RFID Based Attendance System

A MINI PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report titled **RFID BASED ATTENDANCE SYSTEM** is the bonafide work of **DHIVYA.G, FAHIMUNNISHA.B, GOMATHI PRIYA.P.V, GURU PRASATH.G** who carried out the project work under my supervision.

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LIST OF ABBREVIATIONS

RFID	Radio Frequency Identification
AMS	Attendance Management System
f_c	Carrier frequency (13.56 MHz)
f_{res}	Resonance frequency
FSCI	Frame Size for proximity Card Integer
PCD	Proximity Coupling Device
PICC	Proximity Integrated Circuit Card
PPS	Protocol and Parameter Selection
RATS	Request for Answer To Select
REQA	REQuest type A
RFU	Reserved for Future Use
SAK	Select AcKnowledge
UID	Unique IDentification number

ABSTRACT

Attendance need to take at various places including colleges, schools for students and in the industries for the login logout time of colleges. RFID based AMS can be used in any colleges or university or company. In this system each user, student or employee will have a RFID card. And RFID reader will be placed on the door or the entry gate of the company or on the door of the classroom of the school whenever employee wants to enter the office he/she has to take the RFID card near the RFID reader, then RFID reader will note down the card number and the time at which the employees and student has logged in and the same manner while leaving employee/student has to the card. So the exit time will be noted.

CHAPTER 1

INTRODUCTION

Attendance in the educational institutions is generally paper based which may sometimes cause errors, lot of post processing, and biased treatement. To remove these contengencies and to provide a simple, ergonmic and robust way of AMS, we used this project as a kickstarter for us to familiarize with the RFID technology.

CHAPTER 2

LITERATURE SURVEY

Rajneesh Kumar Gujral " Anytime Anywhere- Remote Monitoring of Attendance System based on RFID using GSM Network" - Volume 39– No.3, February 2012

Remote monitoring system is a real-time monitoring system that monitors the system from a remote/mobile location. The conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. tells the establishment of remote monitoring platform based on a GSM short message mode that can monitor and control the remote communication between the central monitoring station and remote monitoring stations. The remote monitoring station can send the short message because GSM network can interconnect and roam all over the country, and its network ability is very strong; the user will no need another network.

Vishal Bhalla "Bluetooth Based Attendance Management System" - Vol. 3 Issue 1 October 2013

Bluetooth based new wireless applications can add comfort and security by automation of the tasks earlier controlled manually. In this paper advantages of low cost, low power and robustness of Bluetooth have been exploited to propose and execute two new consumer systems in the form of a garage door opening system and an electronic attendance record system.

CHAPTER 3
PROPOSED SYSTEM

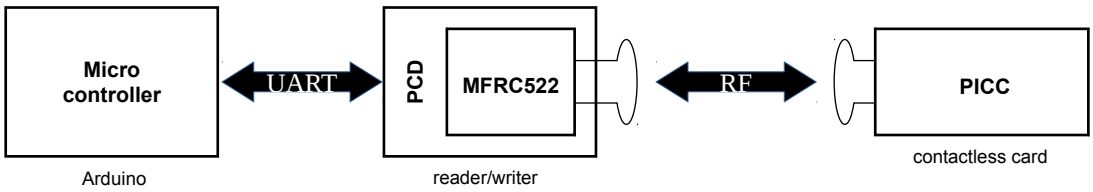

Fig 1: Block Diagram of Overall System

3.1 MICRO CONTROLLER

Microcontroller checks for the data continuously, if any data is received then compares the data in the database. If the tag is authenticated, microcontroller takes the attendance.

Usually Arduino is used in place of the microcontroller but any suitable microcontroller can be used like PIC, ESP,

3.2 ISO/IEC 14443

The ISO/IEC 14443 standard is an international standard technically defining proximity cards and the protocol used to communicate with such a card.

This is the most popular RFID standard and is used in implementations such as MIFARE cards, Calypso electronic ticketing system, Biometric passports, EMV payment cards (PayPass, payWave, ExpressPay), German identity cards, etc. This standard uses the terms PCD (Proximity Coupling Device) and PICC (Proximity Integrated Circuit Card) for the reader and tag devices respectively.

