



PROJECT

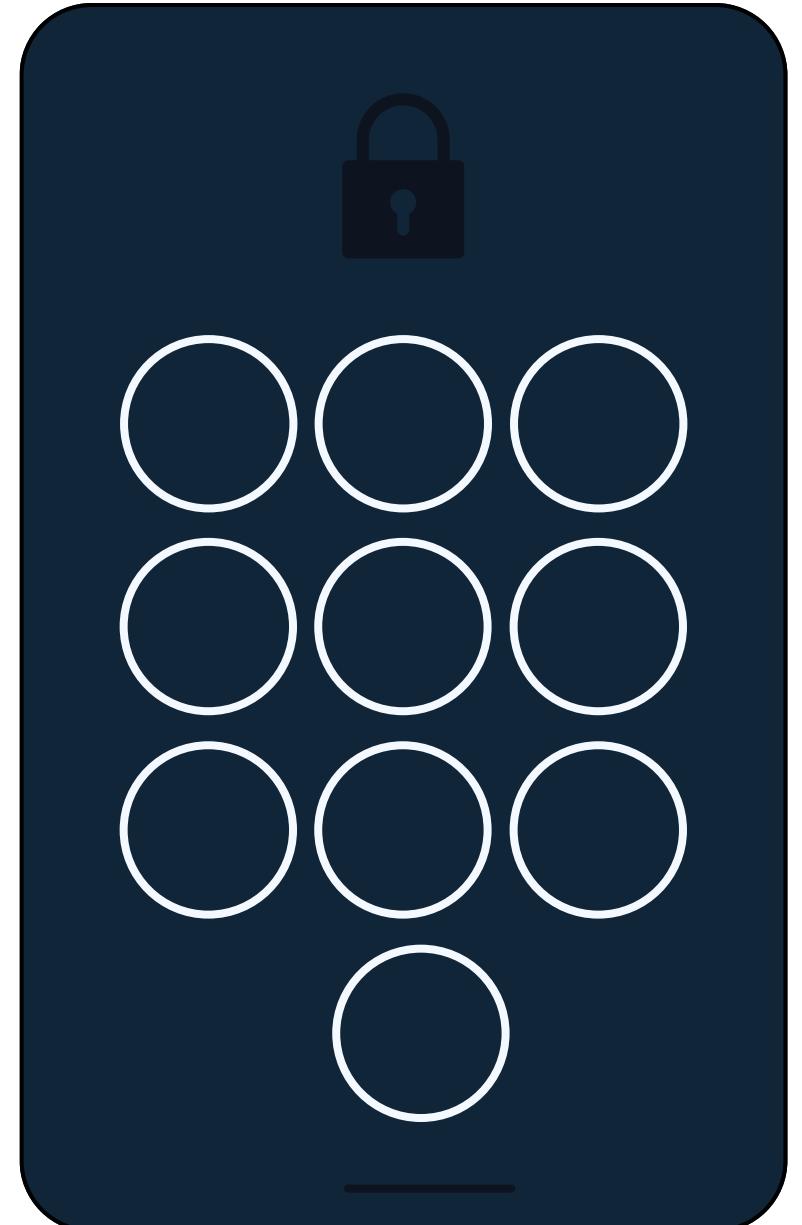
# SMART PIN LOCK SYSTEM

BY  
S . BRINDHAA

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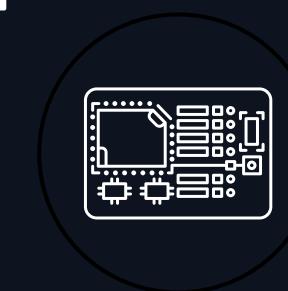




# ABOUT



As part of my project, I have developed a Smart Lock System that focuses on providing keyless, secure, and convenient access to doors using modern technologies. The reason behind choosing this project is that traditional locks often have security risks like lost keys or unauthorized duplication. With advancements in IoT and smart home technologies, smart locks are becoming a more reliable and user-friendly solution. My project aims to improve security by using OTP-based authentication and remote access through a mobile application.

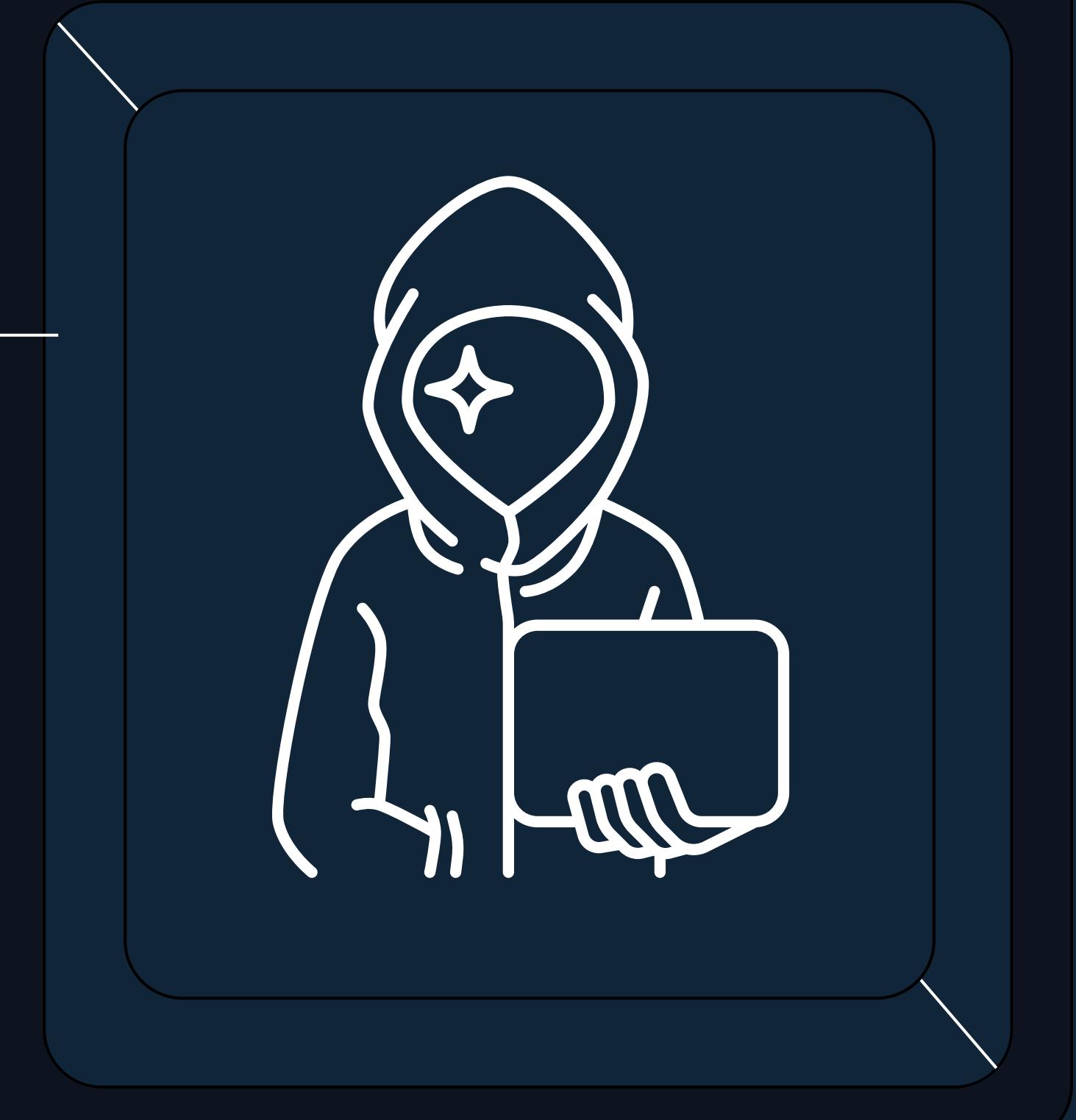




# ABSTRACT



This smart lock system integrates voice assistant using voice controller with keypad-based PIN authentication, offering hands-free access and manual entry for flexibility and security. It features automatic relocking to prevent doors from being left open, making it a reliable solution for smart home and access control applications. The dual authentication enhances security while ensuring convenience for users. Designed for residential and commercial use, it provides a robust and user-friendly access control solution.

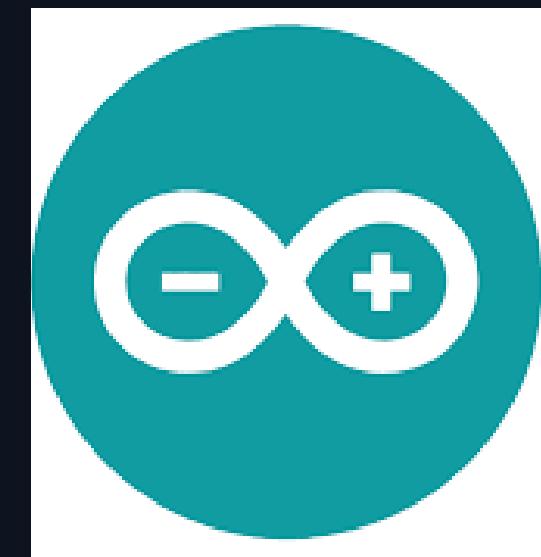


# COMPONENTS

- Arduino Board
- 4x4 Keypad Module
- Electromagnetic Lock (Solenoid Lock)
- 16x2 LCD Display
- Buzzer
- Relay Module
- Voltage Regulator/Power Module
- Bluetooth Module (Possibly HC-05/HC-06)
- Connecting Wires
- Power Jack
- Mobile Phone

