

**IMPLEMENTATION OF IOT IN RESIDENCE GATES**

Group 1

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**CONTINUING EDUCATION PROGRAM CENTER FOR COMPUTING AND INFORMATION TECHNOLOGY,   
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**PROJECT INFORMATION**

Project Title : Implementation of IOT in Residence Gates

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Batch Code : 2ISA1

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Name of Faculty : Mr. Tri Agus Riyadi, S.Kom, MT

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Date of Submission: May 9, 2023



**CERTIFICATE OF ORIGINALITY**

This is to certify that the project report titled "Implementation of IOT in Residence Gates" is an original work completed by Agung Yamora Zubara Siregar, Alfonda Dimas Cahaya, and Ferdi Alwan Muhammad. This project has been submitted in partial fulfillment of their course requirement at the National Institute of Information Technology (NIIT).

The project report has been prepared under our guidance and supervision, and it is ensured that the work presented in this report is the result of the individual efforts of the aforementioned students. The contents of this report have not been submitted to any other institution or organization for the award of any degree, diploma, or other similar recognition.

Author acknowledge that the ideas, designs, and implementations presented in this project report are the intellectual properties of the students mentioned above. Any use or reproduction of this work must give proper credit to the original authors.

Author hereby endorse the authenticity and originality of the work presented in this project report and confirm that it meets the academic standards and requirements set forth by the National Institute of Information Technology (NIIT).

Coordinator :

Mr. Tri Agus Riyadi, S.Kom, MT

**ACKNOWLEDGEMENT**

Author would like to acknowledge the completion of the insightful paper entitled "Implementation of IOT in Residence Gates." This paper comprehensively discusses the integration of Internet of Things (IoT) technology in the functioning of residence gates, thereby enhancing their efficiency, security, and convenience for users.

The contents of this paper provide a detailed overview of the current state of residence gate systems and the potential benefits of incorporating IoT technology. The authors have meticulously examined the various aspects of IoT-enabled residence gates, such as remote access, real-time monitoring, and seamless integration with other smart home devices. Furthermore, the paper explores the challenges and limitations associated with the implementation of IoT in residence gates, offering valuable insights for future research and development in this area.

Overall, the paper serves as a significant contribution to the growing body of knowledge on IoT applications in the context of residential security and smart living. It is evident that the implementation of IoT in residence gates has the potential to revolutionize the way author secure and manage our homes, paving the way for a safer and more connected living environment.

Depok, 10 May 2023

Authors

**SYSTEM ANALYSIS**

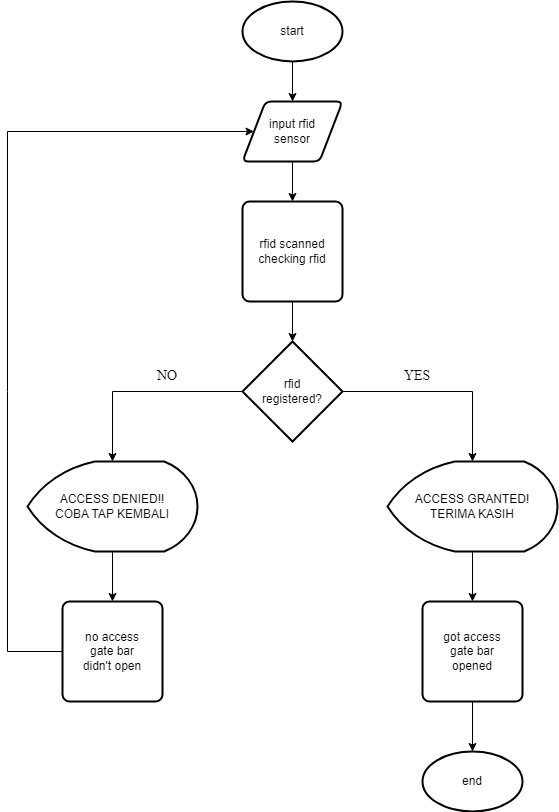
The paper "Implementation of IOT in Residence Gates" delves into the integration of Internet of Things (IoT) technology into residential security systems, specifically focusing on gate access control. The study aims to address the growing need for enhanced security measures in residential communities, as well as to explore the potential benefits and challenges associated with the adoption of IoT-based solutions.

The authors begin by providing an overview of the current state of residential security, highlighting the limitations of traditional access control systems such as manual gates, card-based systems, and basic intercoms. They emphasize the need for more advanced and efficient security measures, particularly in the face of rising crime rates and the increasing complexity of modern living environments.