The ISO/IEC 14443 standard consists of four parts, each describing a different aspect of the proximity card and its use. The four parts are as follows:

Part 1: Physical characteristics
Part 2: Radio frequency power and signal interface
Part 3: Initialisation and anti-collision
Part 4: Transmission protocol

The standard specifies two types of cards, namely Type A and Type B. Both types use the same carrier frequency but use different modulation and encoding schemes. The details for the RF interface for Type A which is used in the project is given below.

Type A	Transmission from PCD to PICC	Transmission from PICC to PCD
Carrier	13.56 MHz	-
Subcarrier	-	847.5 kHz
Modulation	ASK 100%	Load modulation
Coding	Modified Miller	OOK, Manchester

Table 1: ISO/IEC 14443 A RF interface

3.2.1 PCD

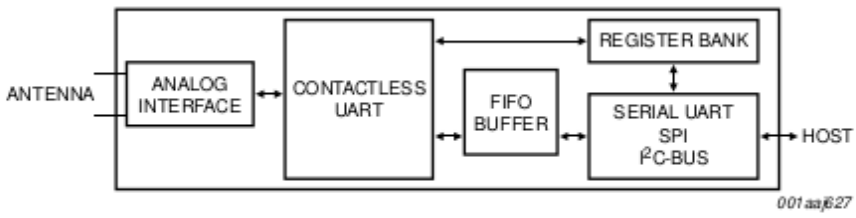

Fig 2: MFRC522 basic architecture

The MFRC522 is common PCD which supports[1] all variants of the MIFARE Mini, MIFARE 1K, MIFARE 4K, MIFARE Ultralight, MIFARE DESFire EV1 and MIFARE Plus RFID protocols.

The MFRC522 is a highly integrated reader/writer IC for contactless communication at 13.56 MHz. The MFRC522 reader supports ISO/IEC 14443 A/MIFARE and NTAG.

The MFRC522's internal transmitter is able to drive a reader/writer antenna designed to communicate with ISO/IEC 14443 A/MIFARE cards and transponders without additional active circuitry[1]. The receiver module provides a robust and efficient implementation for demodulating and decoding signals from ISO/IEC 14443 A/MIFARE compatible cards and transponders. The digital module manages the complete ISO/IEC 14443 A framing and error detection (parity and CRC) functionality.

3.2.2 PICC

The PICC is the RFID Card or Tag using the ISO/IEC 14443A interface, for example Mifare or NTAG203.

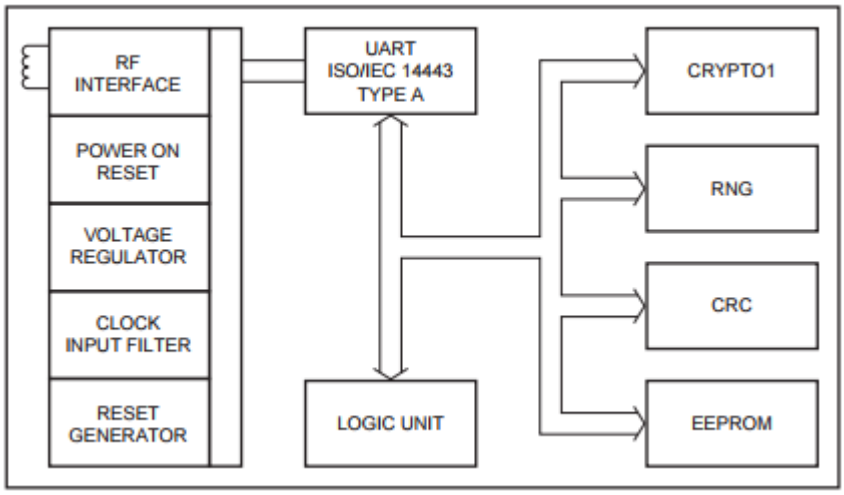

Fig 3: Typical Block Diagram of PICC

3.3 SPI PROTOCOL

Serial peripherial interface bus (SPI) is a synchronous serial communication interface specification used for short distance communication, primarily in embedded systems. Typical applications include secure Digital cards and liquid crystal displays. SPI devices communicate in full duplex mode using a master slave architecture with a single master. The master device originates the frame for reading and writing. Multiple slave devices are supported through selection with individual slave select(SS) lines.