# SOFTWARE USED

- ARDUINO IDE
- ARDUINO BLUETOOTH CONTROL

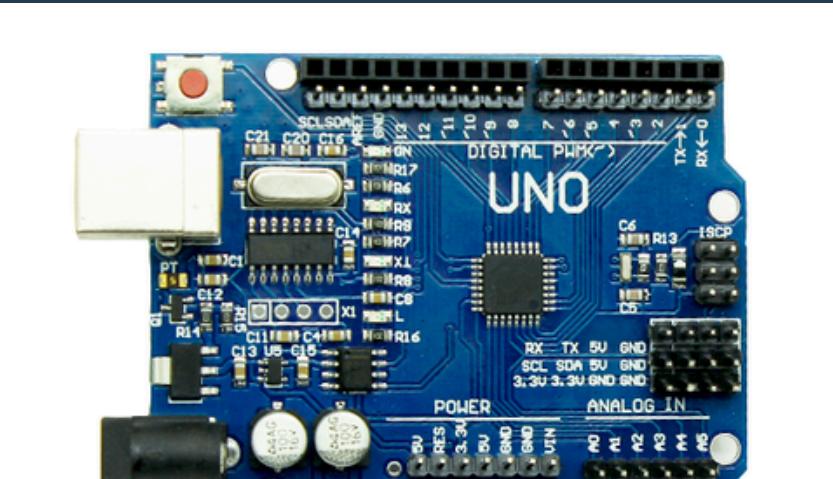




# ABOUT COMPONENTS

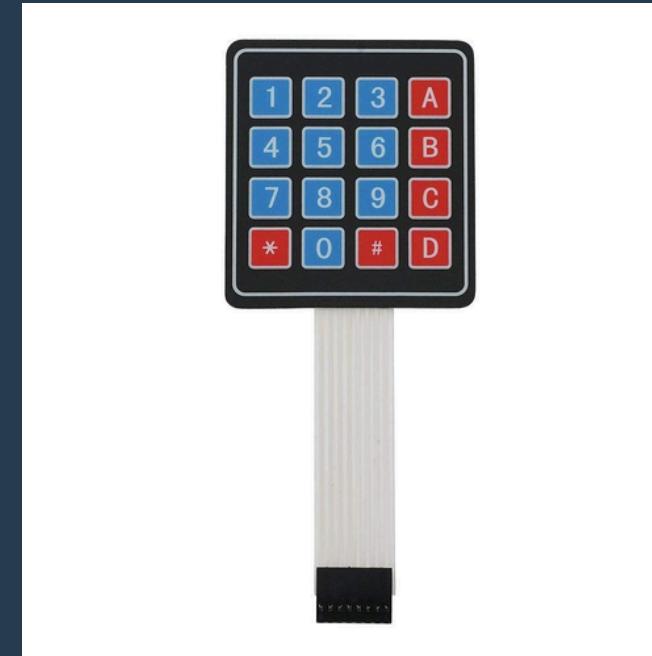
## 1. Arduino UNO

It is the microcontroller that controls all system operations. It processes input from the keypad and Bluetooth module. It then sends commands to the relay, buzzer, and LCD display



## 2 . 4x4 KeyPad

A matrix keypad used for entering a PIN to unlock the door. It sends the input to Arduino for authentication. If the correct PIN is entered, the lock is released.





# ABOUT COMPONENTS

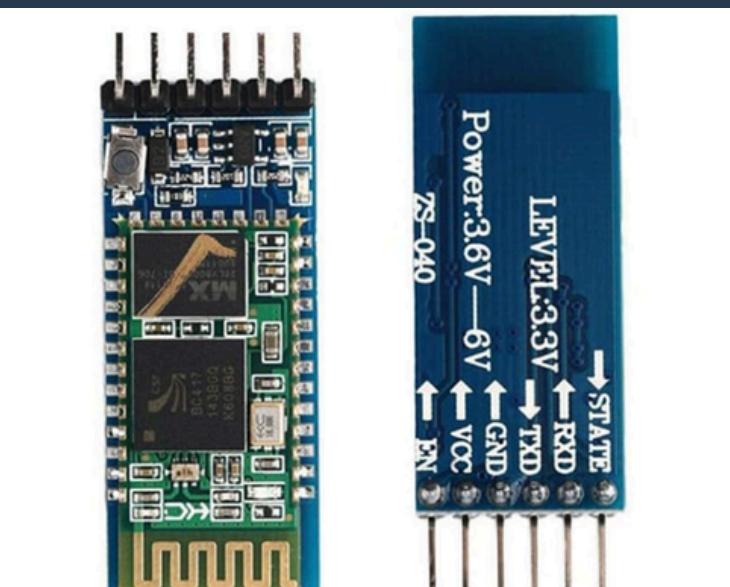
## 3. 16x2 LCD Display

Displays system status messages such as PIN entry, authentication success, or errors. It provides real-time feedback to the user. It operates using an I2C module or direct pin connections.



## 4. HC-05 Bluetooth Module

Enables wireless communication with a smartphone or Google Assistant. It allows users to unlock the door using voice commands. The module communicates via serial with Arduino.

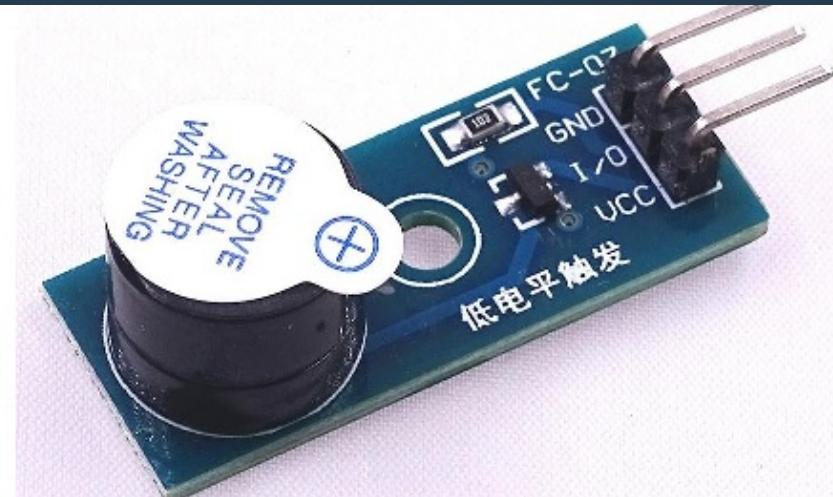




# ABOUT COMPONENTS

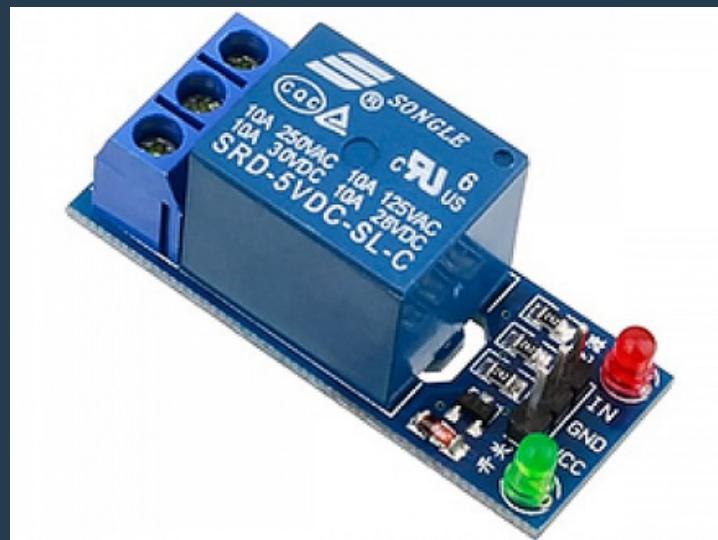
## 5. Buzzer

Provides sound alerts for various actions like incorrect PIN entry, successful unlocking, or system warnings. It helps in user interaction with the lock system. Controlled by Arduino, it emits different beep patterns.



## 6. Relay Module

Acts as an electronic switch to control the solenoid lock. When activated by Arduino, it allows current to flow to the lock. This enables secure and controlled access.





# ABOUT COMPONENTS

## 7. Solenoid Lock

An electrically controlled lock that engages or disengages when triggered. It unlocks when the correct PIN or voice command is received. Requires 12V power and relay control.



## 8. Voltage Regulator

Converts 12V input into stable lower voltages needed for components. Ensures safe operation of Arduino and sensors. Prevents damage due to power fluctuations.

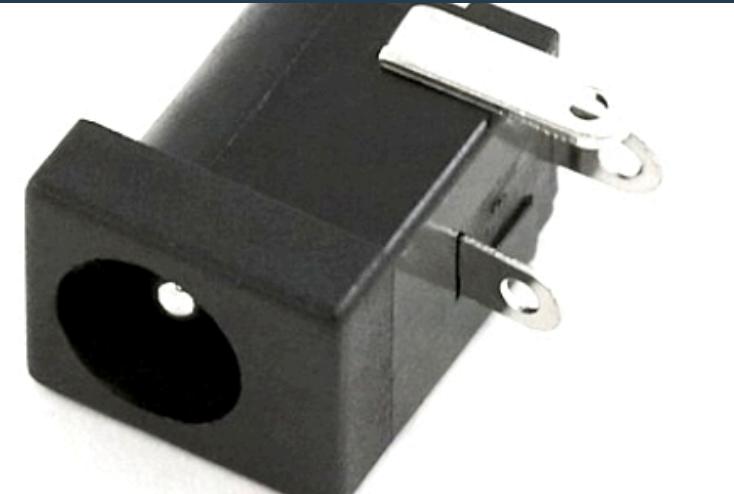




# ABOUT COMPONENTS

## 9. 12V Power Supply

Provides the main power source for the system. Supplies necessary voltage for the solenoid lock and other components. Ensures smooth and reliable operation.