The paper then presents a comprehensive review of IoT technology, its applications, and its potential for revolutionizing residential security systems. The authors discuss the various components and technologies involved in IoT, including UNO board, USB cable, Breadboard 830 tie, LED ( Red, Green ), Cable male to male, Cable male to female, 9g Servo, Modul RFID mf-522, RFID White Card, RFID keychain They also explore the concept of "smart homes"

Additionally, the paper addresses the challenges and potential drawbacks associated with the implementation of IoT in residence gates. These include concerns related to data privacy, security vulnerabilities, and the need for robust infrastructure to support IoT-enabled systems. The authors also touch upon the importance of considering user acceptance and the potential impact on community dynamics when implementing such technologies.

**FLOWCHART**



**CODE PROGRAM**

//Implementation IOT in Residence Gates

//GROUP 1 by Agung, Alfonda, Ferdi

#include <SPI.h>

#include <RFID.h>

#include <Servo.h>

#include <Wire.h>

#include <LiquidCrystal\_I2C.h>

LiquidCrystal\_I2C lcd(0x27, 16, 2); // Set up the LCD I2C module

RFID rfid(10, 9); //D10:pin of tag reader SDA. D9:pin of tag reader RST

unsigned char status;

unsigned char str[MAX\_LEN]; //MAX\_LEN is 16: size of the array

String accessGranted[2] = { "88043653", "631511110113" }; //RFID serial numbers to grant access to

int accessGrantedSize = 2;  //The number of serial numbers

Servo lockServo;  //Servo for locking mechanism

int lockPos = 150;  //Locked position limit

int unlockPos = 55; //Unlocked position limit

boolean locked = true;

int redLEDPin = 5;

int greenLEDPin = 6;

void setup() {

  Serial.begin(9600); //Serial monitor is only required to get tag ID numbers and for troubleshooting

  SPI.begin();  //Start SPI communication with reader

  rfid.init();  //Initialization

  lcd.init(); // Initialize the LCD

  lcd.backlight();  // Turn on backlight

  lcd.setCursor(0,0); // Set cursor to first row, first column

  pinMode(redLEDPin, OUTPUT); //LED startup sequence

  pinMode(greenLEDPin, OUTPUT);

  digitalWrite(redLEDPin, HIGH);

  delay(200);

  digitalWrite(greenLEDPin, HIGH);

  delay(200);

  digitalWrite(redLEDPin, LOW);

  delay(200);

  digitalWrite(greenLEDPin, LOW);

  lockServo.attach(3);

  lockServo.write(lockPos);  //Move servo into locked position

print("Selamat Datang!");

        lcd.setCursor(0,1);

        lcd.print("TAP RFID ANDA");

        locked = true;}}

  if (granted == false){

    Serial.println("Access Denied");

        lcd.setCursor(0,0);

        lcd.print("ACCESS DENIED!");

        lcd.setCursor(0,1);

        lcd.print("COBA TAP KEMBALI");

    digitalWrite(redLEDPin, HIGH);

    delay(200);

    digitalWrite(redLEDPin, LOW);

    delay(200);

    digitalWrite(redLEDPin, HIGH);

    delay(200);

    digitalWrite(redLEDPin, LOW);

    delay(200);

        lcd.setCursor(0,0);

        lcd.print("Selamat Datang!");

        lcd.setCursor(0,1);

        lcd.print("TAP RFID ANDA   ");}}}

**CODE PROGRAM**

Serial.println("Place card/tag near reader...");

}

void loop(){

  lcd.setCursor(0,0); // Display the distance on the LCD

  lcd.print("Selamat Datang!");

  lcd.setCursor(0,1);

  lcd.print("TAP RFID ANDA");

  if (rfid.findCard(PICC\_REQIDL, str) == MI\_OK){ //Wait for a tag to be placed near the reader

    Serial.println("Card found");

    String temp = ""; //Temporary variable to store the read RFID number

    if (rfid.anticoll(str) == MI\_OK){ //Anti-collision detection, read tag serial number

      Serial.print("The card's ID number is : ");

      for (int i = 0; i < 4; i++){ //Record and display the tag serial number

        temp = temp + (0x0F & (str[i] >> 4));

        temp = temp + (0x0F & str[i]);}

      Serial.println(temp);

      checkAccess(temp);} //Check if the identified tag is an allowed to open tag

     rfid.selectTag(str);} //Lock card to prevent a redundant read, removing the line will make the sketch read cards continually

  rfid.halt();}

void checkAccess(String temp){

  boolean granted = false;

  for (int i = 0; i <= (accessGrantedSize - 1); i++){

    if (accessGranted[i] == temp){

      Serial.println("Access Granted");

      granted = true;

      if (locked == true){

        digitalWrite(greenLEDPin, HIGH);

          delay(200);

          digitalWrite(greenLEDPin, LOW);

          delay(200);

          digitalWrite(greenLEDPin, HIGH);

          delay(200);

          digitalWrite(greenLEDPin, LOW);

          delay(200);

