

Identification of job cards using Radio Frequency Identification (RFID) Technique

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Abstract: In industry time is very much important. To reduce time many organizations are searching for new technique which reduces total time and increases rate of production. Radio Frequency Identification (RFID) technique is very much faster than other techniques. Radio Frequency Identification (RFID) is the combination of radio broadcast technology and the radar. . In Radio Frequency Identification (RFID) system we use RFID tag and RFID reader. In company Adler mediequip pvt. Ltd. searching of job cards is very much time consuming process. Therefore the productivity decreases and manpower increases identification.to overcome this problem RFID System is can be implemented in this company. In this chapter for RFID implementation we research some RFID, components like Arduino, tags, reader and RFID system. Different types of RFID tags are studied. RFID system and Arduino are studied and also construction and components of RFID tag are studied.

Keywords- Radio Frequency Identification, RFID Implementation, RFID sensors, Arduino.

I. INTRODUCTION

Radio Frequency Identification (RFID) is technology used for electric and wireless identification of objects, humans and animals. Radio Frequency Identification (RFID) is the combination of radio broadcast technology and the radar. In Radio Frequency Identification (RFID) system we use RFID tag and RFID reader. Each RFID tag has Unique Identification Number (UIN). RFID Scanner or Reader extracts UIN of every tag in its range and update to a database.

The importance of radio frequency identification is that it allows computers to automatically capture information about what is going on in the world. In industry time is very much important thing. To reduce time many organizations are searching for new technique which reduces total time and increases rate of production. RFID technique is very much faster than other techniques like barcode etc. and it is effective and also secure.

Problem :-

Adler mediequip pvt. Ltd. manufactures medical equipments which are mainly used in medical sector. each time when the product is manufactured they have that job card of that products which contains information regarding the product. All the job cards of the product are stored in the company. They need that job card when they have to manufacture new product. Searching one job card from no of job cards is very difficult task and also time consuming. To reduce time of searching we are came up here with radio frequency identification (RFID) technique.as we see this technique is very much useful in all sectors.by this RFID technique identification is very easy.

Problem Definition:-

There is a Company named as Adler Mediequip pvt. Ltd. Which manufactures medical equipments located in Sadavali Maharashtra. There are up to 2 lakh Jobs at a time Manufactured. Each Job has a job card for identification purpose. Now manual checking of the job card of each component or job becomes very difficult and also it is very much time consuming process. For this problem, to increase production time and to decrease time of identification of job cards They should install RFID technique.

II. LITERATURE REVIEW

The objective of this paper is to present an overview of literature dealing with the recent developments in the study of RFID system and components. Several research papers were referred which gave us the information about the key features of RFID technique, in implementation especially on security and privacy aspects and overview of current state and trends of RFID technology. The literature also provides RFID technology principle, advantages and limitations given by researchers. The research papers also gave us an idea about what work has been done till now and provides us the base of the further work of detailed study of RFID system and its components RFID is mostly used for identification of the item from numerous products.

literature survey

Sr. No	Title of paper	Year	Author	Findings
1	Application of RFID technology in Libraries.	2010	Dr. Prabhat Pandey	In library RFID tag contains information of book such as title, material type etc . This technology began to replace bar code system on library items
2	The RFID technology and its applications: A Review	2012	Davinder Prakash Chechi.	Overview of current state and trends of RFID technology. This technology will open new doors to make organizations, companies more secure, reliable, and accurate.
3	RFID technology principle, advantages and limitations	2011	Mandeep Kaur	Identification of single product From numerous products is time saving and requires less man power
4	Research on Issues Related to RFID security and privacy	2007	Chao Young, Jimhwan Jean	It brings many challenges in implementation especially on security and privacy aspects. Use of this technique will increase in future so demands in security is also high.
5	RFID Technology Based Attendance Management System.	2009	Sumita Nainan, Tanvi Shah.	It highlights the key features of RFID technique. And also advantages like quick process of identification and accuracy.

