DIY PROJECT REPORT

SMART LOCK WITH RFID AND ARDUINO

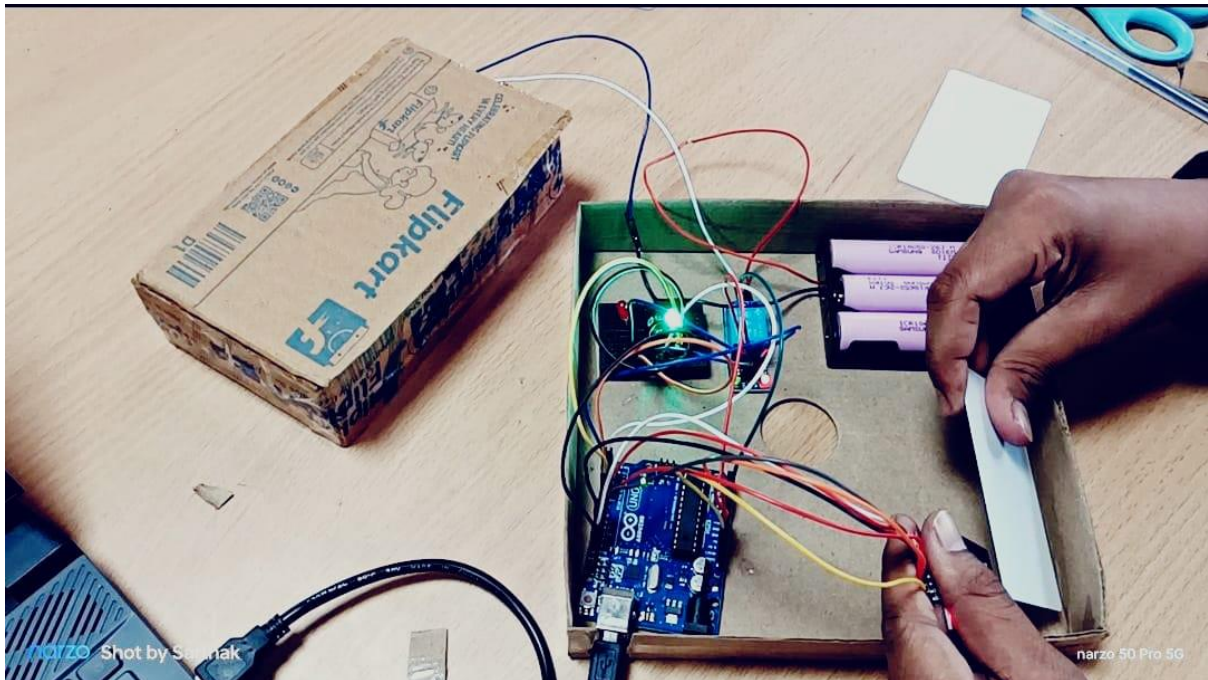## TEAM MEMBERS:

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ABSTRACT

In today's world,security is one of the very important aspect that needs more attention.Keeping that in mind,we have created a Smart Lock with RFID and Arduino.It has an RFID scanner in it which scans the cards that are brought close to it,checks whether the card is authorized or not and grants or denies access accordingly.We have added a solenoid lock which responds to the same by getting locked or unlocked through the stimulus provided by the Arduino.The Code to the same have been coded in C and uploaded in the Arduino to make the components work accordingly.This Project aims to develop a trustworthy lock that is completely secure and cannot be "broke-through" by any other means.No other cards other than the authorized one can open it.It can have its use in any place that needs security be it Hotels or even in a wardrobe.

BACKGROUND AND MOTIVATION:

We have often heard of cases of Robberies and stuff like that happening in several places,so the need of better methods to enhance security was arising.The traditional key and lock system could be surpassed by certain methods of generating a fake key making it unsafe from security point of view.Moreover it required comparatively more input from our side to open or close the lock as compared to our "Smart Lock".Our project involves combining mechanical,electrical and Coding skills.

MOTIVATION

The main motivation behind the "Smart Lock" was to enhance security and make sure only the authorized people get access.Security being one of the most sought-after things in today's world,made us to think in a direction

to improve it in a way to make it more Secure and convenient.

The areas which will be benefitted from the project are:

- Industries to keep their confidential documents and costly equiptment safe locked in a box that only authorized people can access.
- It is useful in people's everyday life to lock up their important things in a much more secure and reliable lock system which they can trust and allow only a few trustworthy people to access.
- Hotels will be most benefitted form the project as it will make their work much more convenient and secure.They can easily change authorization even if a customer looses a card,i.e replacement becomes much easier.