**CODE PROGRAM**

        lcd.setCursor(0,0);

        lcd.print("ACCESS GRANTED ");

        lcd.setCursor(0,1);

        lcd.print("TERIMA KASIH! ");

        lockServo.write(unlockPos);

        locked = false;

        delay(2500);

        lockServo.write(lockPos);

        locked = true;

        delay(2500);}

      else if (locked == false){

        lockServo.write(lockPos);

        lcd.setCursor(0,0);

        lcd.print("Selamat Datang!");

        lcd.setCursor(0,1);

        lcd.print("TAP RFID ANDA");

        locked = true;}}

  if (granted == false){

    Serial.println("Access Denied");

        lcd.setCursor(0,0);

        lcd.print("ACCESS DENIED!");

        lcd.setCursor(0,1);

        lcd.print("COBA TAP KEMBALI");

    digitalWrite(redLEDPin, HIGH);

    delay(200);

    digitalWrite(redLEDPin, LOW);

    delay(200);

    digitalWrite(redLEDPin, HIGH);

    delay(200);

    digitalWrite(redLEDPin, LOW);

    delay(200);

        lcd.setCursor(0,0);

        lcd.print("Selamat Datang!");

        lcd.setCursor(0,1);

        lcd.print("TAP RFID ANDA   ");