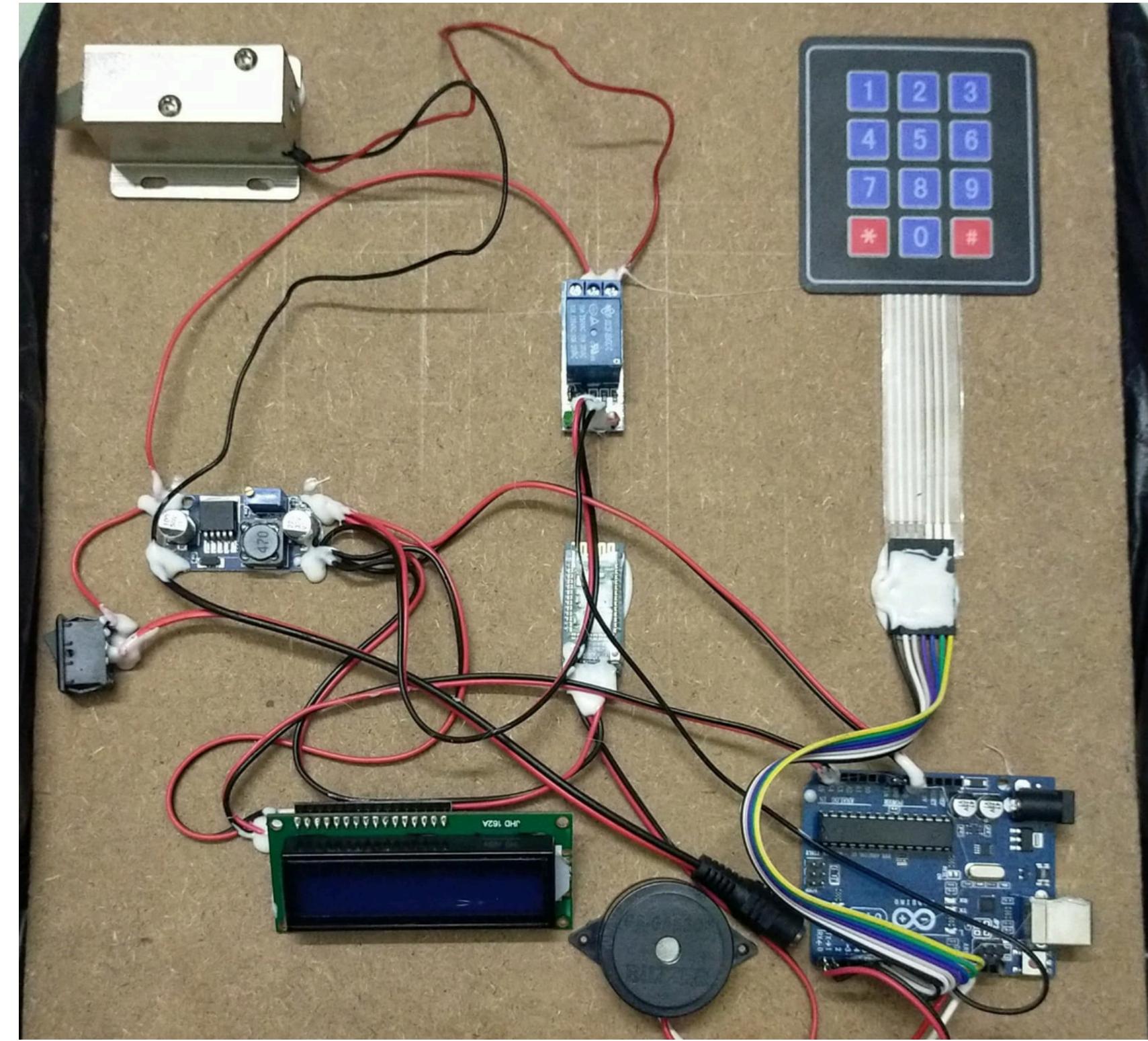


## 10. Jumper Wires

Used to connect different components in the circuit. They allow signal and power transmission between Arduino, keypad, relay, and other modules. Available in male-to-male, female-to-female, and male-to-female types.