Sometimes SPI is called a four wire serial bus, contrasting with three, two, and one wire serial buses. The SPI may be accurately described as a synchronous serial interface(SSI) protocol, which is also a four wire synchronous serial communication protocol. But SSI protocol employs differential signalling and provides only a single simplex communication channel.

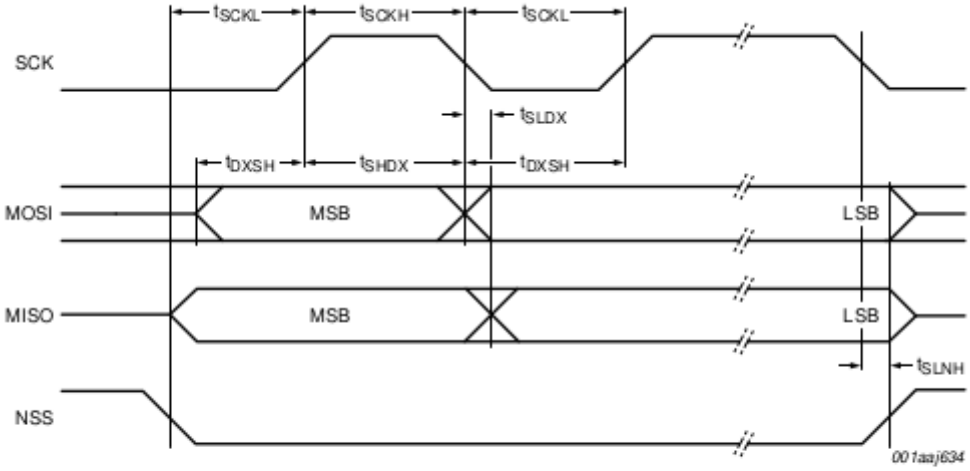

Fig 4: Typical SPI timing diagram

3.4 CIRCUIT DIAGRAM

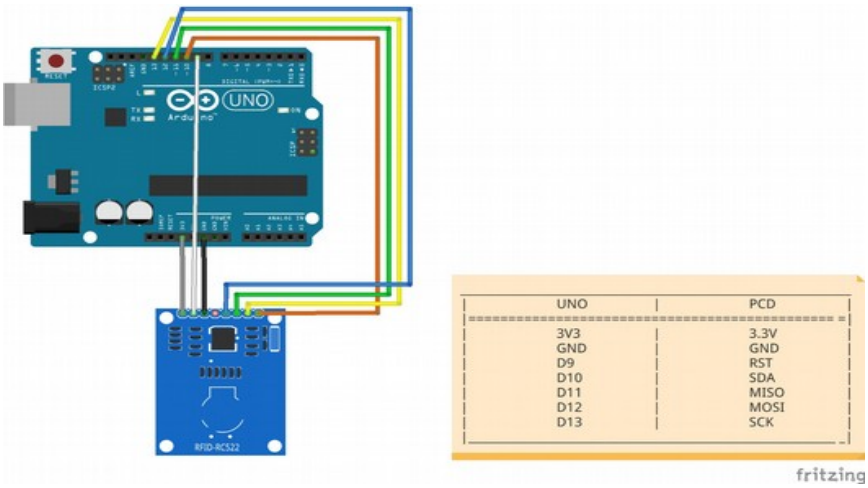

Fig 5: Circuit Diagram

When this circuit is powered ON, initially the microcontroller will display the message as, place the card. When the RFID reader detects the ID card, it will send the unique card no to the microcontroller via serial terminal.

With the help of suitable programming, we need to compare the received card no. with the numbers that are already stored in the microcontroller or any database.

Once, if any of these numbers are match with the received card no., then the corresponding name stored in that no. is displayed on the laptop and also the attendance for the name stored in the corresponding number is marked.

The attendance recording will be closed and the details are displayed on the laptop repeatedly until the microcontroller has been reset.

