

# Arduino Based Smart RFID Security and Attendance System with Audio Acknowledgement

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**Abstract**— there has been emerging demand for secure system that must be reliable and fast responded for the industries and company. RFID (Radio Frequency Identification) is one of the reliable and fast means of identifying any material object. Their significant advantage are that they can read wirelessly, contain more information than barcode and more robust in nature and based on non-line-of-sight technology. RFID tags can read in any environmental challenging conditions where other read technology likes barcode or optical card reader useless. In this paper we purposed a secure system that provides information about authorized and unauthorized persons. In this system when card brought near to the RFID module it reads the card information and it compare with the data in the program memory and displays authorized or unauthorized entry. The door opens for authorized entry and marked the attendance corresponding to that code id and save in excel sheet format in SD card and after that display it's all information on the LCD like name and employee code number that link with authorize entry and welcome message with audio greetings by taking their name which is already saved into SD card and for unmatched entry the gate remain closed and alerts the security person through SPEAKERS by playing the separate audio file saying entry is unauthorized.

**Keywords**— *Automatic Identification and Data Capture technologies (AIDC), Liquid Crystal Display(LCD), RFID Reader, RFID Tag, Proximity Integrated Circuit Card(PICC).*

## I. INTRODUCTION

RFID system provides an efficient and simple method for identification. There are other methods for identification like barcode, optical character recognition, biometric and smart card but possible area of use is much larger for RFID system. Like transportation and logistics, security and animal tagging, postal tracking, time and attendance and road toll management. RFID tags act as small transponders that respond to quires from a reader wirelessly and transmitting a serial number or similar identifier .

Generally RFID system used to design a access control system so that unauthorized personnel can away from the building. For access control employees used a access badge with RFID chip in it. If RFID chip code matched with the record code then only the gate opens otherwise it will be closed. For exchanging the information between the reader and chip used an electromagnetic filed so that proper authentication and tracking process can carried out.

Here, in this project we purpose to make a system which is more advanced than only RFID detection and punch the attendance of authorized entry. The new idea is to introduce a feature called "VOICE GREETINGS". So for that we have used an SD card module to save different audio files with different names and quotation with every individual tag ID. So whenever a card has been detected the particular audio file will be played and with that if card id matches with the saved code GATE will be opened and greet the person and save their attendance to the memory card using an EXCEL sheet.

So, with the feature we have mentioned above it makes a great SECURITY and ATTENDANCE system with its unique feature of GREETING the person by calling their name.

The remaining of the paper is organized as follows: Section two presents the system architecture and flowchart of proposed design and section three shows the proposed circuit diagram and result & discussion and then paper concluded in section fourth along with future scope. In this paper we proposed a cost effective system using latest microcontroller ARDUINO.

## II. SYSTEM ARCHITECTURE

The module included in the proposed system architecture as follows:

- a) *Arduino Uno Microcontroller(Atmega328)*
- b) *RFID Reader*
- c) *RFID tags.*
- d) *Micro SD Card*
- e) *LCD*
- f) *Power Supply Unit*
- g) *Speaker*
- h) *Motor*