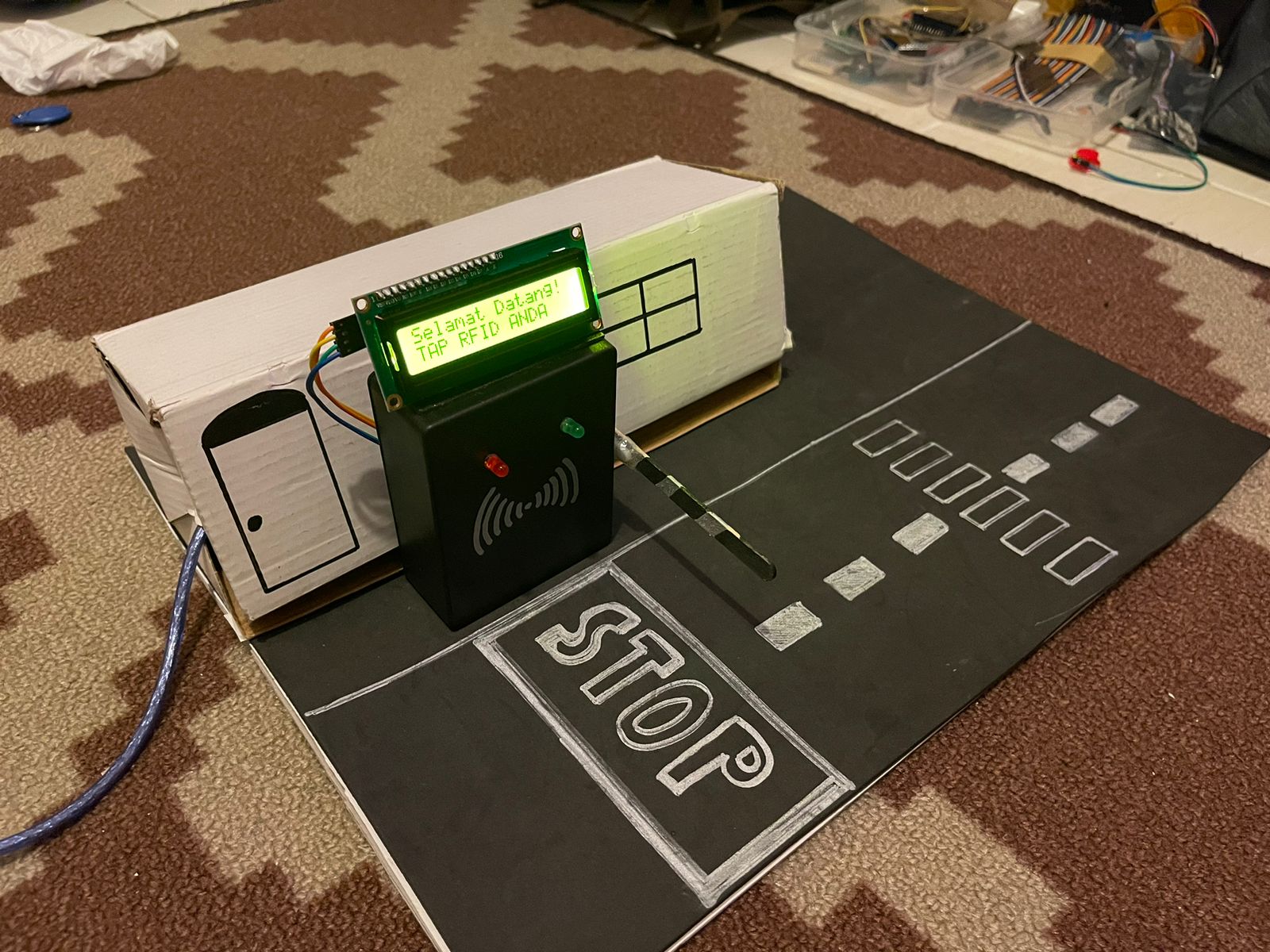
}

}

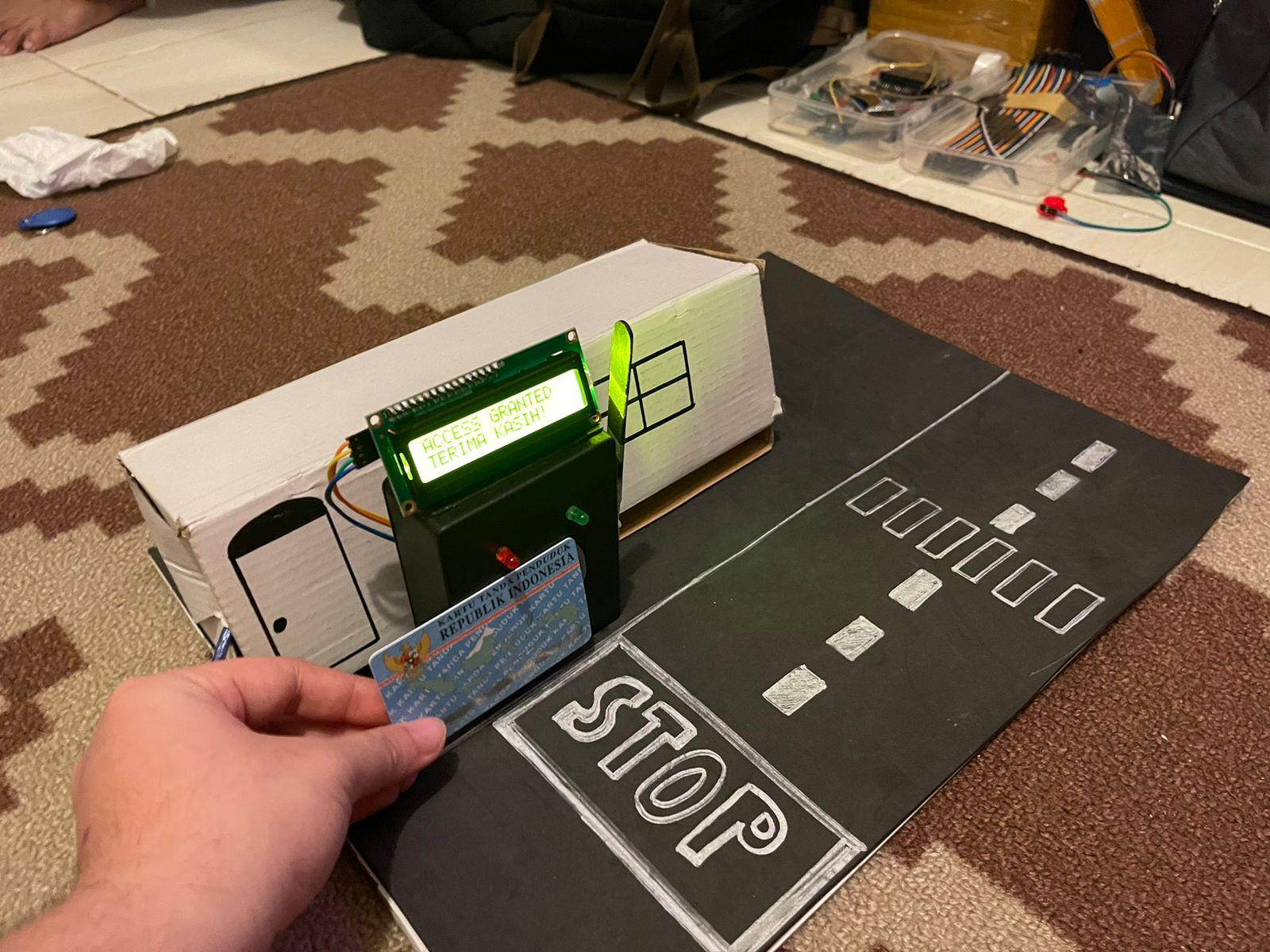
}

**SIMULATION**