CURRENT SOLUTIONS AND ITS ISSUES:

The Traditional lock and key system has its own flaws.It can be opened by thieves using some metal piece as we have heard in many cases of robbery.Locking and unlocking in this traditional key and lock system is slightly unconvenient as compared to our Smart lock which does the job by just bringing a card near to the reader.Getting a new key in traditional lock is indeed a hectic task but authorizing a card in smart lock is a much more easy task.We can authorize as many people we want through simple coding but creating many keys for traditional lock isn't very doable.

OBJECTIVES:

A RFID- (Radio Frequency Identification) based smart lock using an Arduino as a backbone and a few components which allows a person to open a lock without even touching it, where we can allow or deny access to different tags using a master keycard, and a simple LED readout will tell us what is happening in

the system.

Advantages: 1.Convenient: The smart lock system eliminates the need for key,

making access much more convenient.

2.Secure: The use of RFID technology ensures that only authorized users can

access the building or room.

3.Customizable: The list of authorized IDs can be easily updated, adding or

removing users as needed.

4.Easy installation: The smart lock system can be easily installed and integrated into existing locks.

WORK DONE:

- We gathered all the components required to make the circuit.

- We made the connections using breadboard, jumpers, arduino, rfid sensor, buzzer, relay module, LEDs and built a test circuit and to control access using a Mifare MFRC522 reader module, we installed the code into Arduino to open and close a lock.

- We coded the Arduino to function the way it should.It is coded in C language.

- Then we added a solenoid to act as the lock.

COMPONENTS USED IN THE PROJECT

- ARDUINO UNO

- RELAY MODULE - electrically operated switches that open and close the circuits by receiving electrical signals from outside sources.

- MFRC522 MODULE with CARDS to read.

- Red and green LEDs

- BUZZER

- SOLENOID LOCK

- 12V POWER SUPPLY

- BREADBOARD

- JUMPERS

CODE:

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

#define SS_PIN 10
#define RST_PIN 9
#define LED_G 5 //define green LED pin
#define LED_R 4 //define red LED
#define RELAY 3 //relay pin
#define BUZZER 2 //buzzer pin
#define ACCESS_DELAY 3000
```

```
#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(RELAY, OUTPUT);
  pinMode(BUZZER, OUTPUT);
  noTone(BUZZER);
  digitalWrite(RELAY, HIGH);
  Serial.println("Put 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) == "B9 18 A8 99") //change here
the UID of the card/cards that you want to give access
  {
    Serial.println("Authorized access");
    Serial.println();
    delay(500);
    digitalWrite(RELAY, LOW);
    digitalWrite(LED_G, HIGH);
    delay(ACCESS_DELAY);
    digitalWrite(RELAY, HIGH);
    digitalWrite(LED_G, LOW);
  }