3.5 Coding

We use a library of MFRC522 developed by Miguel Balboa for communincation with Arduino[2].

```
#include <SPI.h>
#include <MFRC522.h>
#define RST_PIN 9
#define SS_PIN 10
MFRC522 mfrc522(SS_PIN, RST_PIN);
MFRC522::MIFARE_Key key;

void setup() {
	Serial.begin(9600);
	while (!Serial);
	SPI.begin();
	mfrc522.PCD_Init();
	for (byte i = 0; i < 6; i++) {
		key.keyByte[i] = 0xFF;
	}
}
void loop() {
	if ( ! mfrc522.PICC_IsNewCardPresent())
		return;
	if ( ! mfrc522.PICC_ReadCardSerial())
		return;
	MFRC522::PICC_Type piccType = mfrc522.PICC_GetType(mfrc522.uid.sak);
	if ( piccType != MFRC522::PICC_TYPE_MIFARE_MINI
		&& piccType != MFRC522::PICC_TYPE_MIFARE_1K
		&& piccType != MFRC522::PICC_TYPE_MIFARE_4K) {
			return;
	}
	byte sector = 1;
	byte blockAddr = 4;
	MFRC522::StatusCode status;
```

```
31          byte buffer[18];
32          byte size = sizeof(buffer);
33          status = (MFRC522::StatusCode)mfrc522.PCD_Authenticate(
                                              MFRC522::PICC_CMD_MF_AUTH_KEY_A,
                                              blockAddr,
                                              &key,
                                              &(mfrc522.uid));
34          if (status != MFRC522::STATUS_OK) {
35                return;
36          }
37          status = (MFRC522::StatusCode) mfrc522.MIFARE_Read(blockAddr, buffer, &size);
38          if (status != MFRC522::STATUS_OK) {
39                return;
40          }
41          Serial.print(F("Data in the card: "));
42          dump_data(buffer, 16); Serial.println();
43          Serial.println();
44          mfrc522.PICC_HaltA();
45          mfrc522.PCD_StopCrypto1();
46    }
47    void dump_data(byte *buffer, byte bufferSize) {
48          for (byte i = 0; i < bufferSize; i++) {
49                Serial.print(buffer[i] < 0x10 ? " 0" : "");
50                Serial.write(buffer[i]);
51          }
52    }
```

CHAPTER 4
CONCLUSION & FUTURE IMPLEMENTATION

This system, though is common among IT industries, is rarely implemented in educational instutuions. This can provide faculties, students, parents and management, an morden insight into attendance management.

Faculties need not spend their quality time for taking attendance for each of their lecture hours, managing and calculating attendence percentage and on-duty records. Students and faculties, can manage their academic attendance and their co- and extra-curricular time needs with ease, and need not worry about biased records. Parents will get a crystal clear transperancy of their wards activity and performance, without disturbing the faculities. Management will hold the iron staff to control and

monitor the usage of resources by students and faculties and make development decisions accordingly.

In short, this will revolutionatize not just the AMS of an institution, but the whole way of its functionality.

4.1 Future Implementations

In near future we planned to upgrade the system's functionality and give it ergonomic and aesthetic values.

ESP8266 and ESP32 are two very strong and emerging microcontroller platforms with incorporated WiFi radio. With this the need for additional Arduino WiFi shield to connect to the database will be eliminated. Moreover it offers reduced form factor and Ultra Low Power Consumtion techinques, which will make the system market ready.

With an specially designed *high gain monodirectional antenna*, it will possible to reduce the liability of false entries and provide *presence based attendance*[4] plus real time monitoring of the card's movements.

This system is not just restricted to AMS for an institution. This system can be used to provide a alternative approach to unmanned toll booths. Rather than having a dedicated ISP line for each tool booth in a highway, the latest *SigFox* communication technology can be used as a suitable replacement to transfer the data between a Nation Highway headquarters and the toll booth. Considering the recent introduction of *Arduino MKRFOX1200 boards*, the system can be implement as said with ease.

As of now the user interface for the system is not complete. We are implementing them in web, mobile and desktop platform. The web platform is being created using *MEAN stack*, which is ported to desktop and mobile platform using *Electron.io* and *Nativescript.io*

CHAPTER 5
References

[1] https://www.nxp.com/documents/data_sheet/MFRC522.pdf

[2] https://github.com/miguelbalboa/rfid

[3] A. Kassem, M. Hamad, Z. Chalhoub and S. El Dahdaah, "An RFID attendance and monitoring system for university applications," *2010 17th IEEE International Conference on Electronics, Circuits and Systems*, Athens, 2010

[4] C. Sai Krisha, N. Sumanth and C. Raghava Prasad, "RFID based student monitoring and attendance tracking system," *2013 Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT)*, Tiruchengode, 2013