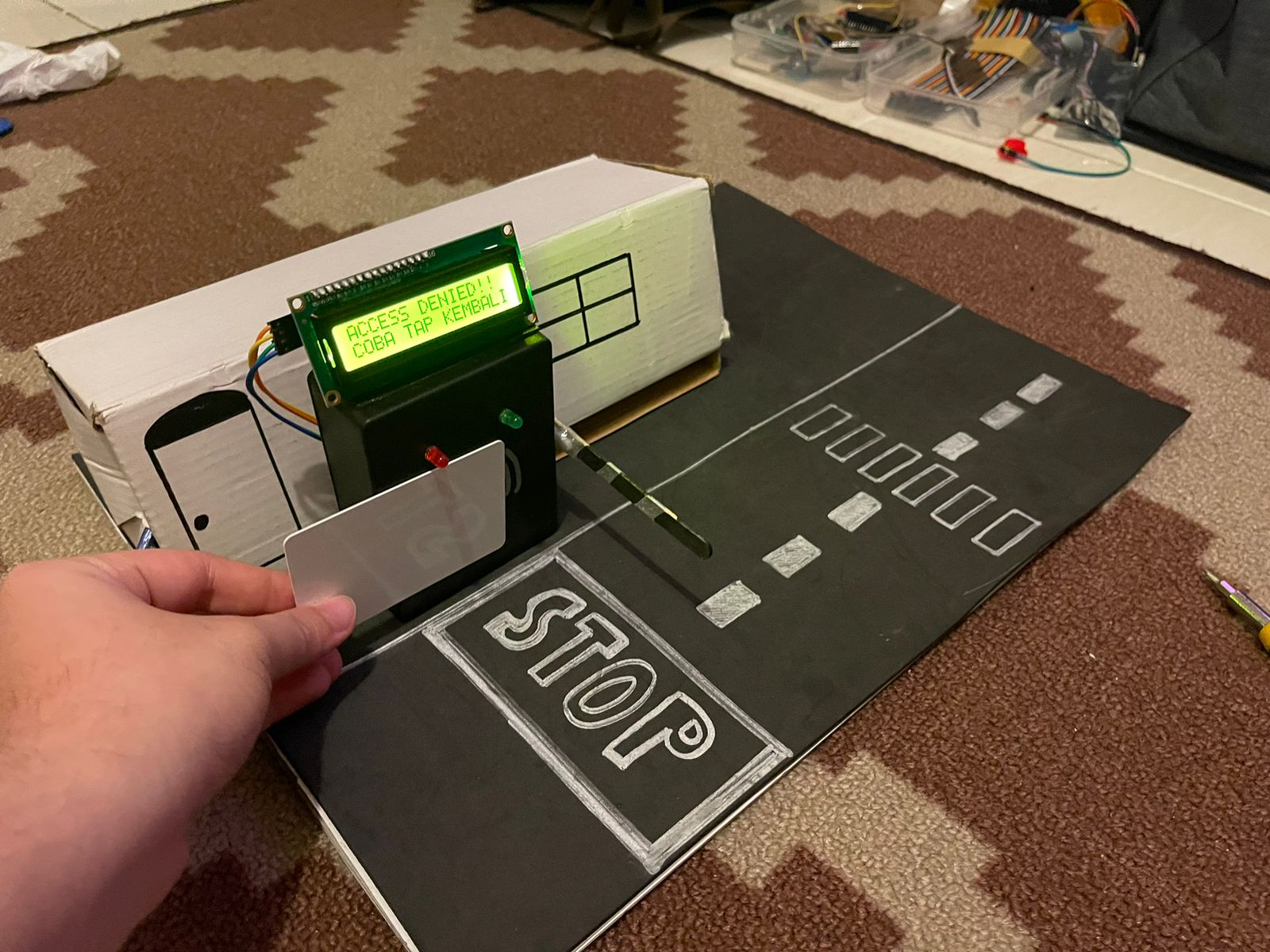
1. Idle simulation gate bar closed display text Selamat Datang! TAP RFID ANDA



