

MULTIMEDIA UNIVERSITY

CYPHER

Smart Home Security System

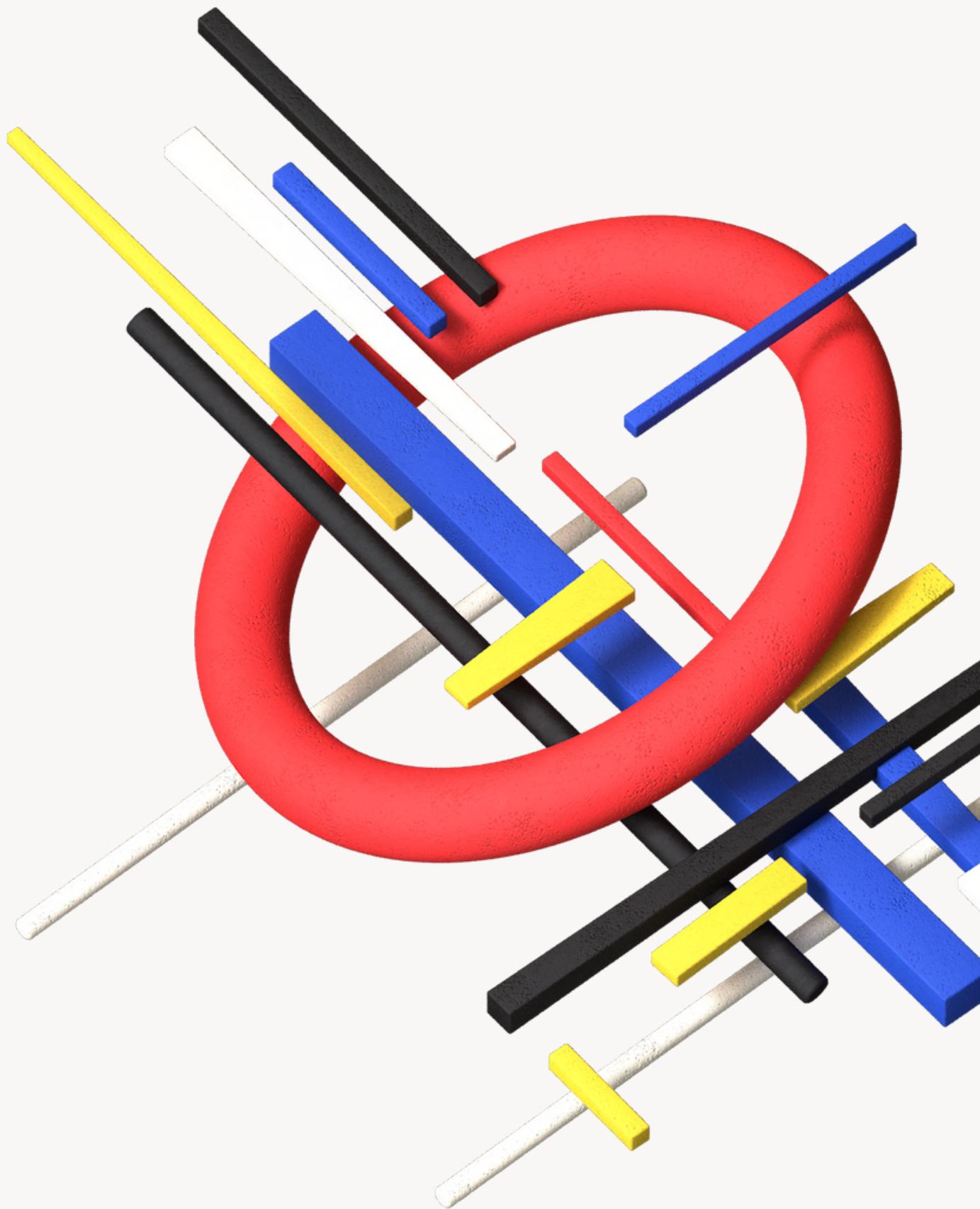


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Introduction

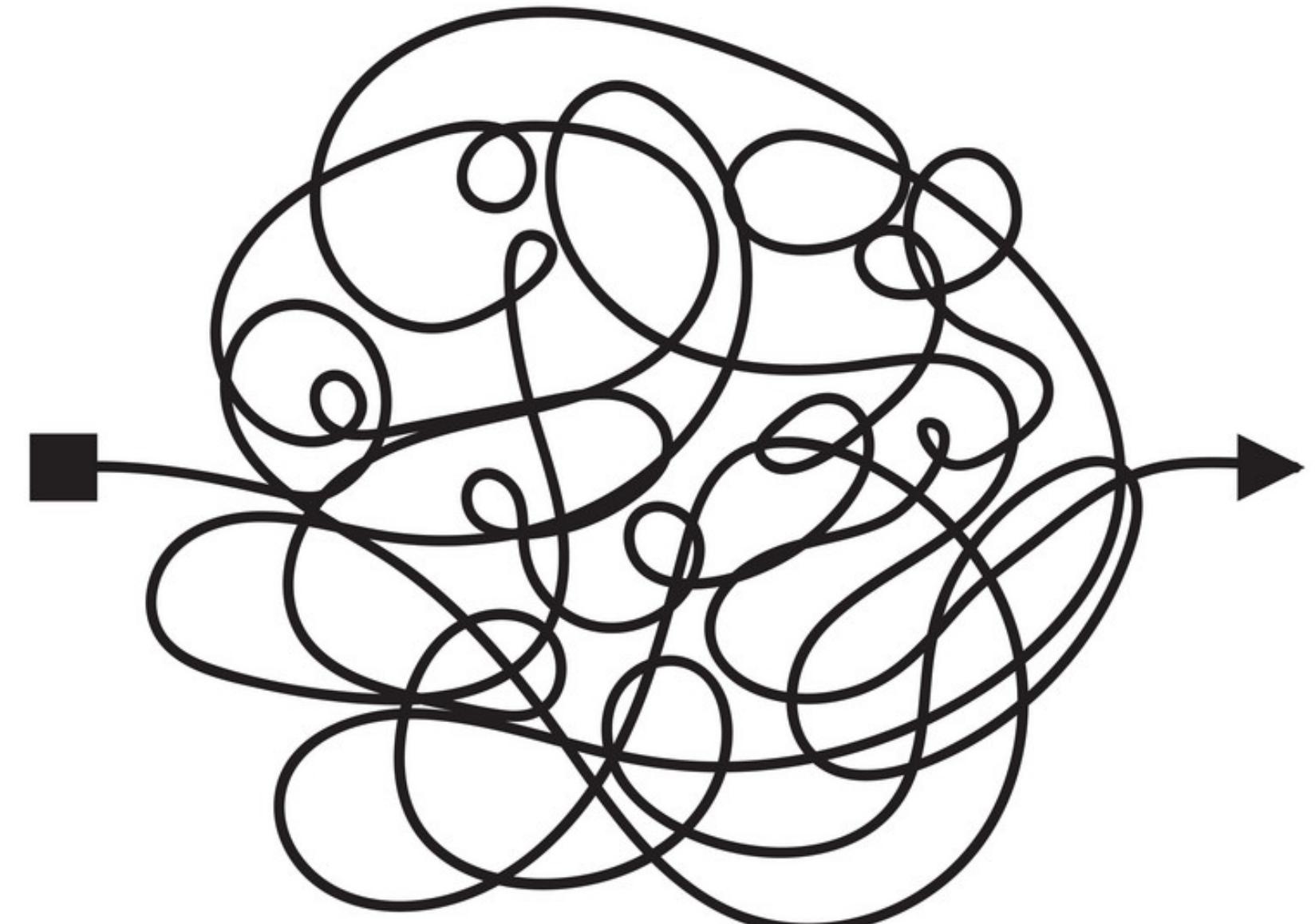
Technology now has a greater impact on many aspects of our lives and Security has been the most challenging task in recent years. The purpose of this project is to design Home Monitoring and Security System. This project consists of building the software part, the hardware part, software-hardware interface and output access via internet and mobile app. The smart lock technology is gradually replacing traditional locks due to its convenience and inexpensive cost.

This system includes a IR temperature sensor, an ultrasonic sensor, a fingerprint sensor, a mobile application, a buzzer, a door lock, a LCD, a microcontroller (NodeMCU) with a Wi-Fi module (ESP8266), and a cloud-based application that allows users to securely track their home in real-time from anywhere on the Internet.



Problem statement?