  else   {
    Serial.println(" Access denied");
    digitalWrite(LED_R, HIGH);
    tone(BUZZER, 300);
    delay(DENIED_DELAY);
    digitalWrite(LED_R, LOW);
    noTone(BUZZER);
  }
}
```

CIRCUIT DIAGRAM:
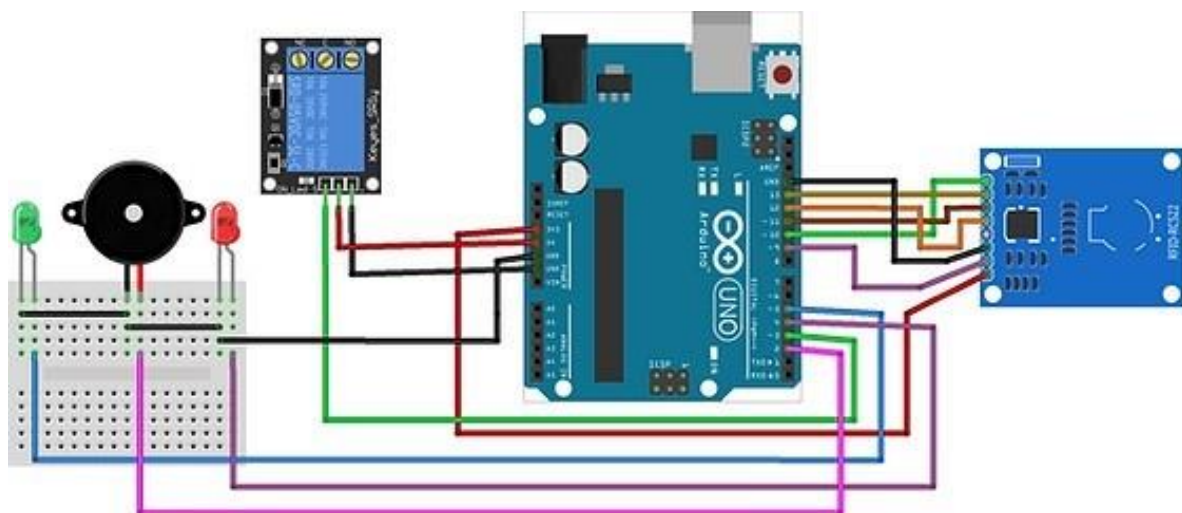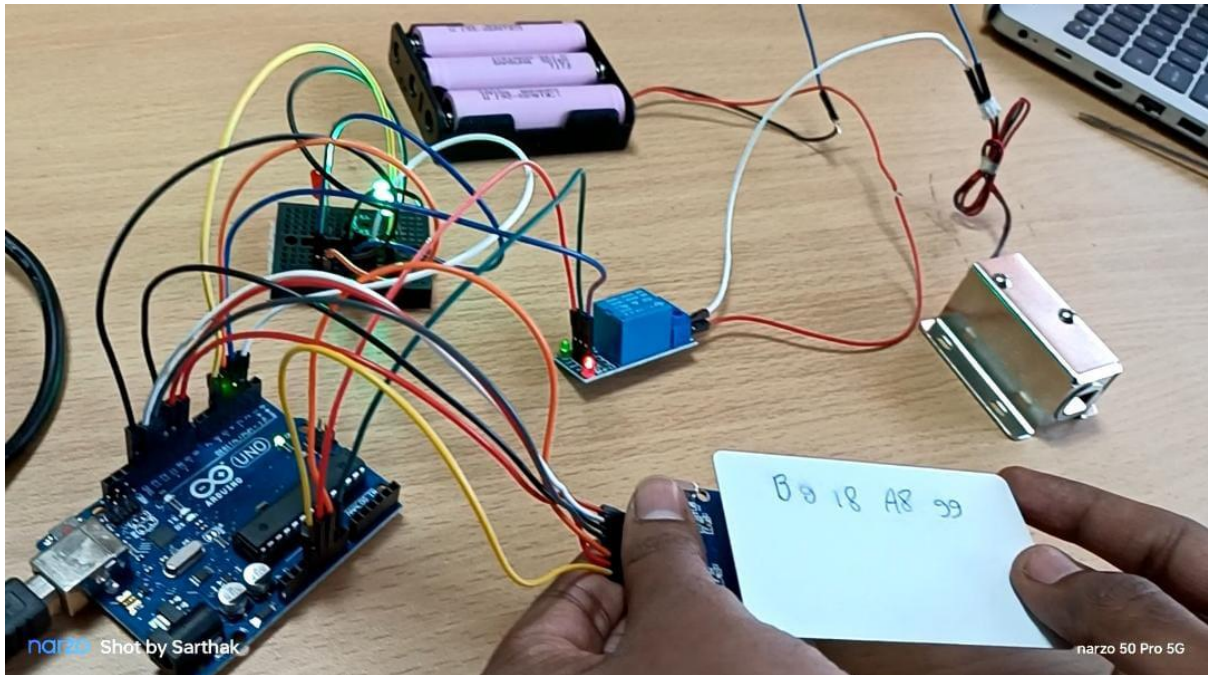
LEARNINGS FROM THE WORK DONE:

- We learned how RFID functions.

- We learnt about working of Arduino.

- We gained some knowledge about coding in "c" .

- We learned the significance of teamwork.

- We learned how to Connect components and uses of components like Breadbaord,Power Relay etc.

CHALLENGES FACED:

- The challenge we faced is that the RFID reader is not getting properly connected to remaining circuit, so we held RFID reader with our hands to make sure the connection sustains properly while scanning the card.

CONCLUDING REMARKS:

The RFID based smart lock is an invisible lock that allows the persons to open the lock using card and without touching the lock and using of this lock increases security as it only allows the person with authorized card to unlock.

REFERENCES:

www.wikipedia.com