1. When registered RFID card tapped, the gate bar opened and display text ACCESS GRANTED TERIMA KASIH



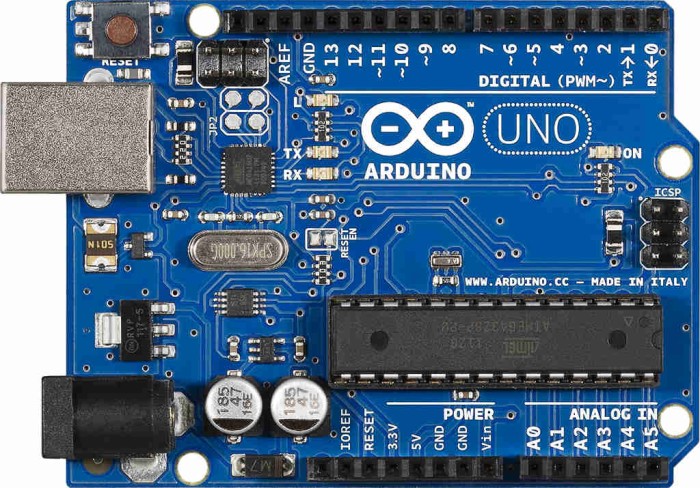
1. When non registered card tapped, gate bar closed and display text ACCESS DENIED!! COBA TAP KEMBALI



**CONFIGURATION**

**Hardware :**

* **UNO Board**
* A microcontroller-based development platform that allows users to create and program electronic projects. It receives input from sensors, processes the data, and controls various components such as motors and lights based on the programmed instructions.



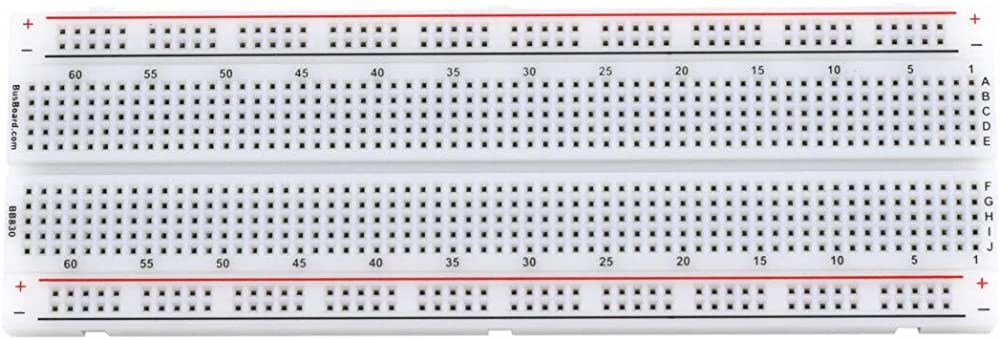
* **USB Cable**
* A USB cable in Arduino is used for two primary purposes: providing power to the Arduino board and enabling communication between the board and a computer for programming and data transfer.



**CONFIGURATION**

**Hardware :**

* **Breadboard 830 Tie**
* In simple terms, a breadboard with 830 tie-points is a tool used in Arduino projects to create temporary circuits and prototypes. It allows you to easily connect and disconnect components, such as sensors, LEDs, and resistors, without soldering. This enables you to test and modify your circuit design before finalizing it.

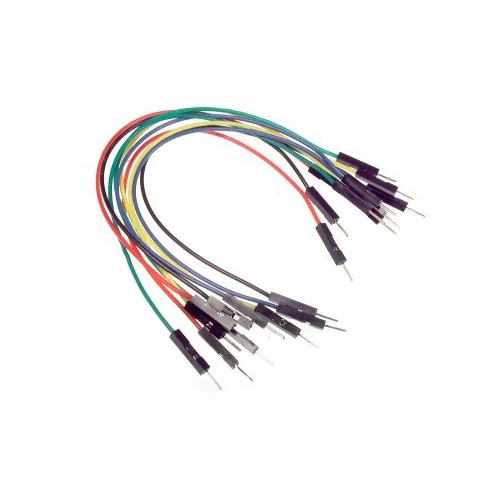


* **LED Red & Green**
* A LED (Light Emitting Diode) in Arduino is a small electronic component that emits light when an electrical current passes through it. In Arduino projects, LEDs are commonly used as indicators for various purposes, such as displaying the status of a sensor or showing that the device is working properly. The red and green LEDs refer to the colors of light emitted by the LEDs, which can be used to represent different states or conditions in a project.
* 

**CONFIGURATION**

**Hardware :**

* **Cable Male to Male**
* A connector that allows for the transfer of electrical signals between two components or devices with female ports. This type of cable is often used to establish connections on a breadboard or between different modules in an Arduino project, enabling communication and data exchange between various components within the system.



