RFID Card Cloner

Introducere

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Acest proiect are ca scop crearea unui card cloner cu ajutorul modulului RFID RC522.

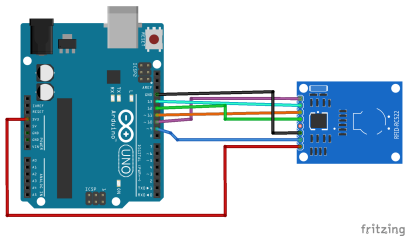
Descriere generală

Dupa cum probabil stiti deja, sistemele RFID (radio frequency identification) folosesc diferite frecvente radio, cele mai populare fiind low-frequency (in jur de 125 KHz), high-frequency(13.56 MHz) si ultra high frequency sau UHF prescurtat (860-960 MHz). Noi vom folosi un modul high-frequency.

Hardware Design

Lista de Componente contine:

1.Arduino UNO 2.Jumper Wires 3.Buzzer 4.Led RGB 5.RFID Cards to test

Schema : 

Software Design

Biblioteca inclusa pe partea de software a fost cea MFRC522 de pe github (

https://github.com/mdxs/MFRC522).

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

#define RST_PIN 9 #define SS_PIN 10

MFRC522 mfrc522(SS_PIN, RST_PIN);

byte buffer[18]; byte block; byte waarde[64][16]; MFRC522::StatusCode status;

MFRC522::MIFARE_Key key;

#define NR_KNOWN_KEYS 8

byte knownKeys[NR_KNOWN_KEYS][MFRC522::MF_KEY_SIZE] = {

```
  {0xff, 0xff, 0xff, 0xff, 0xff, 0xff}, // FF FF FF FF FF FF = factory
default
  {0xa0, 0xa1, 0xa2, 0xa3, 0xa4, 0xa5}, // A0 A1 A2 A3 A4 A5
  {0xb0, 0xb1, 0xb2, 0xb3, 0xb4, 0xb5}, // B0 B1 B2 B3 B4 B5
  {0x4d, 0x3a, 0x99, 0xc3, 0x51, 0xdd}, // 4D 3A 99 C3 51 DD
  {0x1a, 0x98, 0x2c, 0x7e, 0x45, 0x9a}, // 1A 98 2C 7E 45 9A
  {0xd3, 0xf7, 0xd3, 0xf7, 0xd3, 0xf7}, // D3 F7 D3 F7 D3 F7
  {0xaa, 0xbb, 0xcc, 0xdd, 0xee, 0xff}, // AA BB CC DD EE FF
  {0x00, 0x00, 0x00, 0x00, 0x00, 0x00}  // 00 00 00 00 00 00
```

};

char choice;

void setup() {

```
  Serial.begin(9600);
  while (!Serial);
  SPI.begin();
  mfrc522.PCD_Init();
  Serial.println(F("Try the most used default keys to print block 0 to 63 of
a MIFARE PICC."));
  Serial.println("1.Read card \n2.Write to card \n3.Copy the data.");
```

```
  for (byte i = 0; i < 6; i++) {
      key.keyByte[i] = 0xFF;
  }
```

}

void dump_byte_array(byte *buffer, byte bufferSize) {

```
  for (byte i = 0; i < bufferSize; i++) {
      Serial.print(buffer[i] < 0x10 ? " 0" : " ");
      Serial.print(buffer[i], HEX);
  }
```

}

void dump_byte_array1(byte *buffer, byte bufferSize) {

```
for (byte i = 0; i < bufferSize; i++) {
  Serial.print(buffer[i] < 0x10 ? " 0" : " ");
  Serial.write(buffer[i]);
}
```

