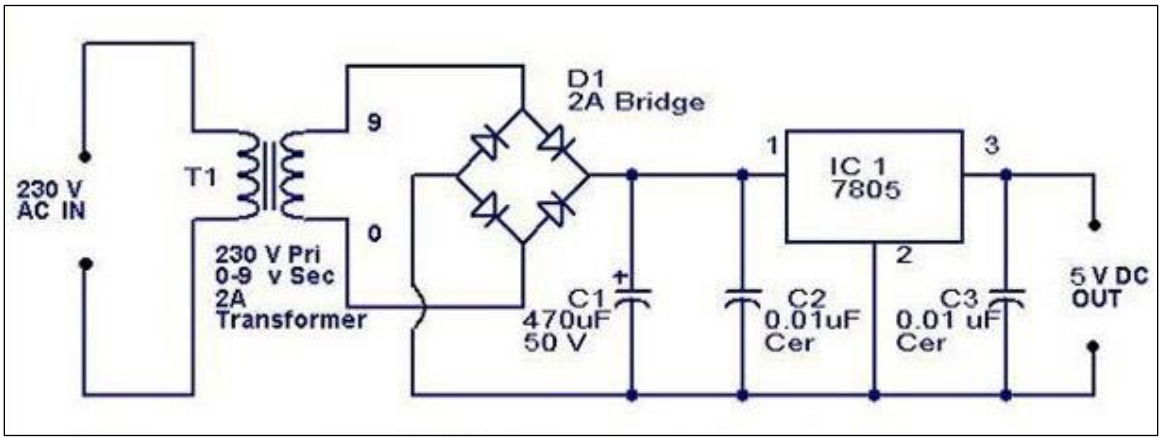
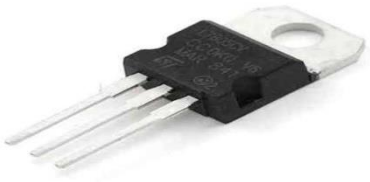


FIG.4.3.POWER SUPPLY

7805 IC



- **LCD DISPLAY**

  In our project we are using 16×2 LCD module to display purpose.It can be used as 8 bit mode/ 4 bit mode.

FIG.4.4.LIQUID CRYSTAL DISPLAY

- **METAL DETECTOR SENSOR**

  A metal detector is a device which responds to metal that may not be readily apparent. The simplest form of a metal detector consists of an oscillator producing an alternating current that passes through a coil producing an alternating magnetic field. If a piece of electrically conductive metal is close to the coil, eddy currents will be induced in the metal, and this produces an alternating electric field of its own. If another coil is used to measure the electric field (acting as a magnetometer), the change in the magnetic field due to the metallic object can be detected.