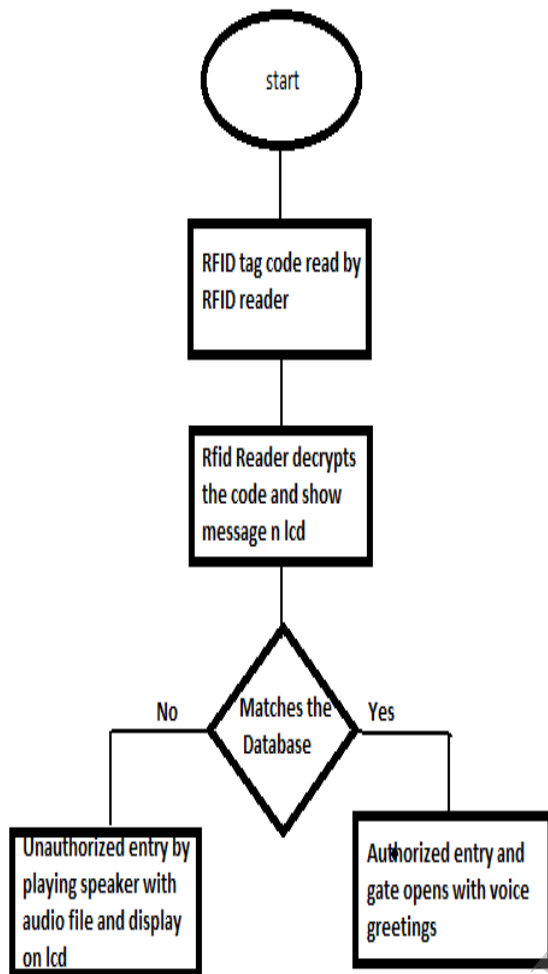


Figure 1 Flow chart of Design System.

Figure 1 shows the flow chart of the proposed system in this first RFID tag code read by the reader and decrypts it and sends its information to the controller. When the code matched with the stored information then only gate will open with audio greeting and display the employee information on the LCD that retrieved by the controller from the micro SD card. If the code not matched then door remain closed and alerts the security person through Speaker by playing the separate audio file saying entry is unauthorized.

#### A. Arduino Uno Microcontroller(Atmega328)

It is a high performance Atmel Pico power 8-bit AVR RISC based microcontroller. It consists of 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB RAM and 23 general purpose input-output lines, 32 general purpose working registers, three flexible timer/counters with compare modes, serial programmable USART, SPI serial port and 6-channel 10 bit A/D convertor. This controller operates between 1.8V-5.5 volts. This controller interfaced with LCD and buzzer, micro SD card using various ports.

#### B. RFID Reader

RFID Reader also known as a Proximity Coupling device (PCD) [3] and it read a data through the tag antenna at a certain frequency. In case of passive tag then reader generate a radio signal so that passive tag can energized and transmit a signal that can read by the reader. The reader translates the received information and passed to the forwarded system through wired or wireless. A single reader can read the data from multiple frequency based tags.

#### C. Radio Frequency Identification Tags

RFID tag known as a proximity integrated circuit card [3] and it can be powered by actively or passively. RFID tags also known as transponder and one transponder consist of antenna, microchip and battery (for active tag only). The size of the chip generally depends on the antenna size. Antenna size and form is dependent on the frequency that used by the tag. Active tag contain on board power source where passive tag are inductively powered via Radio signal that generated by RFID reader. Active tag can work in absence of reader and records the sensor reading or perform their calculation. Passive tags can operate in presence of reader only [4]. In addition to the microchip, some tags contain rewritable memory which size can varies according to the application requirement. The purpose of microchip is to store the Unique Identification (ID) of each object. This ID act as a serial number stored in the RFID memory. The range of RFID tags depends on their frequency. These frequency ranges are Low Frequency (30-500 KHz), High Frequency (10-15MHz) and Ultra High Frequency (2.4- 2.5GHz). Other performance attribute and resistance to interference determined by this frequency range.

#### D. Micro SD Card

In the proposed design used a micro SD card and interfaced with controller also. The main purpose of this SD card is to store the employee Information like employee name and employee code and welcome message. When employee show the RFID tag and it read by the RFID reader and if read code match with the stored base code then gate open and all the information that linked with that code display on the LCD.

#### E. Liquid Crsytal Display

The main purpose of LCD in this proposed design is to display the information like employee code and name, welcome messgae that stored on the SD card when tag match with the based code. The configuration of the LCD used is 16\*2.

#### F. Power Supply Unit

As shown in figure 3 the input to the proposed design supplied through the regulated supply unit that is using a voltage regulator (7805-IC). Which takes input as 9 volt battery and get output as 5 volt? So after this pure direct current voltage obtained from the regulator applied to the proposed design.

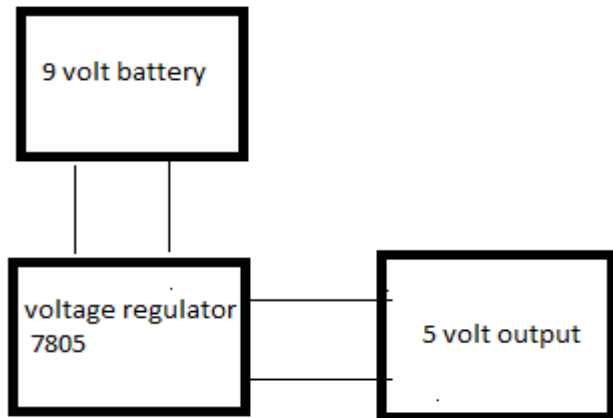


Figure 3 Power Supply Units

### G. Speaker

A Speaker is an audio output device. This speaker interfaced with controller pins so that when RFID tag code matched with stored base code then this speaker will greet the person and if tag code does not match with the stored tag data then it will again play the audio file which contains the voice which tells the person is unauthorized.