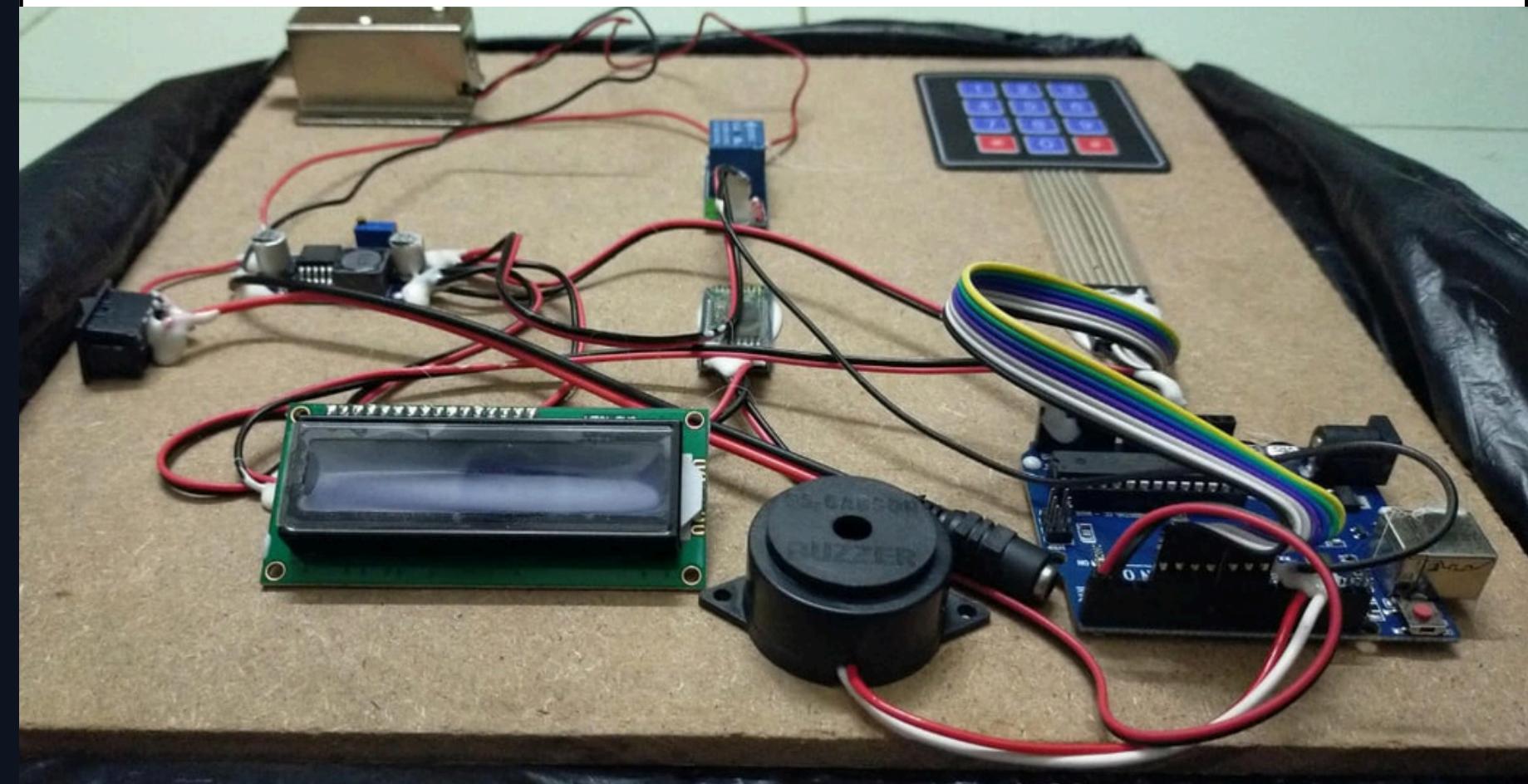


PHOTOS OF THE  
PROJECT



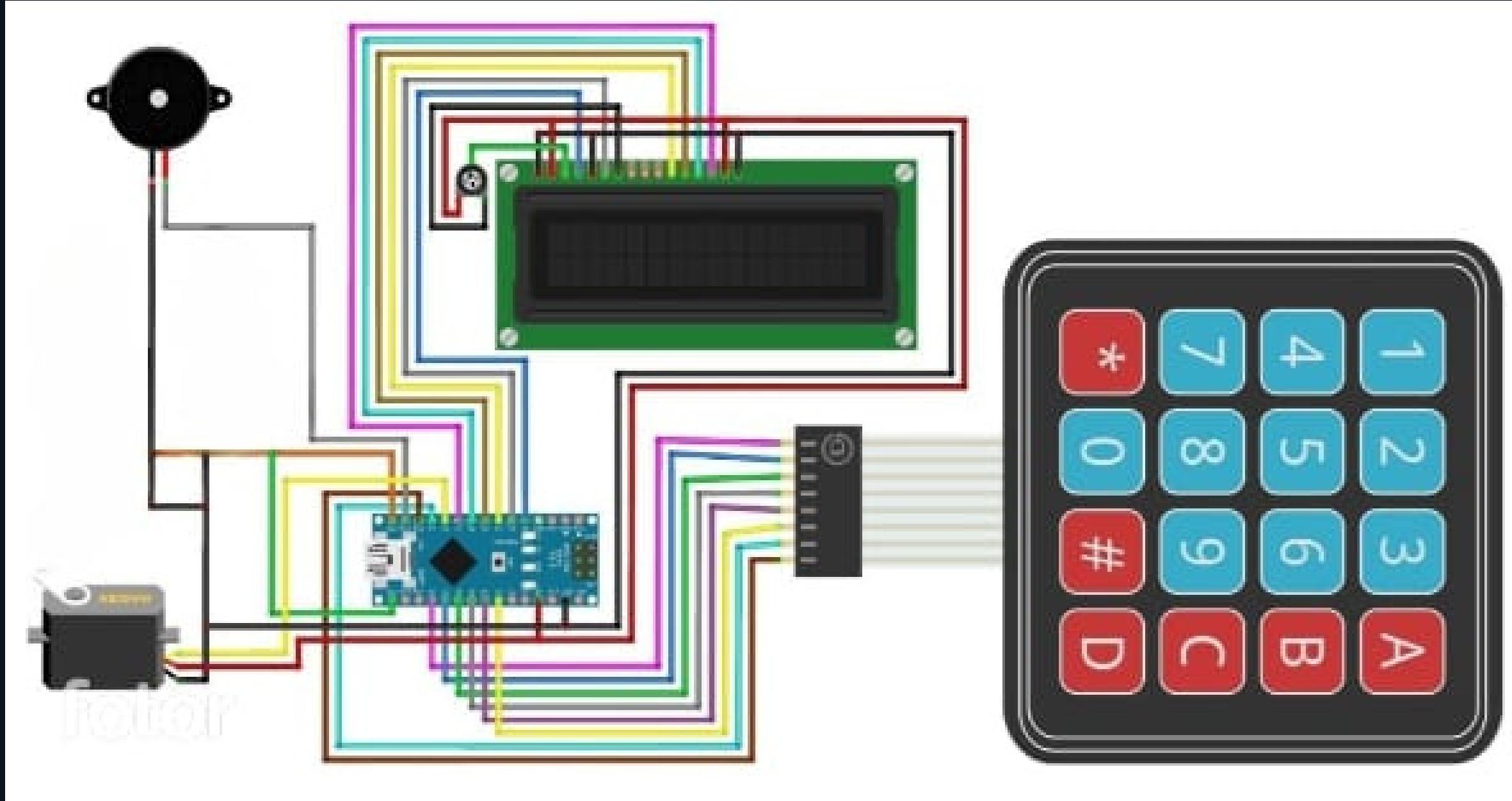


## PHOTOS OF THE PROJECT





# CIRCUIT DIAGRAM

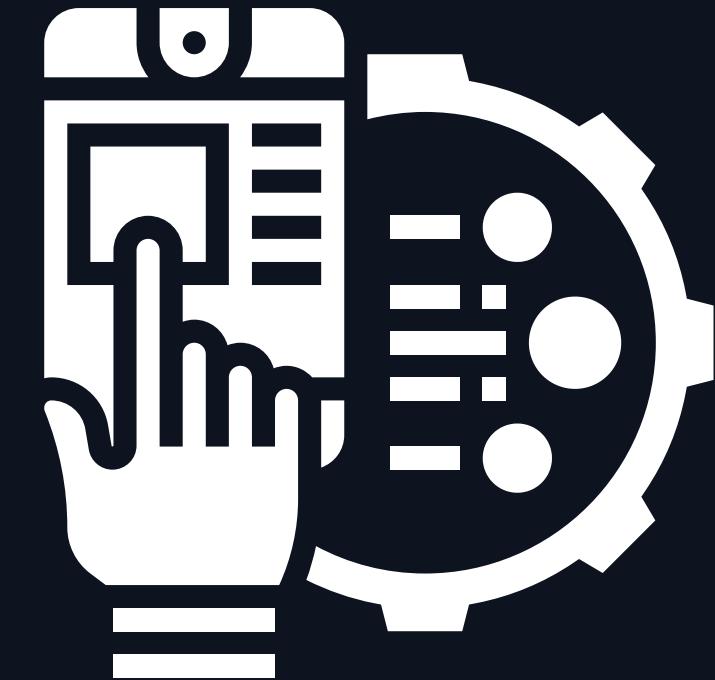




# WORKING PRINCIPLE

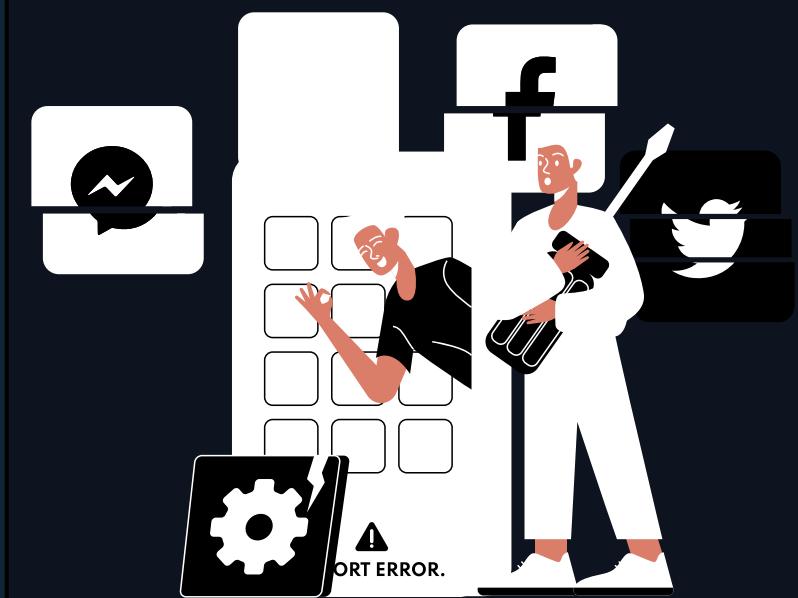


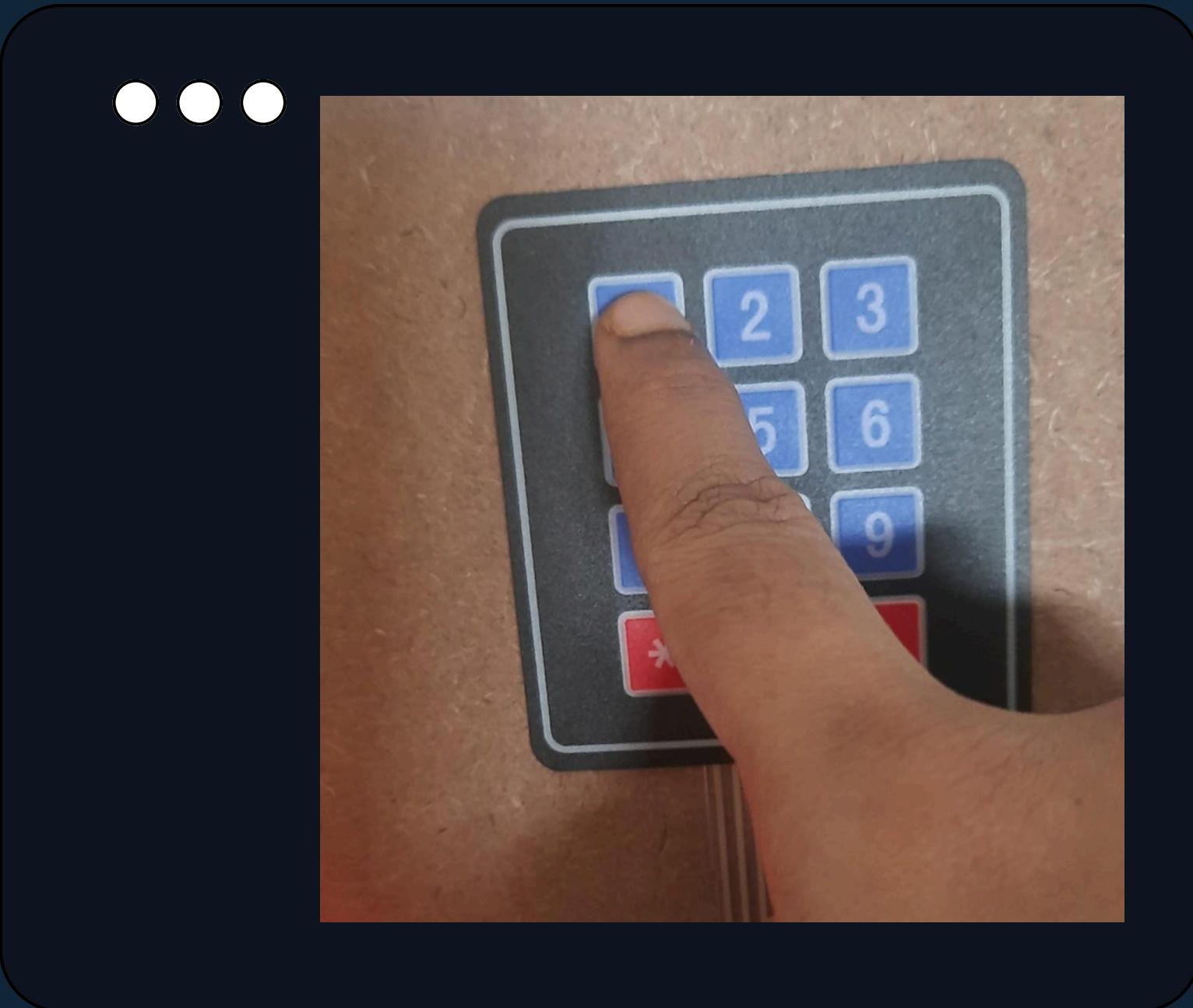
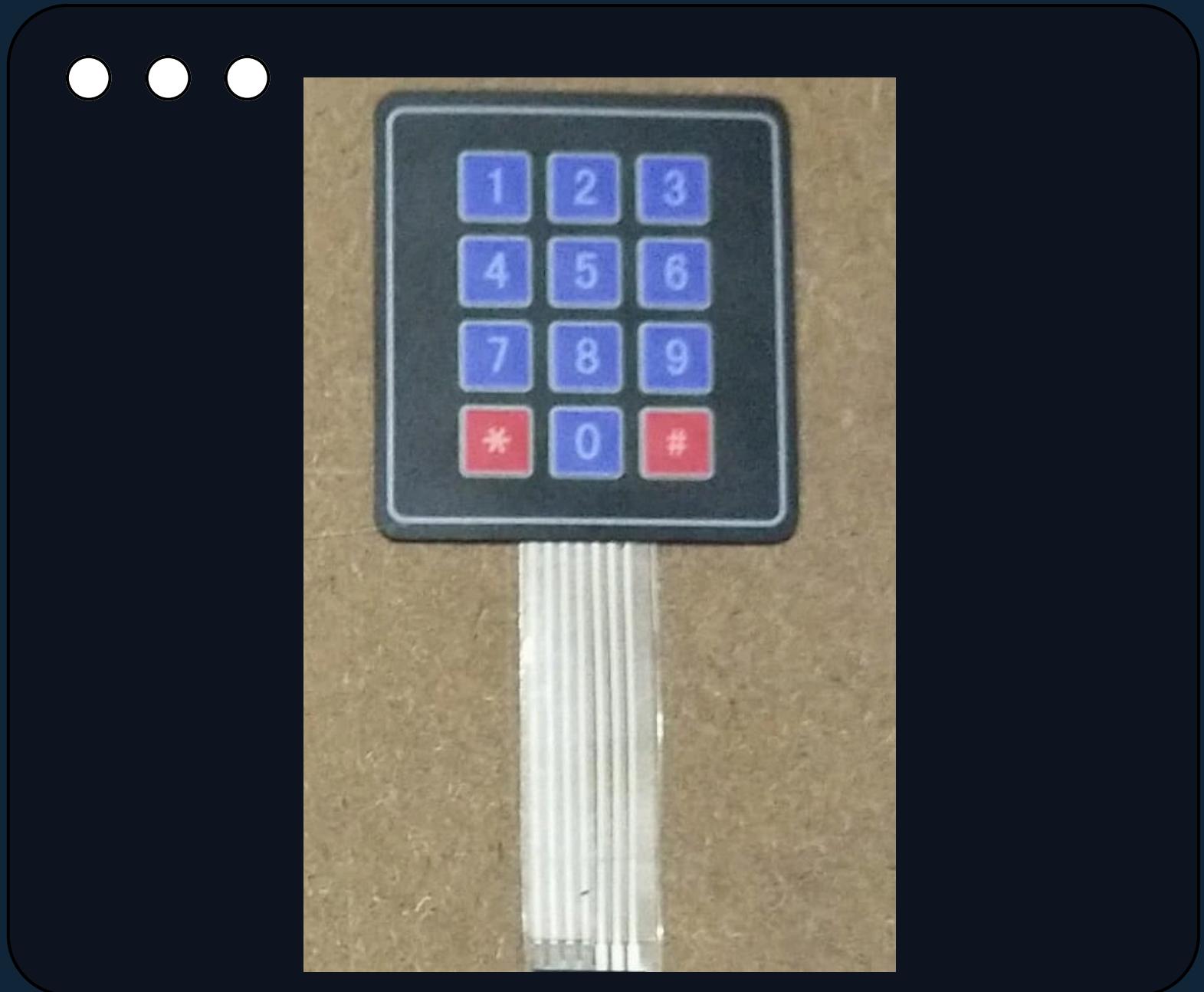
- The user enters a PIN on the keypad or uses a voice command via Arduino Bluetooth Control app.
- The Arduino Uno processes the input and checks if it matches the stored password.
- If the input is correct, the relay module is activated, unlocking the solenoid lock.
- The LCD display shows system status, and the buzzer provides alerts for successful or failed attempts.
- After a set time, the system automatically relocks, ensuring security.