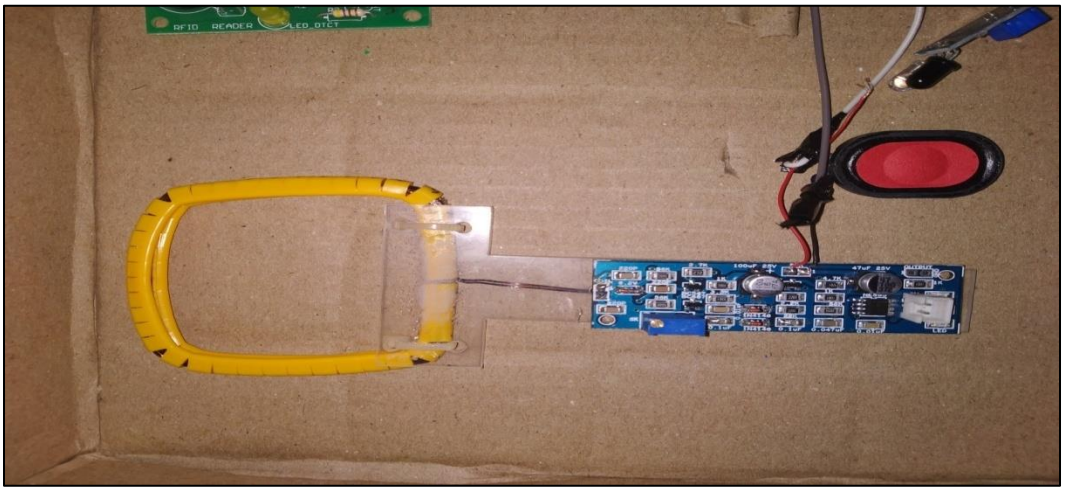


FIG.4.5.METAL DETECTOR

B. SOFTWARE IMPLEMENTATION

In software implementation contain
Simulation, code with HEX file, and checking output on virtual terminal.
We are using following software for checking the output before implantation on hardware.

1. PROTEUS ISIS(SIMULATION)
2. MPLAB IDE8.92V (CODE)
3. PICKIT 3(BURN THE IC)
4. EAGLE(PCB DESIGN)

Steps are as follows:

I. **Write code on MPLAB IDE 8.92V/MPLAB XIDE**
We can write code in MPLAB IDE 8.92v And save with '.c' extention.

II. **Save the code and build.**
After saving the code , build the code .After the building HEX file is created.

III. **Put the HEX file in Proteus software.**

Observe the output on proteus software.

IV. **PCB design on EAGLE**

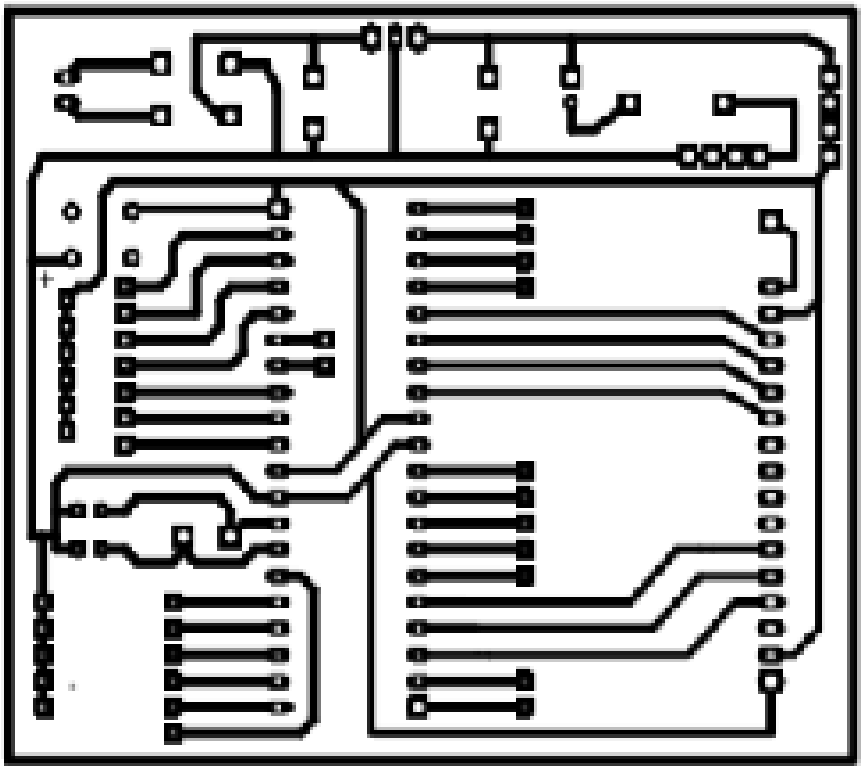


FIG.4.6.PCB LAYOUT

PROTEUS 8 is a software tool suite primarily for electronic design automation. The software is used mainly for simulation and creates electronics prints for manufacturing of printed circuit boards, by electronics design engineers and electronics technicians to manufacture electronics schematics and diagram. This software converts schematic layout into PCB layout using NETLIST ARES which is mainly used for converting schematic layout designed in PROTEUS into PCB layout for manufacturing of PCB.