III. METHODOLOGY

The power given to RFID reader is from an external power source. So when it is ON, the oscillator in it generates a signal with a desired frequency but as the signal strength will be very less it has to be amplified which can be done using an amplifier circuit. In order to propagate the signal to a longer distance we need to modulate the signal which is done by a modulator. With all these improvements the signal is now ready to be transmitted which can be done by an antenna which converts the electrical signal into an electromagnetic signal.

The RFID reader signals are everywhere with its range to detect a tag. When a RFID tag comes in the range of the RFID reader the tag detects the reader's signal through a coil present in it which converts the received radio frequency signal into an electrical signal. This converted signal alone is sufficient to power up the microchip present in the tag. Once the microchip gets powered up, its function is to send the data (unique identification number) which is stored in it. The same way the signal came in, it is sent out through the same coil into the air.

When the signal comes back from the tag through the antenna of RFID reader it is fed to the demodulator and then decoded by a decoder where the original data can be obtained and then further processed by a microcontroller or a microprocessor to perform a specific task.

The above explanation is for a passive RFID tag. In case of an active RFID tag it detects the signal from the reader only to trigger the circuit and make the tag ready to send the data to the reader, since active tags have built-in power source.

RFID Reader:-

It is a device which consists of an antenna, transceiver and a decoder.

Transceiver:-

It can be used either as a transmitter or a receiver. It consists of an oscillator to generate a continuous signal which is modulated to a required frequency and then transmitted into air through an antenna.

Antenna:-

It is a device which converts the electrical signal into electromagnetic signal which is efficient in propagating the signal in air.

Decoder:-

When a RF signal is detected at the antenna from a tag, the decoder helps in retrieving the data.

RFID Tag:-

It consists of 2 components. They are Microchip and an antenna.

Microchip:-

It is a semiconductor device which consists of a circuit etched in it with some KB of memory storage, capable of storing data and transmitting it whenever needed.

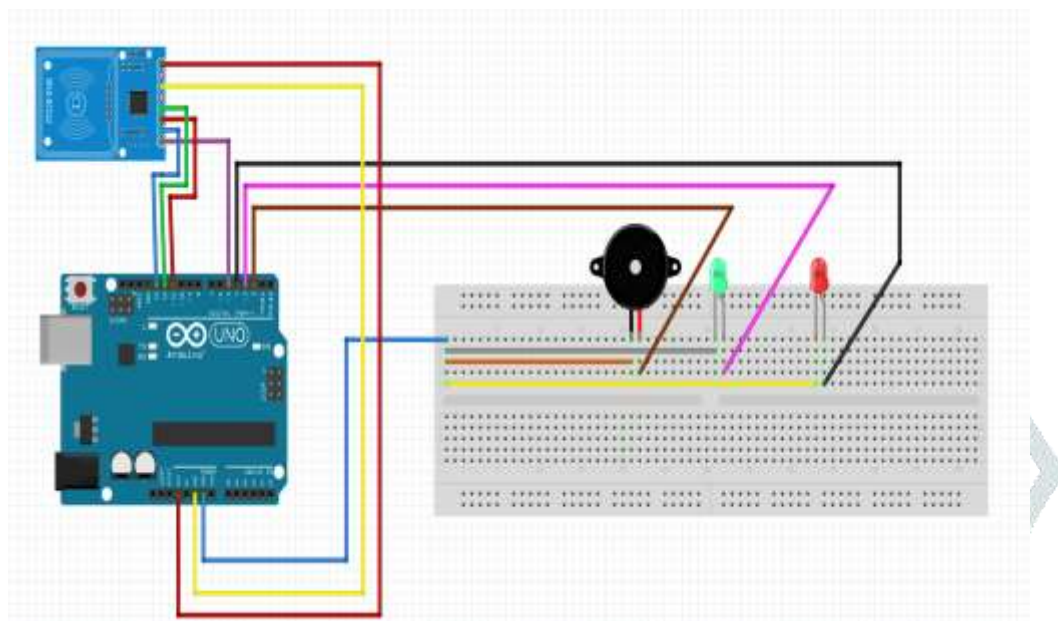
Antenna:- It is used to transmit the data that is present in the chip into air so that it can be detected by a reader.

Incase of an active tag it consists of Microchip, battery and an antenna.