* **Cable Male to Female**
* A connector that allows you to extend or connect two components or devices with different types of connectors. The male end has exposed pins, while the female end has sockets for the pins to fit into, ensuring secure and reliable connections.



**CONFIGURATION**

**Hardware :**

* **9g Servo**
* In simple terms, a 9g servo in Arduino refers to a small, lightweight motorized device that can rotate or move parts with precision. It is often used in robotics, automation, and various DIY projects to control the motion of components. The "9g" in its name indicates its approximate weight of 9 grams, making it a compact and portable option for various applications. When connected to an Arduino board, it can be programmed to perform specific movements or rotation based on the user's desired input.



* **Modul RFID MF-522**
* A device that enables wireless communication between an Arduino board and RFID (Radio Frequency Identification) tags or cards. It is used for reading and writing data to these tags, allowing for various applications such as access control, identification, and tracking of objects or people.
* 

**CONFIGURATION**

**Hardware :**

* **RFID White Card**
* A RFID card, when used with an Arduino, allows for contactless communication and identification. The card stores data, such as an ID number or other information, which can be read by an RFID reader connected to the Arduino. This enables various applications, like access control, inventory tracking, and authentication systems.

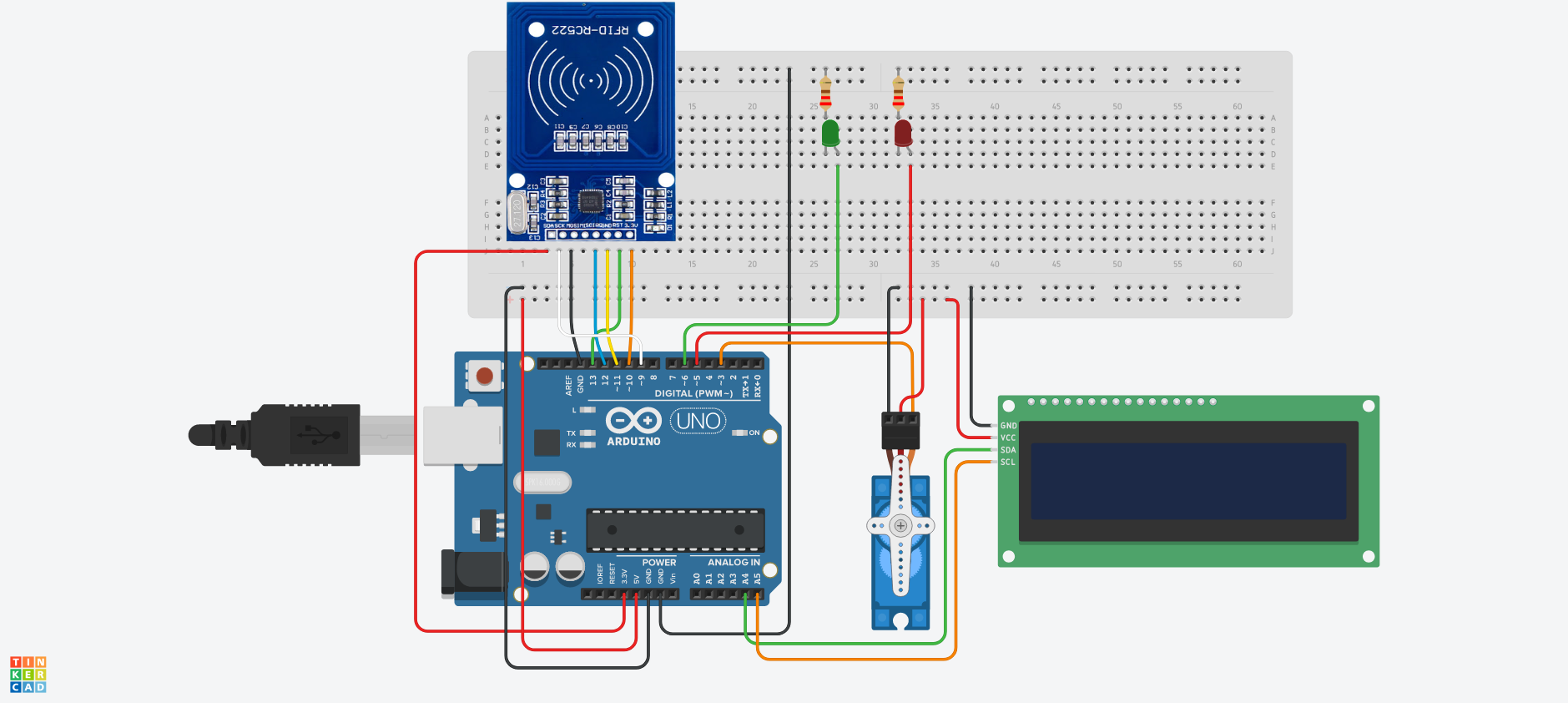


* **LCD 16x2 with I2C**
* A small display module that allows you to show text and simple graphics on a 16-character by 2-row screen. The I2C interface simplifies the wiring and communication between the Arduino and the display, making it easier to set up and program.



