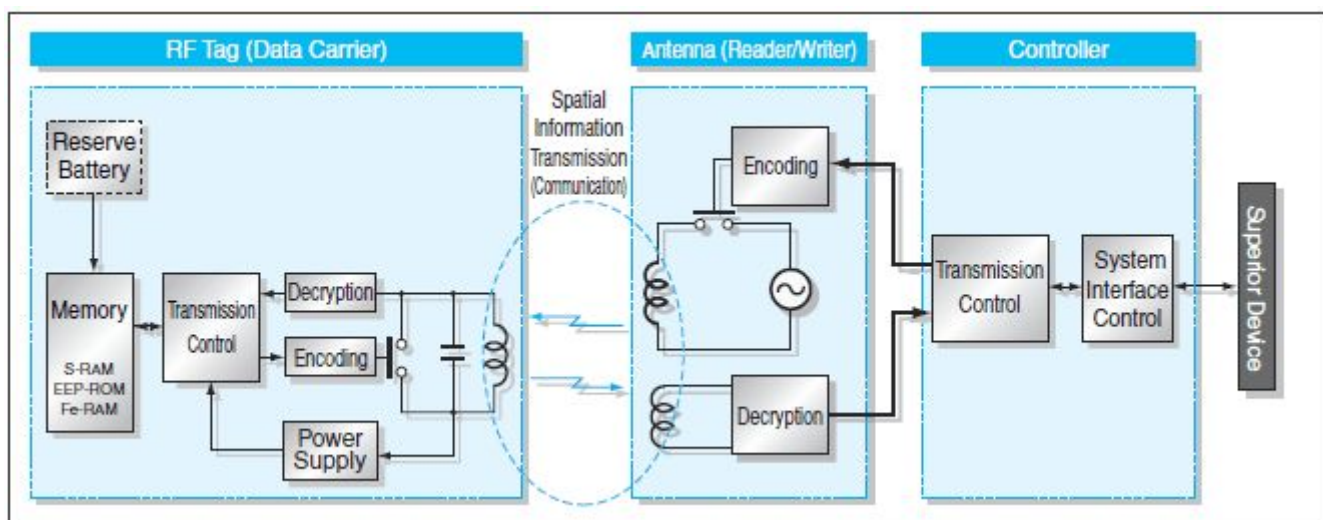


# Radio Frequency Identification (RFID) (Technical Note)

## What is RFID?

Radio-frequency identification (RFID) reads the special tags generally attached to objects. The chip stores information in electronic format which is read by the nearest RFID. The functioning is based on electromagnetic fields. RFID find its major application in Automatic Identification and data capture.

RFID has two main functional components: a tag or a chip which acts as a transponder and is attached to an object. The other one is the reader or the transceiver which interrogates the RFID tag. The chip contains information and is passive in nature. It also contains an antenna to receive and transmit signals. The other part i.e. the reader has a radio frequency module and an antenna generating EMF which the chip receives. Whenever the reader and the chip in close proximity to each other, the chip receives the signal and the reader reads the information.



<http://www.omron-ap.com.my>

## Applications

The RC522 RFID module is the most commonly used module and is based on MFRC522 IC from NXP. This module proves to be very handy with a RFID card tag and key fob tag.

There are different pins in the module like VCC, GND, RST and IRQ having the usual functionalities (Power supply, ground, reset, interrupt). The other pins like MISO / SCL/ TX is the Master-In-Slave-Out and act as serial clock (when 12C is interfaced) and as a serial output (when UART interface is enabled). MOSI (Master out Slave In) which gives the SPI input. SCK is the serial clock and SS/SDA/Rx is the serial data (when 12C is enabled) and serial data input (when UART is enabled).

For the past 2 decades, the Vatican has been using rfid for tracking more than 2 million ancient manuscript including the oldest bible in the vatican.

## Specification

Frequency Range: 13.56 MHz ISM Band  
Host Interface: SPI / I2C / UART  
Operating Supply Voltage: 2.5 V to 3.3 V  
Max. Operating Current: 13-26mA  
Min. Current (Power down): 10µA  
Logic Inputs: 5V Tolerant  
Read Range: 5 cm



RFID MODULE	ARDUINO
3.3v	Arduino Pin 3.3V
RST (Reset)	Arduino Pin 9
GND (Ground)	Arduino Pin GND
NC	No Connection
MISO	Arduino Pin 12
MOSI	Arduino Pin 11
SCK	Arduino Pin 13
SDA	Arduino Pin 10

# Radio Frequency Identification (RFID) (Application Notes)

## Project

To determine unique code of a RFID code and to grant access only to specific unique code.