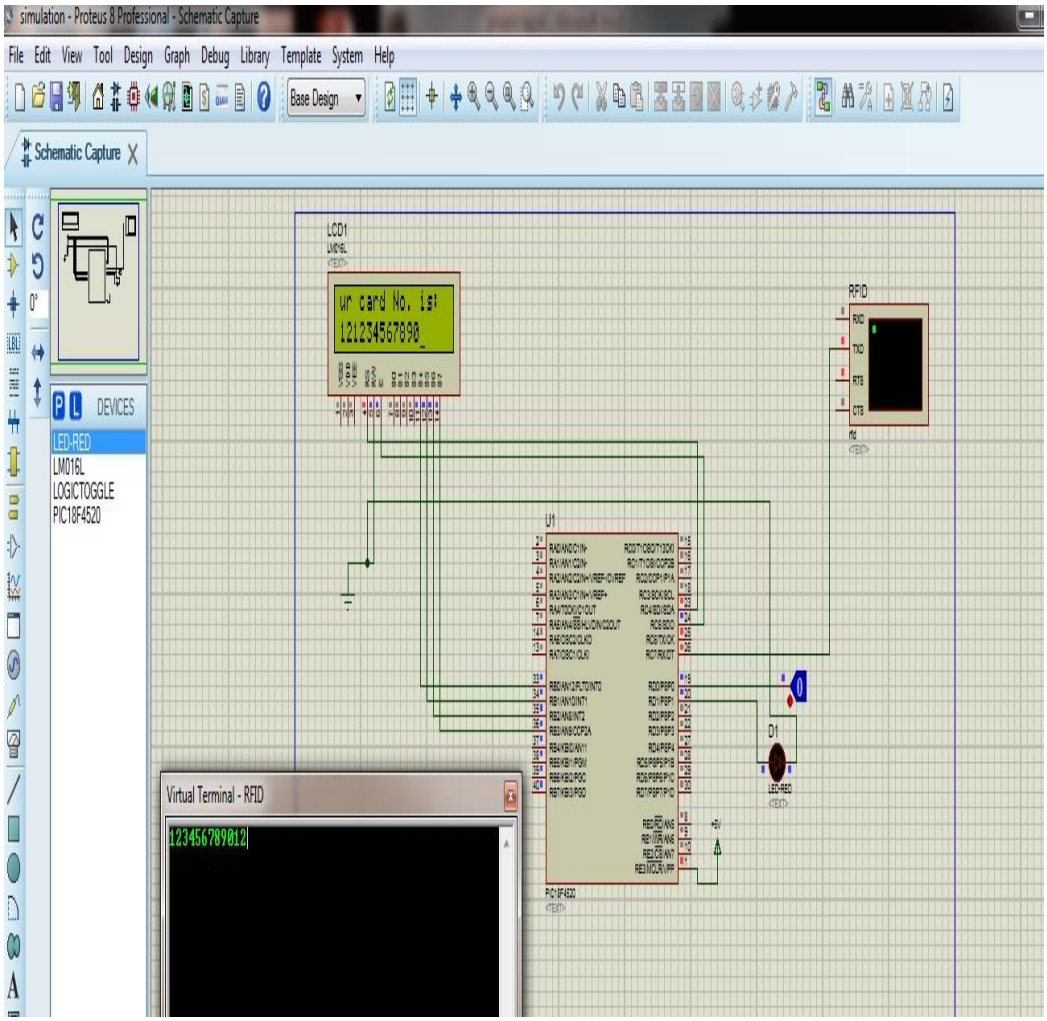


Fig.4.7.SIMULATION

CHAPTER 5

RESULT & TESTING

RESULT & TESTING

In our project we are using RFID (Radio Frequency Identification technology) for baggage checking at airport terminals promotes flexible and efficient baggage conveying system. RFID is efficient than barcode system. Design is done to meet all the specifications & requirements. The performance has been verified both in software simulator and hardware design. The total circuit is completely verified functionally and is following the application software. It can be concluded that the design implemented in the present work provide portability, flexibility and the data transmission is also done with low power consumption. This enables a paperless working environment and real-time traceability of products within the airport which improves the operational efficiency and reliability. After fabrication of project has been tested for different conditions. The system has been run for several hours in a normal environment. The baggage are readily tracked through the RFID module. Metal detector is properly working.

