RFID Attendence Using RC522

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Abstract—We have designed RFID RC522 Based Attendance System Using Arduino. MFRC522 RFID Reader is a very simple yet effective module. It is an RFID module and is used for scanning RFID cards. Its a new technology and is expanding day by day. This system can be used to take attendance for student in school, college, and university. It also can be used to take attendance for workers in working places. Its ability to uniquely identify each person based on their RFID tag type of ID card make the process of taking the attendance easier, faster and secure as compared to conventional method. Students or workers only need to place their ID card on the reader and their attendance will be taken immediately. With real time clock capability of the system, attendance taken will be more accurate since the time for the attendance taken will be recorded. The system can be connected to the computer through RS232 or Universal Serial Bus (USB) port and store the attendance taken inside database

Index Terms—RFID, SD-CARD, Module, Rtc, Lcd, RFID Card, Arduino

I. INTRODUCTION

RFID, which stands for Radio Frequency Identification, is an automatic identification technology used for retrieving from or storing data on to RFID Tags without any physical contact [1]. Proposed system primarily comprises of RFID Tags, RFID Reader, Middleware and a Backend database. In traditional method, lots of difficulties exist which includes lost of attendance book, fake attendance and so on. If the book is lost, faculty has to create the new attendance book and therefore absented students get an opportunity to mark their fake presence in the new log book.RFID Tags are uniquely and universally identified by an identification sequence, governed by the rubrics of EPC global Tag Data Standard. In monitoring applications of the university, the use of RFID technology enables the university management to avoid attendance records from loss, misplacement and damages. This technology also will save money, time and decreases work endeavour's in dealing with the participation records. Universities bring progressively turned into great mindful of the fact that making methods more efficient and less time consuming, RFID Might assistance on accelerate those techniques and Along these lines diminish the lead time in a few separate zones such as parking, attendance and others [4, 5]. The suggested application is RFID Attendance Management System be applied in Al-Nahrain University, to record the attendance of students, employees and lecturers, whereby each person is uniquely identified by an RFID transponder .This unique identifier can be used to retrieve all the staffs record from centralised data base to improve attendance system, reduce human error.

2. SYSTEM OVERVIEW

The system consists of Arduino uno,sd card module,rtc module,Rfid MRFC522 Module,lcd,red and green, led,buzzer.

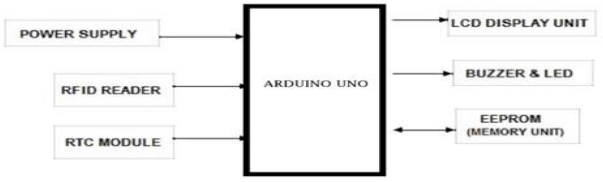

Fig 1.Block diagram

3. COMPONENTS

3.1 Arduino Uno

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button. The 14 digital input/output pins can be used as input or output pins by using pinMode(), digitalRead() and digitalWrite() functions in Arduino programming. Each pin operates at 5V and can provide or receive a maximum of 40mA current, and has an internal pull-up resistor of 20-50 KΩ which are disconnected by default. Out of these 14 pins, some pins have specific functions as listed below:

Serial Pins 0 (Rx) and 1 (Tx): Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip. External Interrupt Pins 2 and 3: These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. PWM Pins 3, 5, 6, 9 and 11: These pins provide an 8-bit PWM output by using analogWrite() function. SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK): These pins are used for SPI communication .In-built LED Pin 13: This pin is connected with an built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW, its off .Along with 14 Digital pins, there are 6 analog input pins, each of which provide 10 bits of resolution, i.e. 1024 different values. They measure from 0 to 5 volts but this limit can be increased by using AREF pin with analog Reference() function. Analog

pin 4 (SDA) and pin 5 (SCA) also used for TWI communication using Wire library. Arduino Uno has a couple of other pins as explained below: AREF: Used to provide reference voltage for analog inputs with analog Reference() function. Reset Pin: Making this pin LOW, resets the microcontroller.

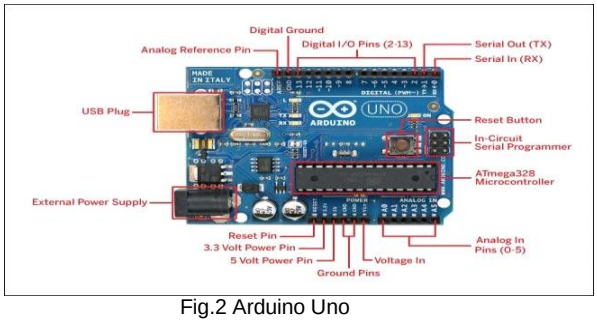

Fig.2 Arduino Uno

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Table.1 Arduino Uno

3.2 RFID(MFRC522) Module

The RC522 RFID Reader module is designed to create a 13.56MHz electromagnetic field that it uses to communicate with the RFID tags (ISO 14443A standard tags). The reader can communicate with a microcontroller over a 4-pin Serial Peripheral Interface (SPI) with a maximum data rate of 10Mbps. It also supports communication over I2C and UART protocols.