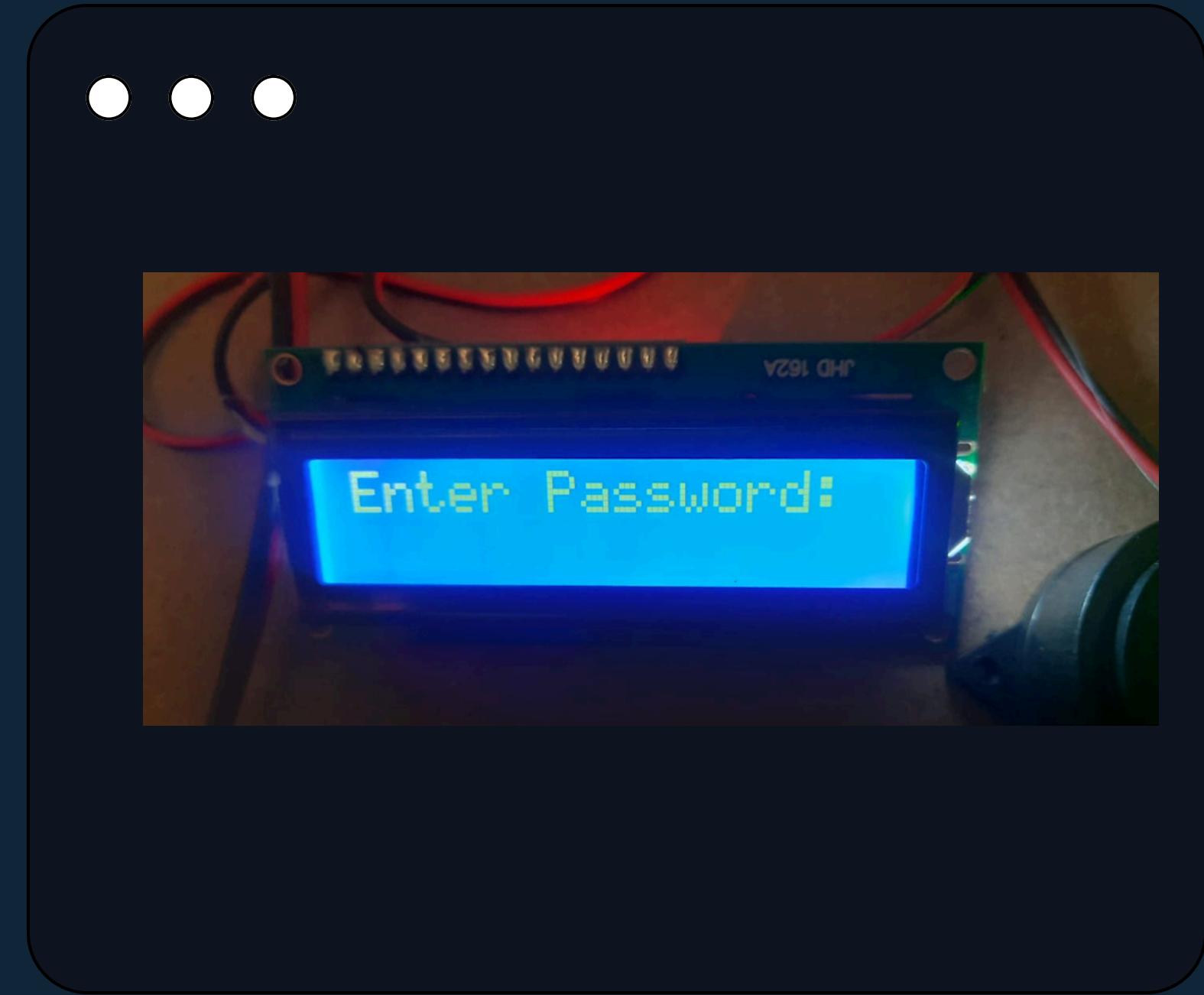
WORKING DEMO

USING KEYPAD

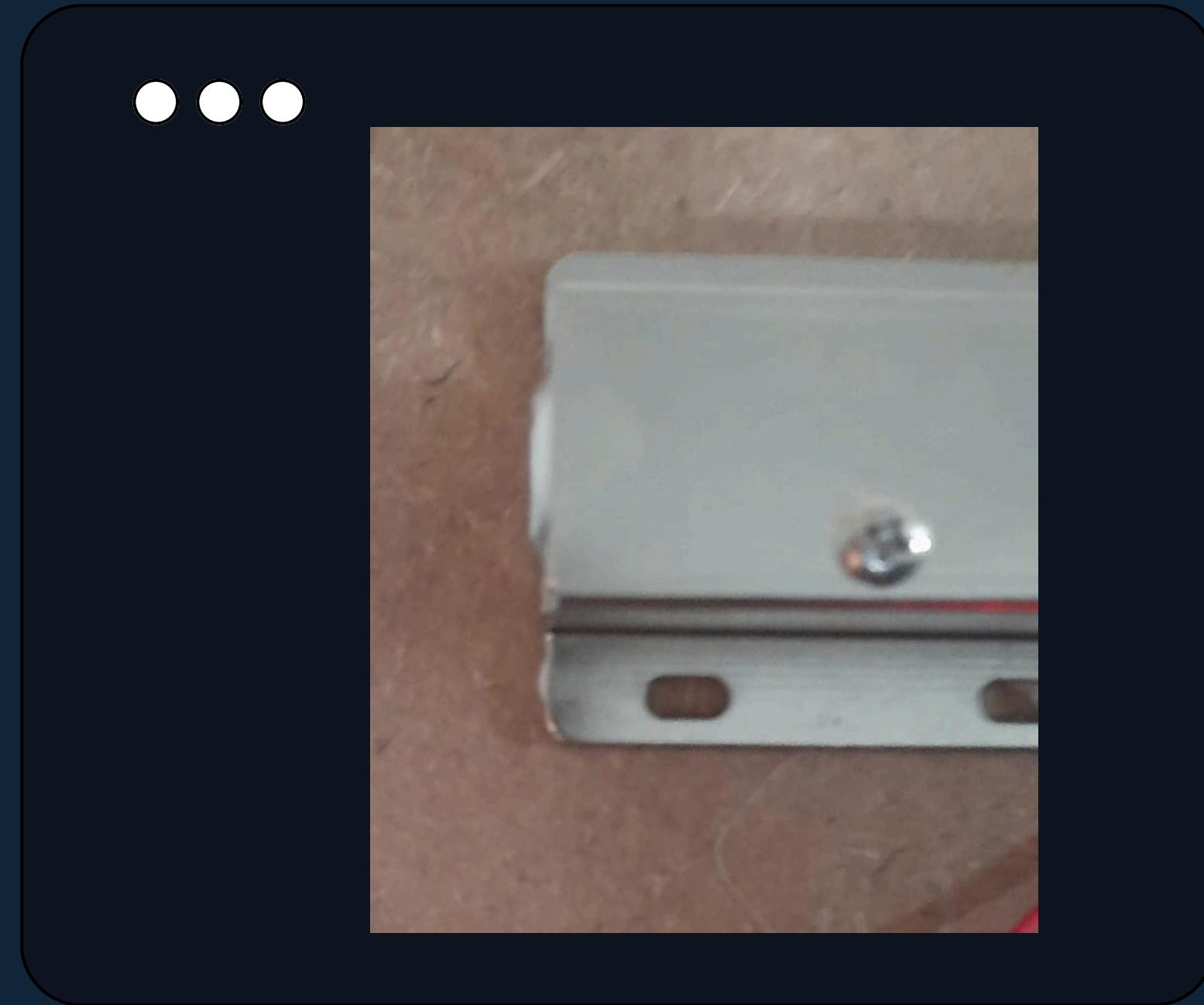
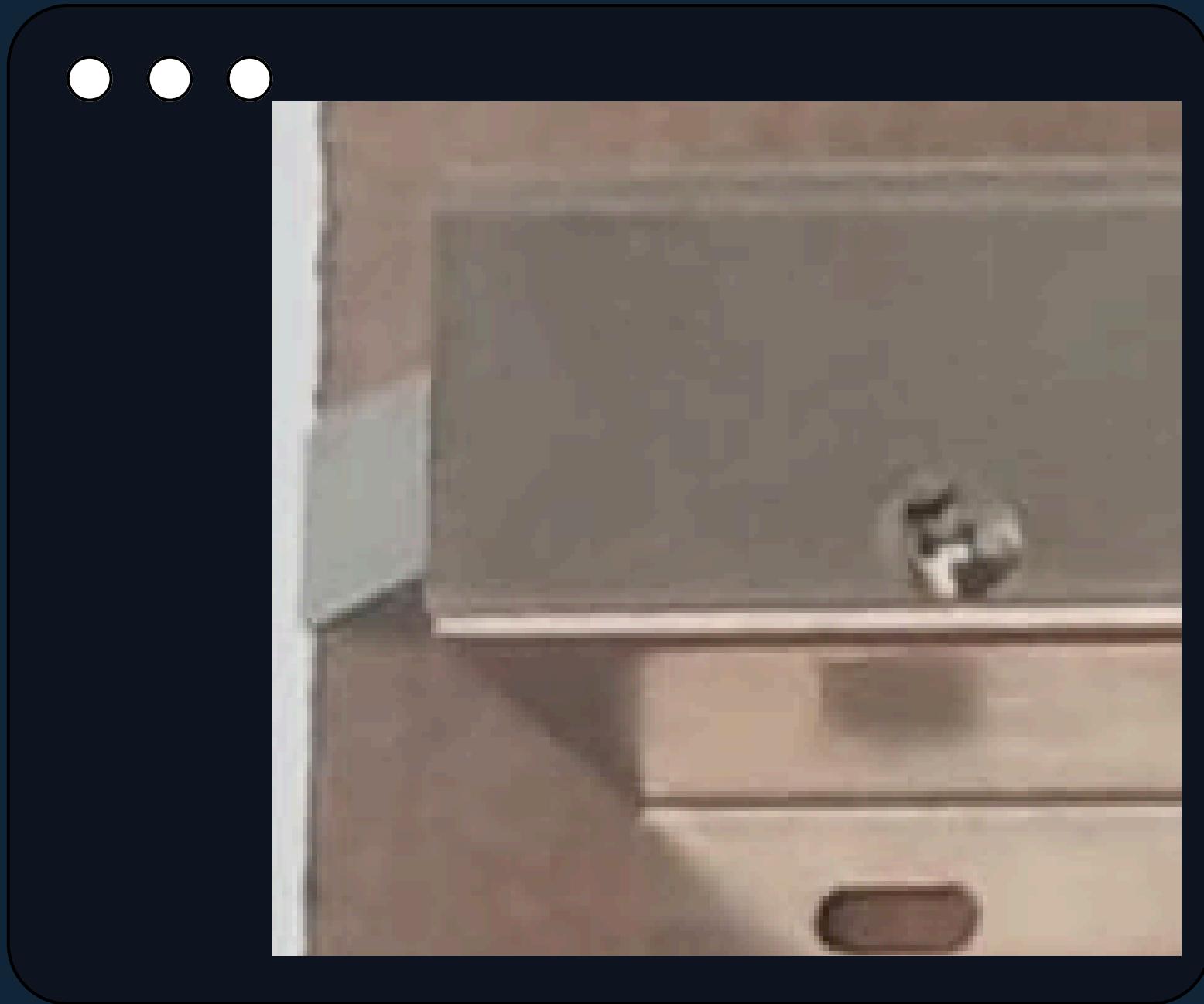