Battery:-

In active devices in order to power up the microchip battery is externally used.

Connection Diagram :-



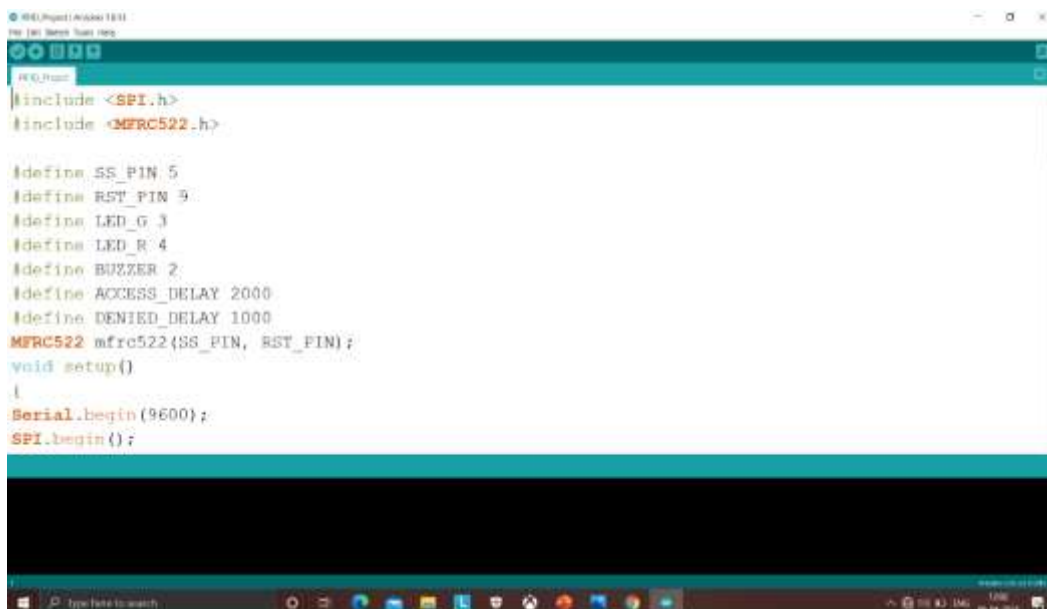
The connection diagram is drawn by using fritzing software. It is easily available on internet for drawing these kind of project diagrams. By using this software we get idea regarding how to make connections for accurate working of this prototype. Figure shows connections of this prototype and also required components.

MFRC522 Reader to Arduino Connections

PIN	WIRING TO ARDUINO UNO
SDA	Digital 5
SCK	Digital 13
MOSI	Digital 11
MISO	Digital 12
IRQ	Don't Connect
GND	GND
RST	Don't Connect
3.3V	3.3V

Table shows the connections of Arduino UNO board with MFRC522 RFID Reader. These connections in the prototype have made with the help of jumper wires. Some soldering work has done on MFRC522 RFID Reader for connections.

Program



```

#include <SPI.h>
#include <MFRC522.h>

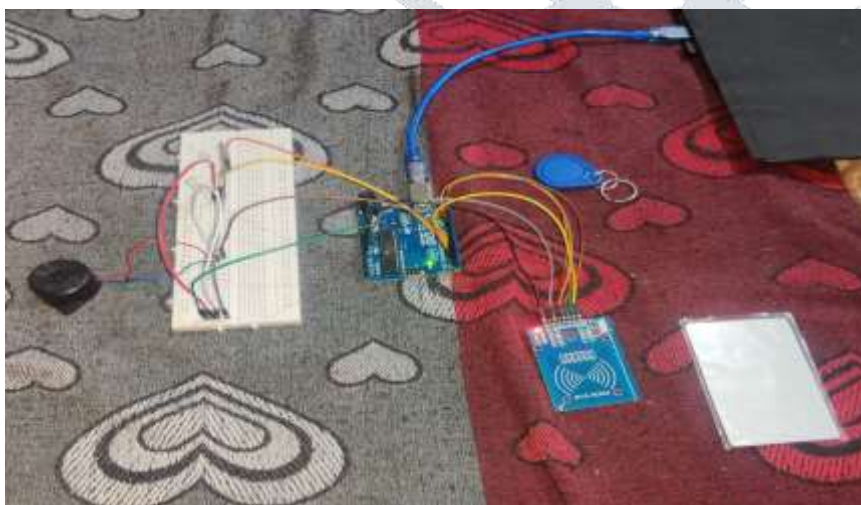
#define SS_PIN 5
#define RST_PIN 9
#define LED_G 3
#define LED_R 4
#define BUZZER 2
#define ACCESS_DELAY 2000
#define DENIED_DELAY 1000
MFRC522 mfrc522(SS_PIN, RST_PIN);
void setup()
{
  Serial.begin(9600);
  SPI.begin();
}