The module comes with an interrupt pin. It is handy because instead of constantly asking the RFID module "is there a card in view yet? ", the module will alert us when a tag comes into its vicinity.

The operating voltage of the module is from 2.5 to 3.3V, but the good news is that the logic pins are 5-volt tolerant, so we can easily connect it to an Arduino or any 5V logic microcontroller without using any logic level conve

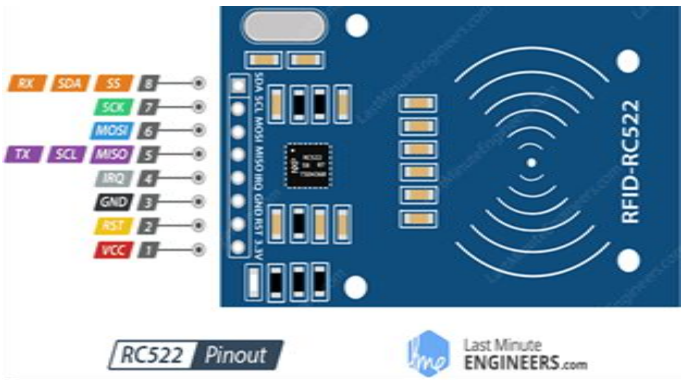

Fig.3 RFID Module

3.2 A RC522-Specifications:

Operating Current	13-26mA / DC 3.3V
Idle Current	10-13mA / DC 3.3V
Sleep Current	< 80uA
Peak Current	< 30mA
Operating Frequency	13.56MHz
Supported card types	mifare1 S50, mifare1 S70 MIFARE Ultralight, mifare Pro, MIFARE DESFire
Environmental Operating Temperature	-20 - 80 degrees Celsius
Environmental Storage Temperature	-40 - 85 degrees Celsius
Relative humidity	relative humidity 5% - 95%
Reader Distance	≥ 50mm / 1.95" (mifare 1)
Module Size	40mm × 60mm
Module interface	SPI
Data transfer rate	Maximum 10Mbit/s

Table.2 RC522

3.3 Sd Card Module

The micro- SD Card Module is a simple solution for transferring data to and from a standard SD card. The pin out is directly compatible with Arduino, but can also be used with other microcontrollers. It allows you to add mass storage and data logging to your project.

This module has SPI interface which is compatible with any sd card and it use 5V or 3.3V power supply which is compatible with Arduino UNO/Mega.

SD module has various applications such as data logger, audio, video, graphics. This module will greatly expand the capability an Arduino can do with their poor limited memory.

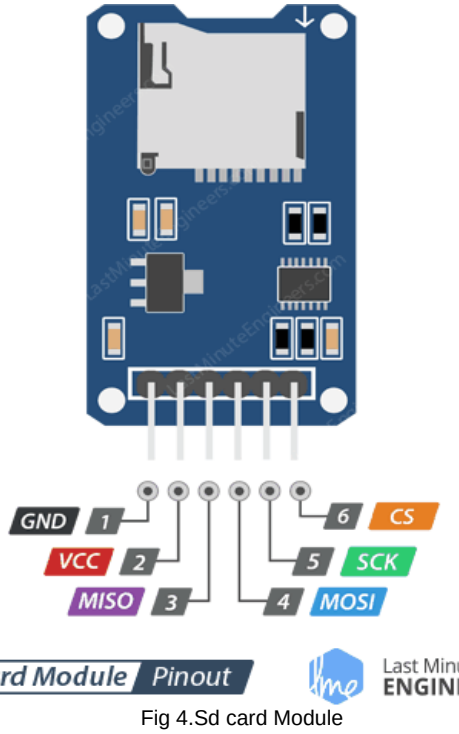

Fig 4.Sd card Module

3.3 A Specifications:

Working Voltage	5V/3.3V
Interface	SPI
Compatible	MicroSD

Table 3. Sd card Module

3.4 RTC Module

Real time clocks (RTC), as the name recommends are clock modules. The DS1307 real time clock (RTC) IC is an 8 pin device using an I2C interface. The DS1307 is a low-power clock/calendar with 56 bytes of battery backup SRAM. The clock/calendar provides seconds, minutes, hours, day, date, month and year qualified data. The end date of each month is automatically adjusted, especially for months with less than 31 days.

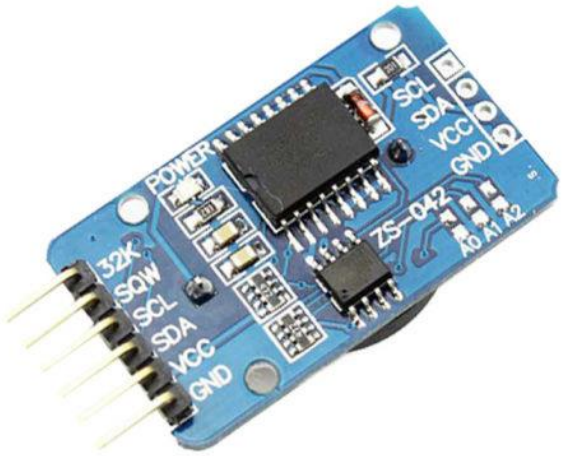

Fig 5.RTC Module

3.4 A Specifications:

Operating voltage of DS3231 MODULE	2.3V – 5.5V
Maximum voltage at SDA , SCL	VCC + 0.3V
Operating temperature	-45ºC to +80ºC

Table 4.RTC Module

3.5 LCD16X2

16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots.