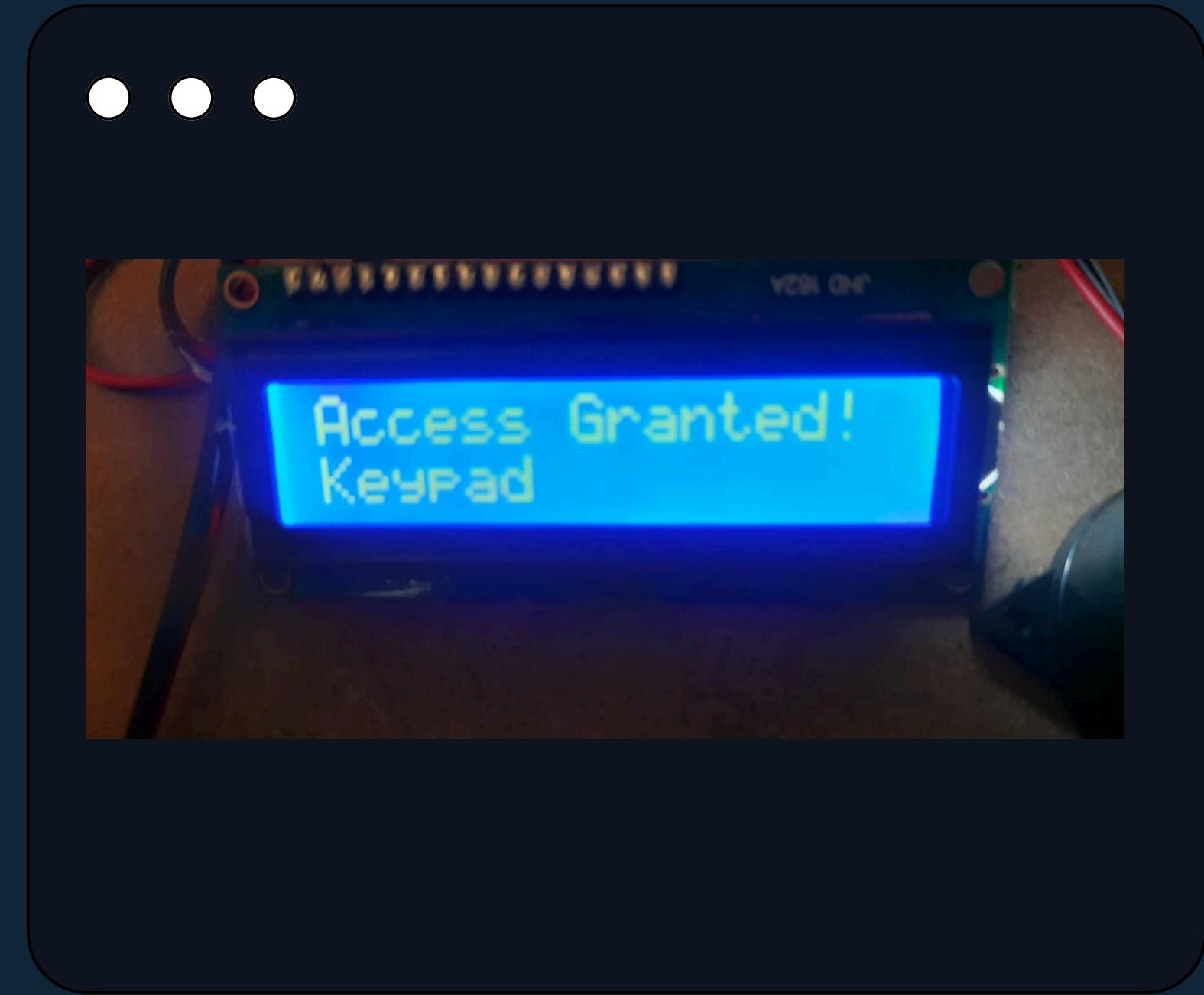
STEP 1 . The user enters a PIN on the keypad



STEP 2 . A 16x2 LCD Display shows the password being entered



STEP 3 . The Solenoid unlocks after entering the right pin



STEP 4 . A 16x2 LCD Displays the access has been granted using Keypad.



STEP 5 . The Solenoid Locks itself after specified or mentioned time.

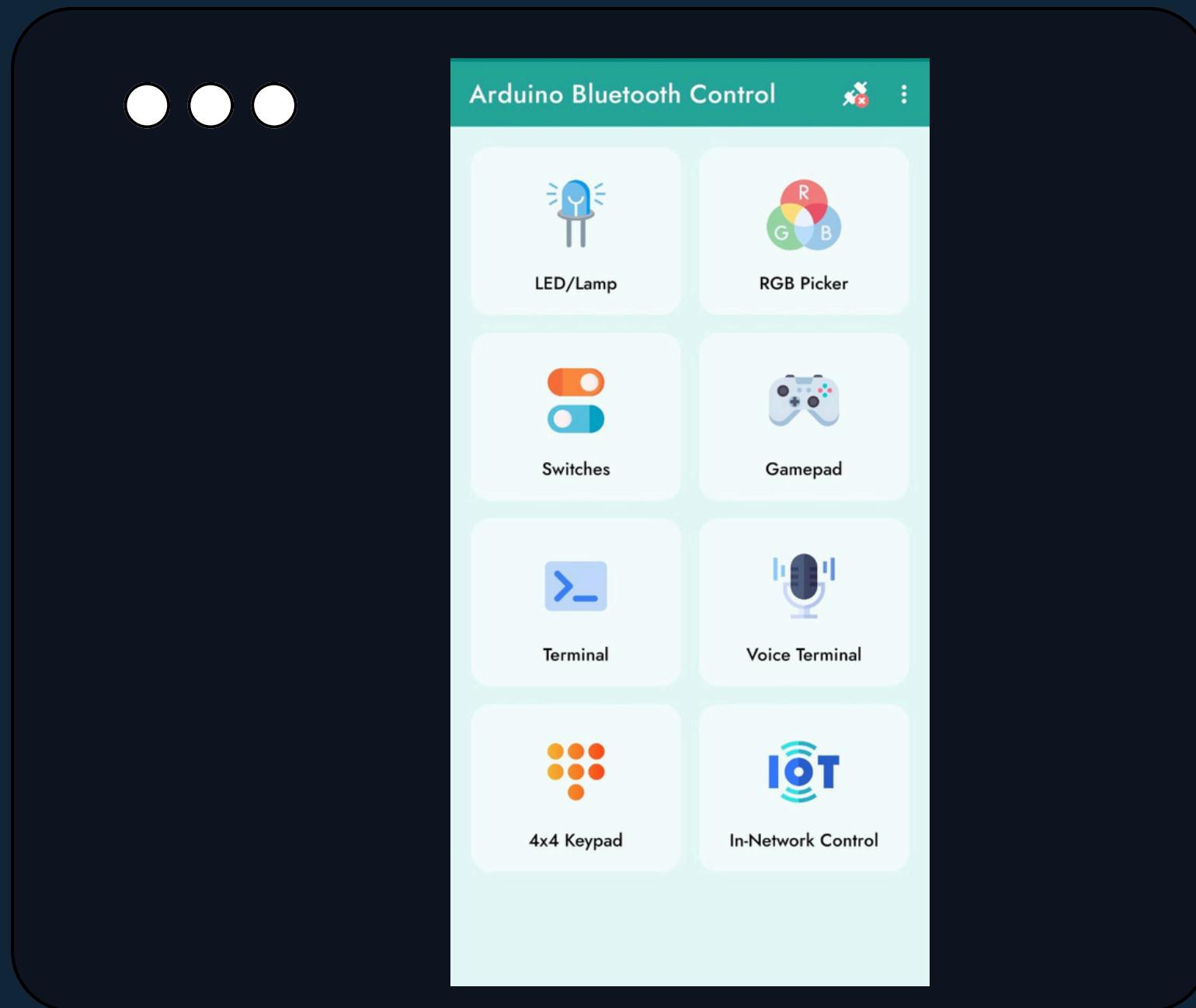
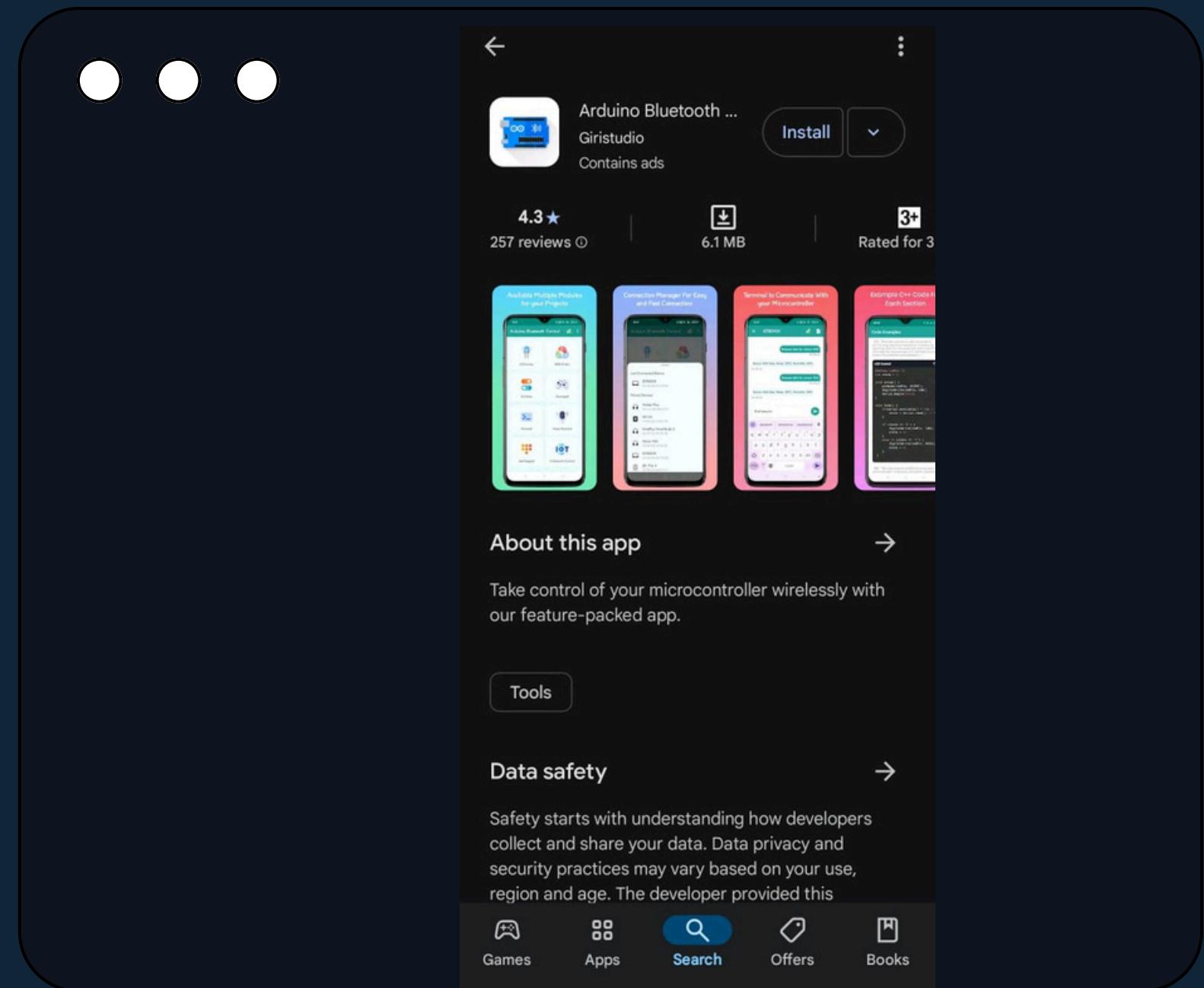