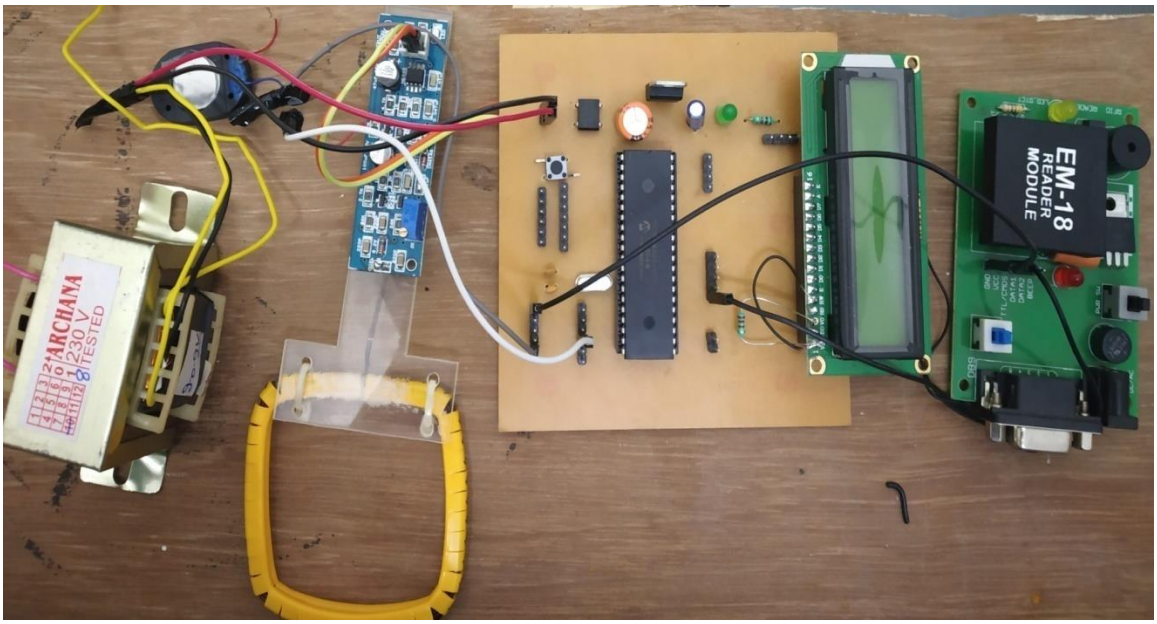


FIG.5.RESULT

CHAPTER 6

ADVANTAGES & APPLICATION

ADAVANTAGES

RFID has following advantages

a. Reduce time in baggage detection
b. Automatically handle the baggage
c. No chance of baggage missing
d. Eliminate the miss management in baggage sorting
e. Efficient identification system i.e RFID
f. Design by using low cost material with high strength.
g. Can be easily accomplished in bigger scale.
h. Reduce the accident

APPLICATION

The applications for RFID tags are numerous and some of the most innovative and successful may yet to be identified. However, initially the applications fall into the following sub divisions

- Manufacturing
- Supply Chain Management
- Security Access & Control
- Asset Tracking
- Payment
- Government vehicles.
- Industrial
- Hospital

CHAPTER 7

CONCLUSION

CONCLUSION

Nowadays many problem occur in airports. Main problem is mishandling of luggage during check out ,loaded to the correct airplane, etc. This project will surely help to improve security at public places. It saves the Human effort & increase accuracy. It is economical and can be implemented anywhere where security is serious concern.

FUTURE SCOPE

- A Front Camera can be used for Lane Tracking purpose.
- System can be monitored & globally tracking using PC.
- Instead of a Microcontroller we can use a CPLD chip since the CPLD incorporates many more features than a Microcontroller. VLSI/VHDL can be used for CPLD programming

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DATASHEETS:

1) PIC microcontroller PIC18f4520
2) 16x2 LCD
3) LM 7805 voltage regulator
4) EM18 module