## Procedure

RFID:

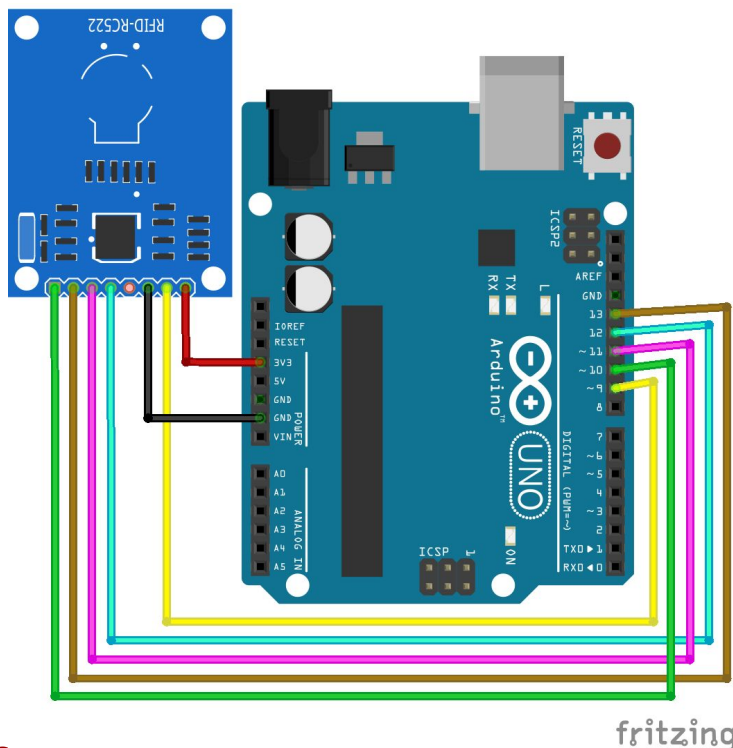
- 3.3V to 3.3V of Arduino
- RST to Pin 9 of Arduino
- GND to GND of Arduino
- MISO to Pin 12 of Arduino
- MOSI to Pin 11 of Arduino
- SCK to Pin 13 of Arduino
- SDA to Pin 10 of Arduino

- Find and install the required libraries (h files) from <https://tinyurl.com/Z2MLibraries>.

- Run code, open serial monitor, bring the tag card or blue tag to the reader, check tag's UID.

- Change the UID (eg. 8D 97 E7 2B) in the code to give or to deny access.

## Schematic



## Challenge

1. Create a door access system in which both your blue tag and tag card can be used to access the door, but not accessible by other cards or tags.

## Components Required

Component	Part No.	Qty
Arduino UNO	EMX-00001-A	1
RC522 RFID Module	EMC-00005-A	1
Jumper Wires - M-F	EDA-00001-A	7

## Code

```
#include <SPI.h> /* Search and add this zip library */
#include <MFRC522.h>
/* Set pin number for pin SDA and pin RST of RFID */
#define SDA_PIN 10
#define RST_PIN 9
MFRC522 mfrc522(SDA_PIN, RST_PIN); /* Setup RFID */

void setup() {
  /* Initiate a serial communication, SPI bus, MFRC522 */
  Serial.begin(9600);
  SPI.begin();
  mfrc522.PCD_Init();
  Serial.println("Approximate your card to the reader...");
  Serial.println();
}

void loop() { /* Detect if a card is present */
  if (!mfrc522.PICC_IsNewCardPresent()) {
    return;
  }
  if (!mfrc522.PICC_ReadCardSerial()) /* Read the cards */ {
    return;
  }
  Serial.print("UID tag :"); /* Show UID on serial monitor */
  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();
  /* Change here the UID of the card/cards that you want to give access */
  if (content.substring(1) == "8D 97 E7 2B") {
    Serial.println("Authorized access");
    Serial.println();
    delay(3000);
  }
  else {
    Serial.println("Access denied");
    delay(3000);
  }
}
```