### H. Motor

A motor is a mechanical device which uses electrical power to work according to the application. Here in this project a DC motor has been used to open the gate when the tag code matches with the saved code in the software. DC motor takes very less voltage to operate and takes very less time to open the gate.

### Key Specifications

- i) Power Requirement – 3-5 VDC
- j) Current Requirement <math><110\text{mA}</math>
- k) Communication – SPI with 9600 Baud rate
- l) Dimension – 63mm \* 98mm \* 5mm
- m) Operating Temperature Range - -40 to 185 °F

## III. RESULTS AND DISCUSSION

### A. Working of the System

As shown in figure 4, when RFID tag placed on the RFID reader then it read and through reader its code send to the controller and then controller match this received code with stored code if code match with the stored code then the door opens for authorized entry and marked the attendance corresponding to that code id and save in excel sheet format in SD card and after that display it's all information on the LCD like name and employee code number that link with authorize entry and welcome message with audio greetings by taking their name which is already saved into SD card and for unmatched entry the gate remain closed and alerts the security person through SPEAKERS by playing the separate audio file saying entry is unauthorized.

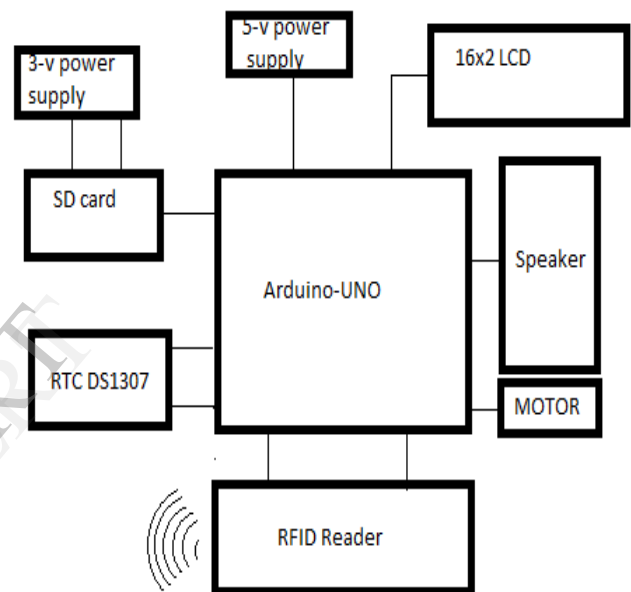


Figure 4 Block Diagram of Proposed Circuit

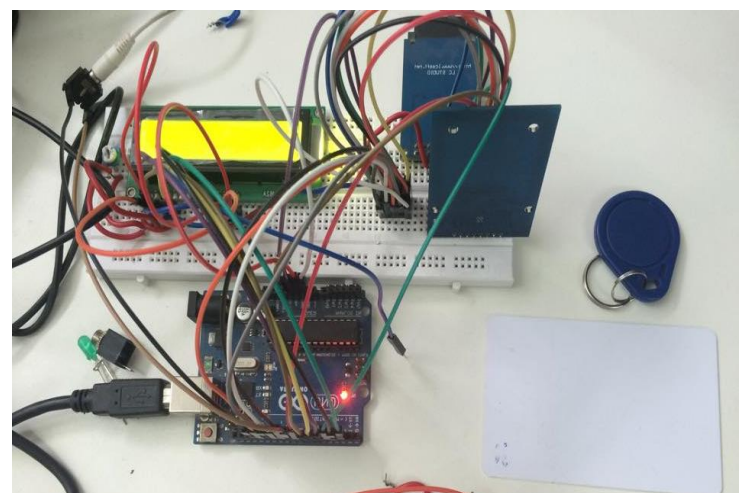


Figure 5 Working Circuit Diagram of Proposed Design



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