```

Control statements	Operators	Functions
if if..else for while do while switch..case	+, -, *, /, <, >, <=, >=, <>, &&, , !	pinMode() digitalWrite() digitalRead() delay() noTone() tone() Serial.println()

As shown in figure we have used Arduino IDE software for programming purpose in this project. To access RFID functions of MFRC 522 reader library of MFRC522 should be added to the Arduino IDE compiler. By using these functions we code program which interact with Arduino and RFID reader. LED and buzzers functions are also included in code. Table shows control Statements, Operators, Functions Which are used in code

Project Prototype



We have made one small prototype of RFID system which is to be applied in the industry. In this prototype we have used Arduino, RFID reader, RFID tags, Breadboard, jumper wires, LEDs and buzzer. Connections are made with the help of connection diagram in the fritzing software. For programming purpose we have used Arduino IDE software which makes good communication with Arduino UNO. Program is attach in the appendix.

IV. CONCLUSION

- Different types of RFID tags are studied.
- RFID system and Arduino are studied.
- Construction and components of RFID tag are studied.
- MFRC522 reader is selected as RFID reader.
- Passive tag is selected as RFID tag.
- Arduino UNO is selected as a microcontroller.
- Program is coded for project prototype.
- Project Prototype is fabricated for demo purpose.

V. APPENDIX

Program:-

```
#include <SPI.h>
#include <MFRC522.h>
#define SS_PIN 5
#define RST_PIN 9
#define LED_G 3
#define LED_R 4

#define BUZZER 2
#define ACCESS_DELAY 2000
#define DENIED_DELAY 1000
MFRC522 mfrc522(SS_PIN, RST_PIN);
void setup()
{
  Serial.begin(9600);
  SPI.begin();
  mfrc522.PCD_Init();
  pinMode(LED_G, OUTPUT);
  pinMode(LED_R, OUTPUT);
  pinMode(BUZZER, OUTPUT);
  noTone(BUZZER);
  Serial.println("Please place the reader on the job card for identification ...");
  Serial.println();
}
void loop()
{
  if ( ! mfrc522.PICC_IsNewCardPresent())
  {
    return;
  }
  if ( ! mfrc522.PICC_ReadCardSerial())
  {
    return;
  }
  Serial.print("UID tag :");
  String content= "";
  byte letter;
  for (byte i = 0; i < mfrc522.uid.size; i++)
  {
    Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
    Serial.print(mfrc522.uid.uidByte[i], HEX);
    content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
    content.concat(String(mfrc522.uid.uidByte[i], HEX));
  }
  Serial.println();
  Serial.print("Message : ");
  content.toUpperCase();
  if (content.substring(1) == "15 A9 29 2A")
  {
    Serial.println("Selected job card is correct.");
    Serial.println("Material=stainless steel.");
    Serial.println("Dimensions=30x20x40");
  }
}
```

```
Serial.println();  
delay(500);  
digitalWrite(LED_G, HIGH);  
tone(BUZZER, 500);  
delay(500);  
digitalWrite(LED_G, LOW);  
noTone(BUZZER);  
delay(1000);  
}  
else {  
Serial.println(" Selected job card is incorrect.");  
digitalWrite(LED_R, HIGH);  
  
tone(BUZZER, 100);  
delay(1000);  
  
digitalWrite(LED_R , LOW);  
noTone(BUZZER);  
delay(1000);  
}  
}
```

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VII. REFERENCES

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