}

bool try_key(MFRC522::MIFARE_Key *key) {

```
  bool result = false;

  for(byte block = 0; block < 64; block++){

  status = mfrc522.PCD_Authenticate(MFRC522::PICC_CMD_MF_AUTH_KEY_A, block,
key, &(mfrc522.uid));
  if (status != MFRC522::STATUS_OK) {
      Serial.print(F("PCD_Authenticate() failed: "));
      Serial.println(mfrc522.GetStatusCodeName(status));
      return false;
  }
```

```
  byte byteCount = sizeof(buffer);
  status = mfrc522.MIFARE_Read(block, buffer, &byteCount);
  if (status != MFRC522::STATUS_OK) {
      Serial.print(F("MIFARE_Read() failed: "));
      Serial.println(mfrc522.GetStatusCodeName(status));
  }
  else {

      result = true;
      Serial.print(F("Success with key:"));
      dump_byte_array((*key).keyByte, MFRC522::MF_KEY_SIZE);
      Serial.println();


      Serial.print(F("Block ")); Serial.print(block); Serial.print(F(":"));
      dump_byte_array1(buffer, 16);
      Serial.println();

      for (int p = 0; p < 16; p++)
      {
        waarde [block][p] = buffer[p];
        Serial.print(waarde[block][p]);
        Serial.print(" ");
      }

      }
```

```
  }
  Serial.println();

  Serial.println("1.Read card \n2.Write to card \n3.Copy the data.");
```

```
  mfrc522.PICC_HaltA();
  mfrc522.PCD_StopCrypto1();
  return result;

  start();
```

```
}
```

void loop() {

```
start();
```

```
}
```

void start(){

```
choice = Serial.read();

if(choice == '1')
{
  Serial.println("Read the card");
  keuze1();

  }
  else if(choice == '2')
  {
    Serial.println("See what is in the variables");
    keuze2();
  }
  else if(choice == '3')
  {
    Serial.println("Copying the data on to the new card");
    keuze3();
  }
```

```
}
```

void keuze2(){

```
for(block = 4; block <= 62; block++){
  if(block == 7 || block == 11 || block == 15 || block == 19 || block == 23
|| block == 27 || block == 31 || block == 35 || block == 39 || block == 43
|| block == 47 || block == 51 || block == 55 || block == 59){
    block ++;
  }
```

```
Serial.print(F("Writing data into block "));
Serial.print(block);
Serial.println("\n");

  for(int j = 0; j < 16; j++){
    Serial.print(waarde[block][j]);
    Serial.print(" ");
  }
  Serial.println("\n");

}

Serial.println("1.Read card \n2.Write to card \n3.Copy the data.");
start();
```

}

void keuze3(){ Serial.println(“Insert new card...”);

if (! mfrc522.PICC_IsNewCardPresent())

```
      return;
```

```
  if ( ! mfrc522.PICC_ReadCardSerial())
      return;
```

```
  Serial.print(F("Card UID:"));
  dump_byte_array(mfrc522.uid.uidByte, mfrc522.uid.size);
  Serial.println();
  Serial.print(F("PICC type: "));
  MFRC522::PICC_Type piccType = mfrc522.PICC_GetType(mfrc522.uid.sak);
  Serial.println(mfrc522.PICC_GetTypeName(piccType));
```

```
  for (byte i = 0; i < 6; i++) {
      key.keyByte[i] = 0xFF;
  }
```

```
for(int i = 4; i <= 62; i++){
  if(i == 7 || i == 11 || i == 15 || i == 19 || i == 23 || i == 27 || i ==
31 || i == 35 || i == 39 || i == 43 || i == 47 || i == 51 || i == 55 || i ==
59){
    i++;
  }
  block = i;


  Serial.println(F("Authenticating using key A..."));
  status = (MFRC522::StatusCode)
mfrc522.PCD_Authenticate(MFRC522::PICC_CMD_MF_AUTH_KEY_A, block, &key,
&(mfrc522.uid));
```

```
  if (status != MFRC522::STATUS_OK) {
      Serial.print(F("PCD_Authenticate() failed: "));
      Serial.println(mfrc522.GetStatusCodeName(status));
      return;
  }

  Serial.println(F("Authenticating again using key B..."));
  status = (MFRC522::StatusCode)
mfrc522.PCD_Authenticate(MFRC522::PICC_CMD_MF_AUTH_KEY_B, block, &key,
&(mfrc522.uid));
  if (status != MFRC522::STATUS_OK) {
      Serial.print(F("PCD_Authenticate() failed: "));
      Serial.println(mfrc522.GetStatusCodeName(status));
      return;
  }
```