# WORKING DEMO

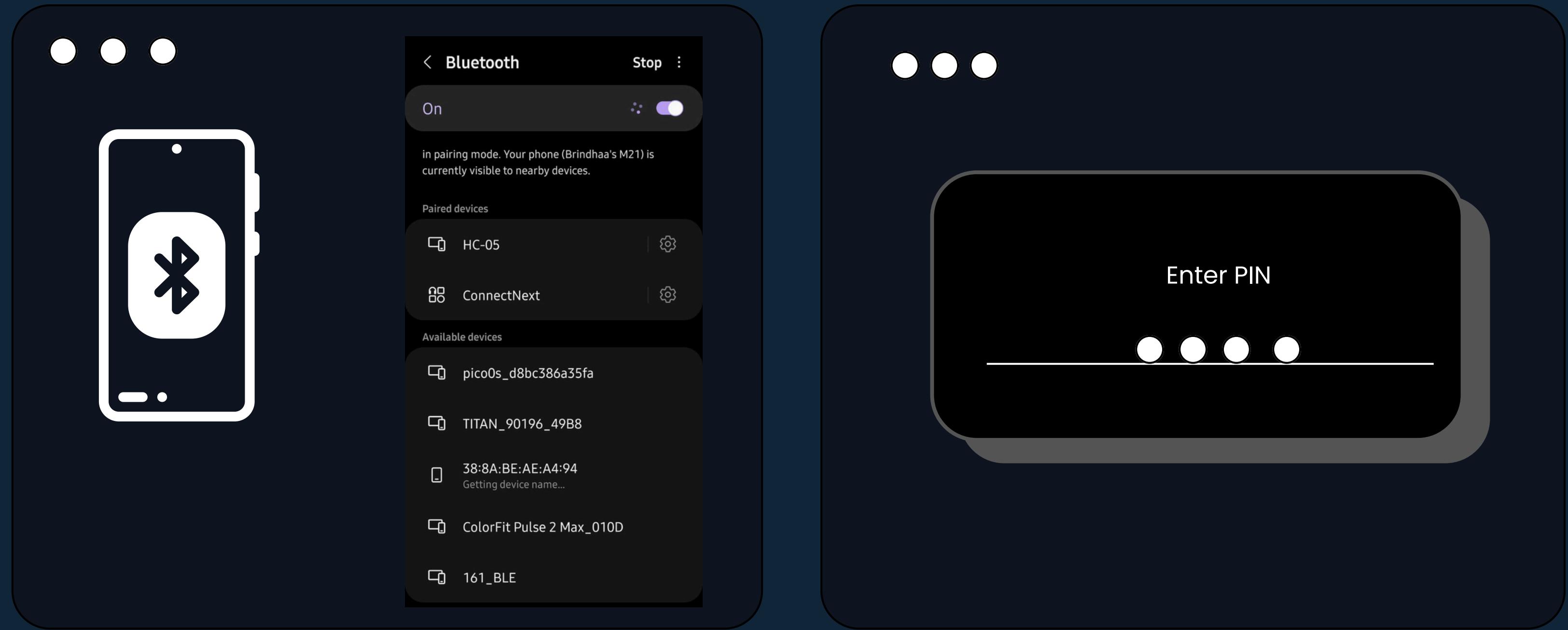


USING VOICE CONTROLLER

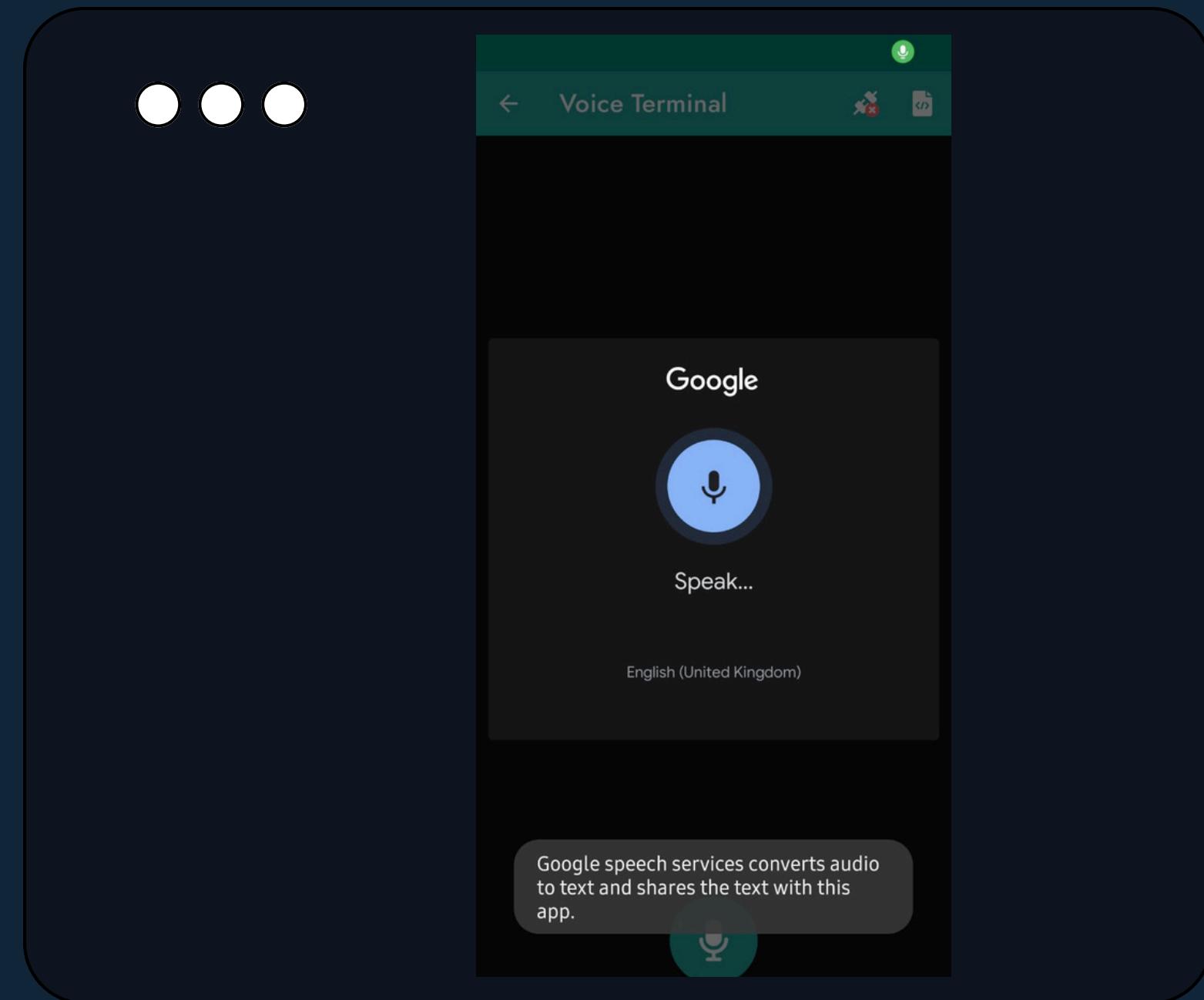
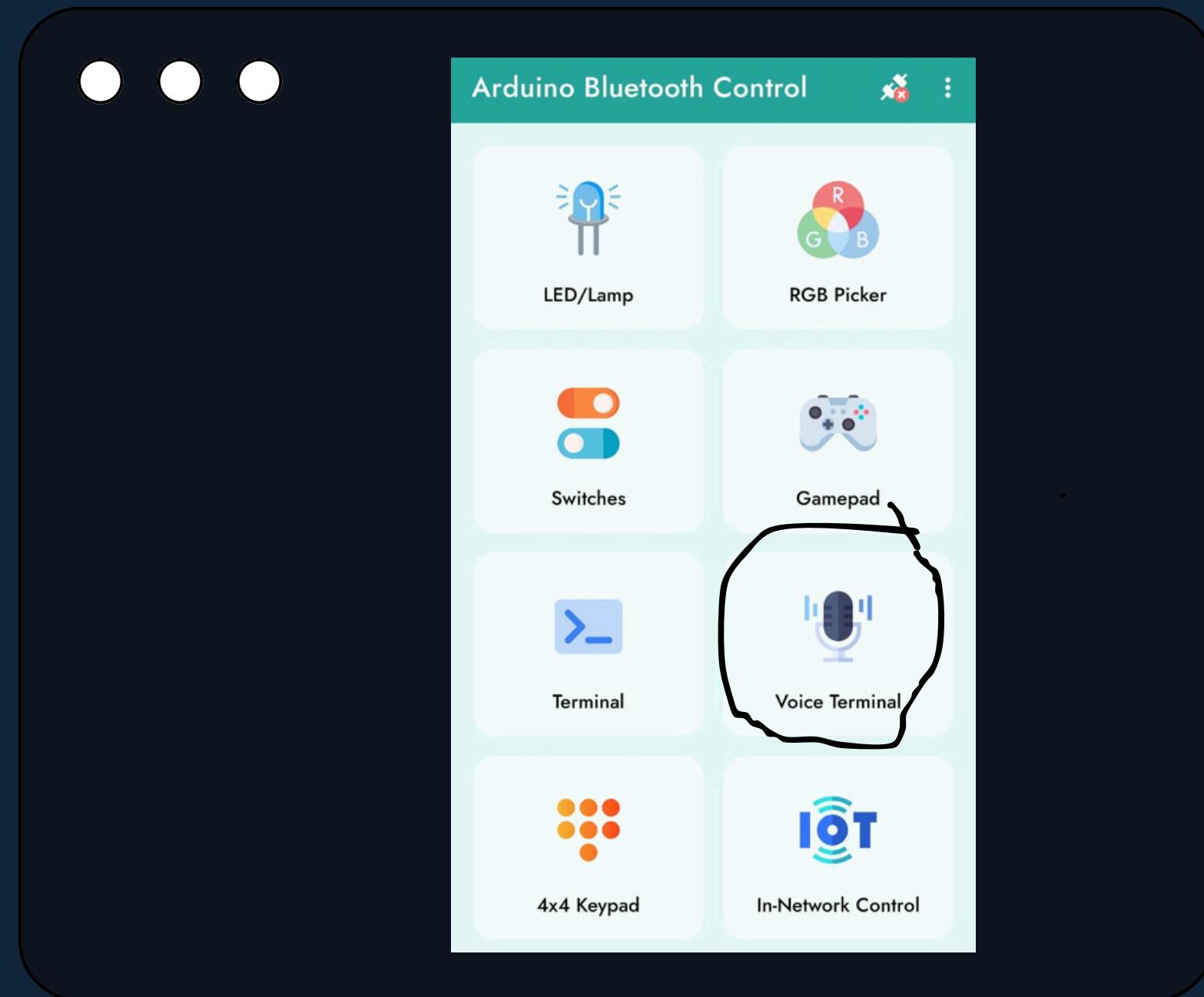