**CONFIGURATION**

**Sketch :** Sketched in Tinked CAD

****

**Software :**

1. Arduino IDE
2. Tinker CAD
3. Ms. Word
4. Canva

**Operating System :**

Windows 11

**ADVANTAGES**

The implementation of the Internet of Things (IoT) in residence gates offers numerous advantages, transforming the way homeowners manage their property's access and security. By integrating smart devices and sensors into residence gates, individuals can benefit from enhanced convenience, safety, and efficiency.

1. Remote Access Control: One of the most significant benefits of IoT-enabled residence gates is the ability to control access remotely. Homeowners can use their smartphones or other connected devices to open and close gates, grant temporary access to visitors or service providers, and receive notifications when someone enters or leaves the property. This level of control and flexibility allows for improved convenience and peace of mind.

2. Improved Security: IoT technology can enhance the security of residence gates through features such as biometric authentication, facial recognition, or license plate recognition.

3. Real-time Monitoring: IoT-enabled residence gates can provide homeowners with real-time data on the status of their gates, including open or closed positions, battery life, and maintenance needs. This information can be accessed through a smartphone app or an online dashboard, enabling homeowners to monitor their gates' performance and address any issues promptly.

4. Energy Efficiency: Smart residence gates can be programmed to operate in energy-saving modes, such as automatically closing after a certain period or adjusting their operation based on weather conditions. This can help reduce energy consumption and contribute to a more sustainable living environment.

**DISADVANTAGES**

The implementation of the Internet of Things (IoT) in residence gates has the potential to revolutionize home security and automation, offering numerous benefits such as remote monitoring, access control, and integration with other smart devices. However, despite these advantages, there are several disadvantages that must be considered before implementing IoT in residence gates. These include:

1. Privacy concerns: The integration of IoT devices in residence gates may lead to potential privacy issues, as data collected by these devices can be highly sensitive, including information about the occupants' daily routines and habits. Additionally, the use of cameras and other surveillance equipment may raise concerns about surveillance and intrusion into personal lives.

2. Security vulnerabilities: IoT devices are often susceptible to hacking and other security breaches, which could compromise the security of the residence gate and allow unauthorized access. This is particularly concerning given the sensitive nature of the information that may be stored on these devices, as well as the potential for physical harm to residents if the gate is breached.

3. High costs: The implementation of IoT in residence gates can be expensive, particularly when considering the costs of purchasing and installing the necessary devices, as well as ongoing maintenance and updates. This may be prohibitive for some homeowners, particularly those on a tight budget.

4. Technical issues: The use of IoT devices in residence gates may lead to various technical issues, such as connectivity problems, software glitches, and hardware malfunctions, which could impact the functionality and reliability of the gate. This may require ongoing troubleshooting and maintenance, which can be time-consuming and frustrating for homeowners.

5. Dependence on internet connectivity: IoT devices rely on internet connectivity to function properly, which means that any disruption in internet service could render the residence gate inoperable or less secure. This may be particularly problematic in areas with unreliable internet service or during times of high network congestion.

**CONCLUSION**

In conclusion, the implementation of IoT in residence gates has the potential to revolutionize the way we manage and secure our homes. By integrating smart devices and sensors, homeowners can benefit from increased convenience, enhanced security, real-time monitoring, and energy efficiency. Furthermore, IoT-based residence gates can offer remote access control and notifications, allowing for better management of visitors and service providers.

The implementation of IoT in residence gates offers numerous advantages that can significantly improve the convenience, security, and efficiency of managing property access. By embracing this technology, homeowners can benefit from remote access control, enhanced security features, real-time monitoring, energy efficiency, and seamless integration with other smart home systems.

While the implementation of IoT in residence gates offers numerous potential benefits, it is crucial for homeowners to carefully weigh these advantages against the various disadvantages, such as privacy concerns, security vulnerabilities.

As the IoT landscape continues to evolve, it is expected that more advanced features and capabilities will be integrated into residence gates, further enhancing their utility and value proposition for homeowners. By embracing IoT technology and addressing its challenges, we can create smarter, safer, and more efficient homes for the future.