Serial.print(F(“Writing data into block ”));

```
  Serial.print(block);
  Serial.println("\n");

  dump_byte_array(waarde[block], 16);


   status = (MFRC522::StatusCode) mfrc522.MIFARE_Write(block, waarde[block],
16);
    if (status != MFRC522::STATUS_OK) {
      Serial.print(F("MIFARE_Write() failed: "));
      Serial.println(mfrc522.GetStatusCodeName(status));
    }


   Serial.println("\n");

}
mfrc522.PICC_HaltA();
mfrc522.PCD_StopCrypto1();

Serial.println("1.Read card \n2.Write to card \n3.Copy the data.");
start();
```

}

void keuze1(){

```
Serial.println("Insert card...");

  if ( ! mfrc522.PICC_IsNewCardPresent())
      return;
```

```
  if ( ! mfrc522.PICC_ReadCardSerial())
      return;
```

```
  Serial.print(F("Card UID:"));
  dump_byte_array(mfrc522.uid.uidByte, mfrc522.uid.size);
  Serial.println();
  Serial.print(F("PICC type: "));
  MFRC522::PICC_Type piccType = mfrc522.PICC_GetType(mfrc522.uid.sak);
  Serial.println(mfrc522.PICC_GetTypeName(piccType));


  MFRC522::MIFARE_Key key;
  for (byte k = 0; k < NR_KNOWN_KEYS; k++) {

      for (byte i = 0; i < MFRC522::MF_KEY_SIZE; i++) {
          key.keyByte[i] = knownKeys[k][i];
      }

      if (try_key(&key)) {

          break;
      }
  }
```

}

De asemenea pe langa card cloner am mai creat un lock system cu ajutorul caruia vom testa daca cartela s-a clonat cu adevarat.

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

#define NOTE_D8 4699 #define SS_PIN 10 #define RST_PIN 9 int buzzer = 8; MFRC522 mfrc522(SS_PIN, RST_PIN); *Create MFRC522 instance. void setup() { Serial.begin(9600);* Initiate a serial communication

```
SPI.begin();      // Initiate  SPI bus
mfrc522.PCD_Init();   // Initiate MFRC522
Serial.println("Approximate your card to the reader...");
Serial.println();
```

} void loop() {

```
// Look for new cards
if ( ! mfrc522.PICC_IsNewCardPresent())
{
  return;
}
// Select one of the cards
if ( ! mfrc522.PICC_ReadCardSerial())
{
  return;
```

```
}
//Show UID on serial monitor
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) == "BC 6A 09 49") //change here the UID of the
card/cards that you want to give access
{
  tone(buzzer, 1000);
  delay(1000);
  noTone(buzzer);
  Serial.println("Authorized access");
  Serial.println();
  delay(3000);
}
```

else {

```
  tone(buzzer, 700);
  delay(1000);
  noTone(buzzer);
  Serial.println(" Access denied");
  delay(3000);
}
```

}

Rezultate Obţinute

In urma realizarii proiectului am reusit sa clonez cu usurinta cartele care functioneaza pe baza frecventelor radio

Concluzii

A fost un proiect foarte fun si usor de realizat care are o aplicabilitate in domeniul securitatii cibernetice

Jurnal

Puteți avea și o secțiune de jurnal în care să poată urmări asistentul de proiect progresul proiectului.

Bibliografie/Resurse

<note> https://www.youtube.com/watch?v=VXx6l3vgBno&t=653s Export to PDF