STEP 1 . Install the “ARDUINO BLUETOOTH CONTROL” App



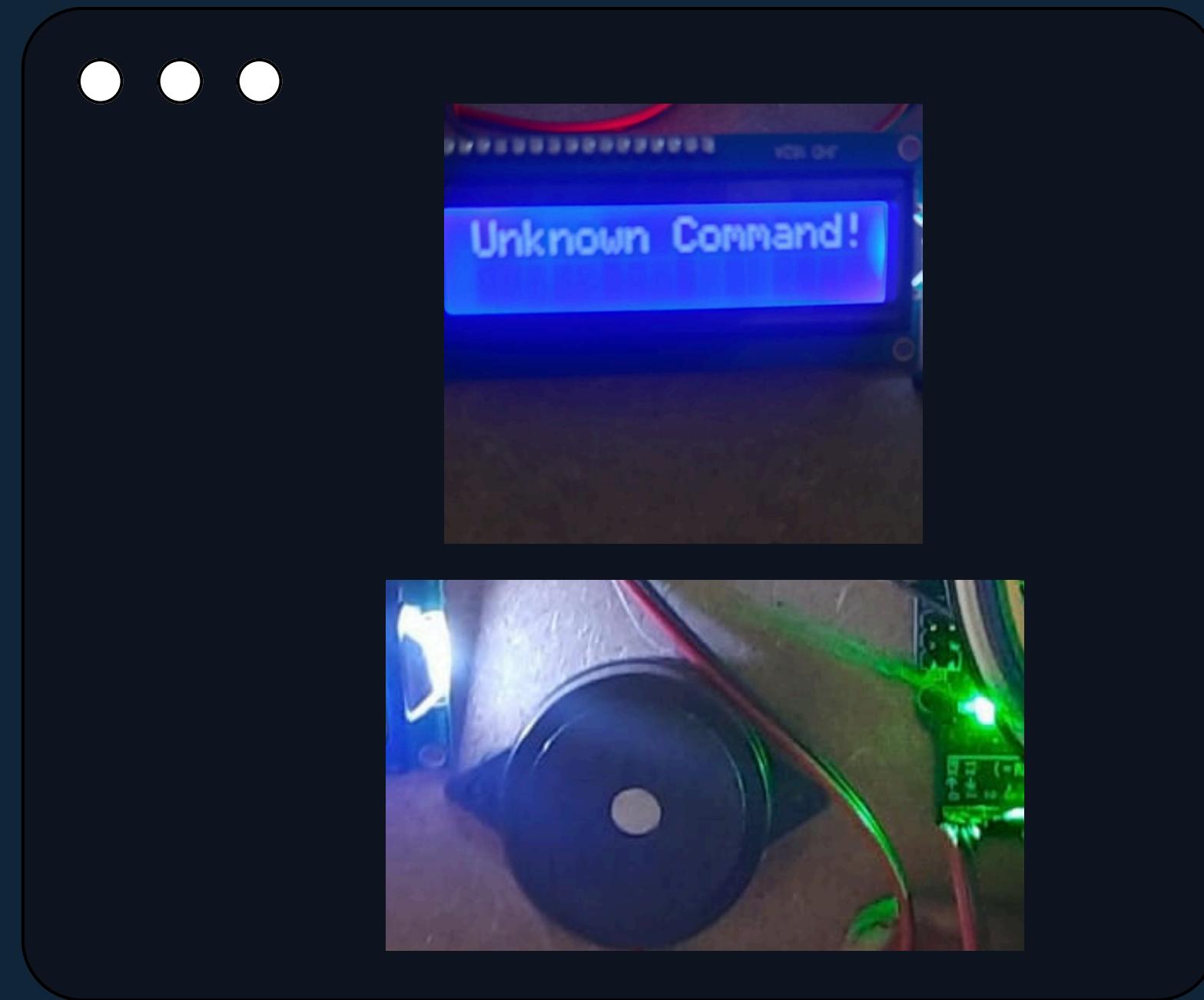
STEP 2 . Connect the mobile Bluetooth with the HC-05 Bluetooth Module.



STEP 3 . Open the voice terminal in arduino bluetooth control app and give the command



STEP 4 . The door is unlocked through Bluetooth and closes after few seconds.



STEP 5 . If unknown passkey or command is given buzzer produces sound and displays.

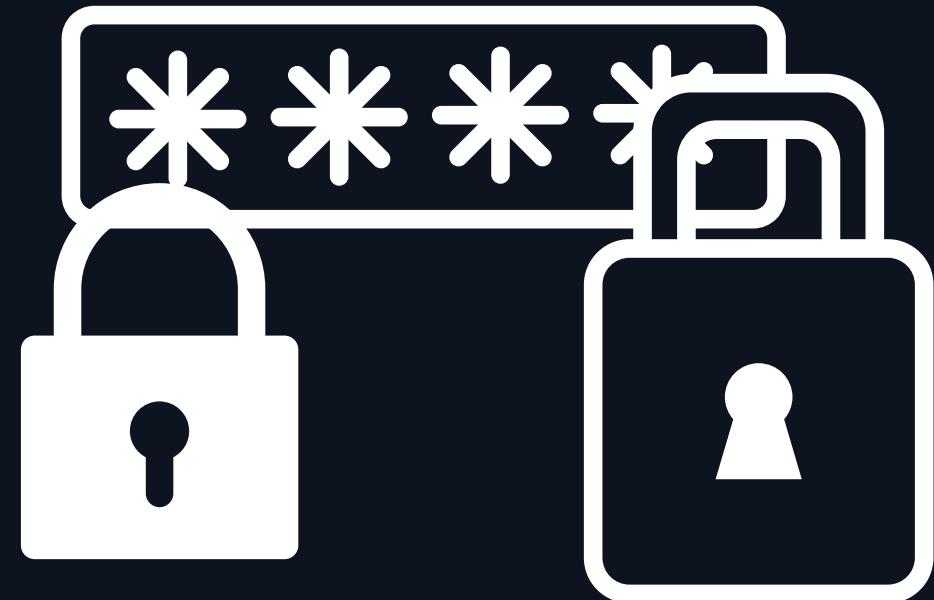


FINAL PROJECT .



# ADVANTAGES

1. Can unlock using PIN or voice command – Users can enter a PIN on the keypad or use a voice command through voice Assistant, making it more flexible.
2. Hands-free operation with Google Assistant – Voice control allows users to unlock the door without touching the keypad.
3. Auto-relocks after some time for security – The system automatically locks the door after a set time, preventing it from being left open accidentally.
4. Easy to use with LCD and buzzer alerts – The LCD displays status messages, and the buzzer gives alerts for incorrect PINs or successful unlocking.
5. Suitable for homes and offices

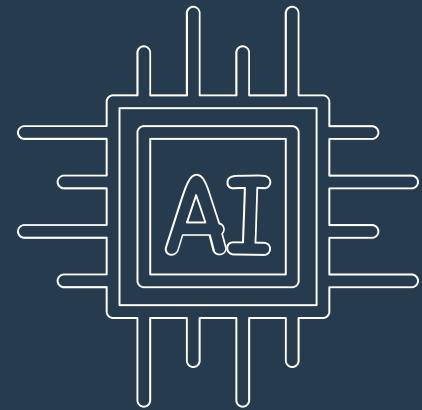




# FUTURE ENHANCEMENT



- IoT Integration – Connecting the system to the Internet for remote access and real-time monitoring via a smartphone app.
- Cloud-Based Security – Storing access logs securely in the cloud for better tracking and analytics.
- AI-Powered Authentication – Using AI to detect voice patterns and prevent unauthorized access.
- Biometric Enhancements – Adding fingerprint or facial recognition for multi-layer security.
- Smart Home Compatibility – Integrating with home automation systems like Alexa and Apple HomeKit.
- Wireless Communication Upgrades – Replacing Bluetooth with Wi-Fi for better range and reliability.
- Battery Backup Solutions – Implementing low-power modes or backup batteries to ensure continuous operation.





# CONCLUSION

The Smart PIN Lock System combines PIN entry and voice control, offering a secure and convenient way to unlock doors. Its automatic relocking enhances security, making it ideal for homes and offices. While power dependency and Bluetooth range are limitations, its ease of use and dual authentication make it a reliable alternative to traditional locks. With improvements like remote access, it can become an even more advanced security solution.





Lock

Protect

Data

Threat

Security

Attack

KeyPad

Voice

# THANK YOU

Stay Safe, Stay Secure

Secured



Protected

Unlocked