Fig 6.Lcd

ITEM	SYMBOL	LEVEL	FUNCTIONS
1	VSS	0V	Power Ground
2	VDD	+5V	Power supply for logic
3	V0	—	Contrast adjust
4	RS	H/L	H:data L:command
5	R/W	H/L	H:read L:write
6	E	H.H→L	Enable signal
7-14	DB0-DB7	H/L	Data Bus
15	LEDA	+5V	Power supply for LED Backlight
16	LEDK	0V	

Table 5.Lcd

3.5 A Specifications:

Display Format	16x2 Dots LCD
Outline Dimension	85(W)x30(H)x12(T)mm
Visual Area	64.5×16.0mm
Active Area	55.45(W)x10.75(H)mm
Character Size	2.95x5.15mm
Diagonal Size	2.6“
Dot (Pixel) Size	0.55X0.60mm
IC Package	COB LCD
IC or Equivalent	SPLC780C/HS44780/KS0066 or Equivalent
Interface	6800 8-bit/4-bit Parallel
Interface	parallel
Display Type	STN/FSTN
Sunlight Readable	No
Touch Panel Optional	No
Contrast Ratio(Typ)	No
Viewing Direction	6: 00
LED Backlight Color	Blue /Yellow Green /Gray
Appearance	White on Blue/Black on Yellow Green/White on Gray
Power Supply(Typ)	3.3V/5V
Backlight Current (Typ)	15mA
Operating Temp	-20℃~70℃
Storage Temperature	-30℃~80℃
If accept customized	Yes
RoHS Compliance	Yes

Table 6.Lcd

3. 6 Piezo Electric Buzzer

A piezo buzzer is a sound producing device. The main working principle is based on the theory that, whenever an electric potential is applied across a piezoelectric material, a pressure variation is generated. A piezo buzzer consists of piezo crystals in between two conductors.

Fig 7. Buzzer

3.6 A Specifications:

Rated Voltage	6V DC
Operating Voltage	4-8V DC
Rated current	<30mA
Sound Type	Continuous Beep
Resonant Frequency	~2300 Hz.

Table 7.Buzzer

4. WORKING

The working principle of RFID based attendance system is so much simple. It works on the principle of radio frequency waves. This system consists of a microcontroller and RFID reader. This RFID reader consists of a coil when a voltage is given to this coil it produces the electromagnetic field. When this electromagnetic field link with the RFID tag it produces current. This current transfers the data from the RFID tag to the RFID reader. Suppose when the RFID tag which have the student’s information take this near to the RFID system then the RFID system which have the RFID sensor senses this tag and gives the signal to the RFID reader. The RFID reader which is interfaced with microcontroller mark the attendance of that specific student and store’s it in the database. The LCD will show if the attendance is marked or not. The SD card model will save the information. Rtc module will give us real date and time. The buzzer will buzz if the attendance is not marked.

5. FUTURE SCOPE

Further improvement can be undertaken on this project for better enhancement: A webcam can be integrated into the system to monitor the person who swaps the card, thus avoiding the problem of a person scanning in for another person. The attendance system can be enhanced to biometric technology which is a full proof technique that captures a

person's unique biological or physical features and prevents unauthorized activities.

6. OUTCOME/RESULT

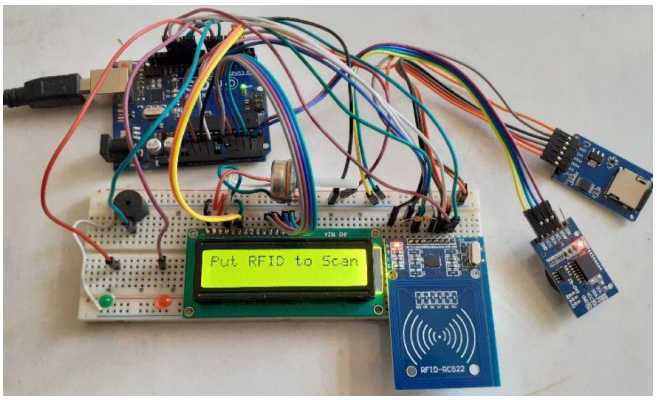

Fig 8. Result

A	B	C	D
Date	Time	Name	Number
2/3/2020	12:41:59 PM	omkar	123456
2/3/2020	12:42:06 PM	prajwal	789101

Table 8. Result

7. CONCLUSION

The proposed system of attendance management using RFID technology will improve the process of manual attendance, especially in an organization or school environment. In the long run, with reducing unit tag and reader costs, several businesses will be able to leverage the benefits of RFID technology. Thus by implementing the proposed framework helps in identifying the actual attendance of the class.

References

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