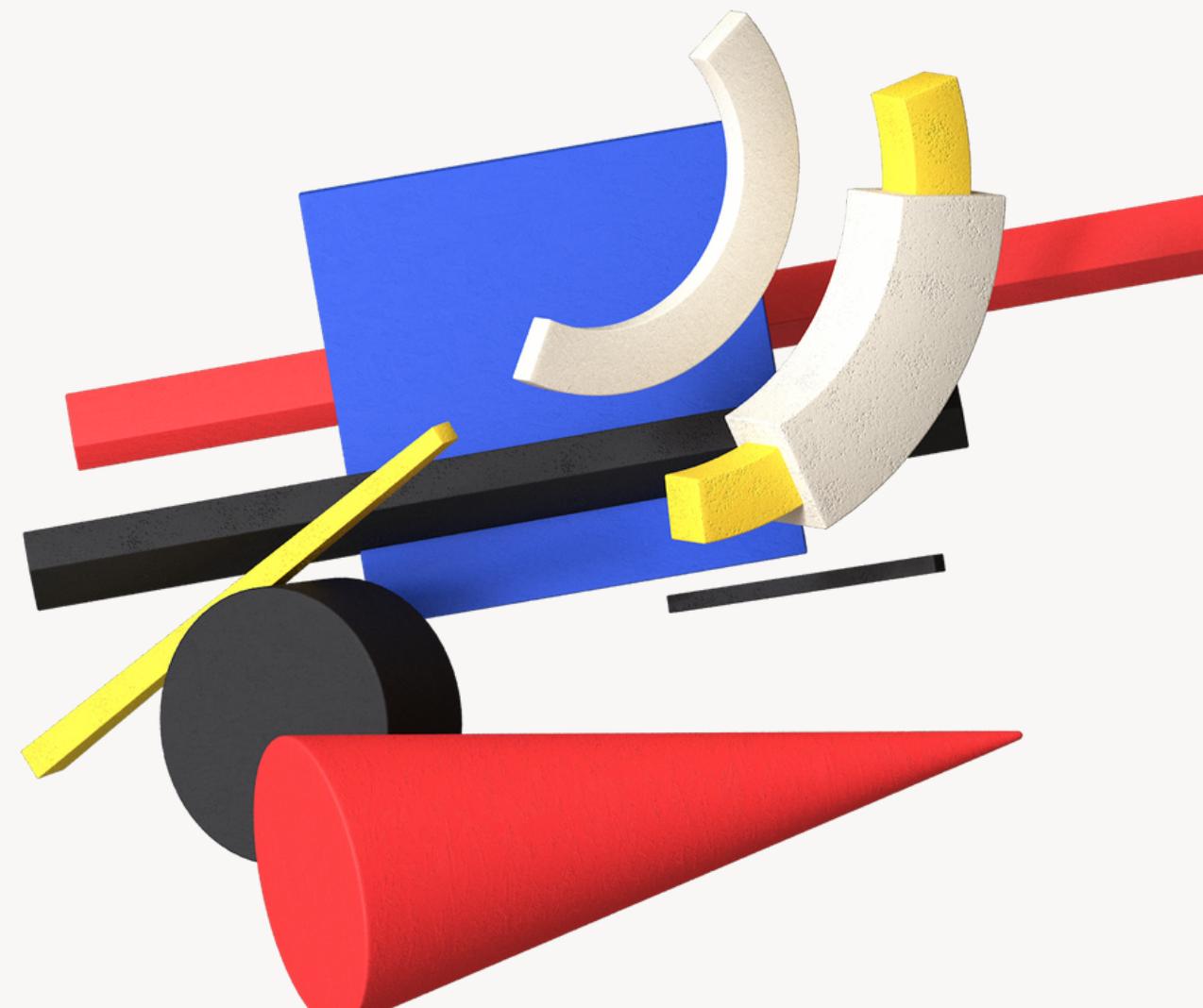
Homeowners are not aware of how vulnerable they are to intruders or robbers. Our homes are where we keep our belongings and money. Indeed ,we can never be certain that they are secure . When we leave the house or go to bed, we frequently lock the doors. However, simply closing the door is not enough, we need to know if someone is trying to break in or if they are simply passing through. And why aren't the homeowners notified when the alert is raised for it?



Objectives

Why Cypher?

- To build a home security system which will have the capability to alarm / notify the user or homeowner through notification on phone and to call the police station if needed.
- To develop an efficient IoT system that will give full access to the user to be able to real-time monitor the home remotely as well as control sensors present in the home.
- To give user a higher and more personal security system based on biometric system, fingerprint lock.
- To be able to remotely unlock your home's lock over the phone.
- To provide a prototype of low-cost home security system without a monthly fee.



A. Ramkumar, T. Vaigaiselvam, S. Rajendran, S. Saravanavel, A. Kamalesh and K. Rajesh, "Android Controlled Smart Home Automation with Security System," 2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), 2022, pp. 1245–1249, doi: 10.1109/ICACITE53722.2022.9823575. (Marwan's)

Problem that the author is addressing:

If you need immediate assistance when alone at home or while your home is being attacked.

Theories/methods/models used:

Application can manage any appliance in your house and the special function is Ultra Panic Mode. First screen is login verification and then can control different devices .The user's information will be sent to the neighborhood and local police stations when the panic mode is "Enabled." User information such as location and profile information

Results:

Using a smartphone application to turn things like fans and lights on and off and to message with the users details like name and location to the police in an emergency.

Strengths:

- login authentication, so only users can access and monitor the house
- The app have a panic mode to contact police not only to control appliances at home.

weaknesses:

- Customer cannot customize the timing home appliance like from when till when or at sunset.
- using Arduino GSM which need a sim card to connect to internet , send and receive SMS, and make voice calls while can use ESP8266.

S. Lokesh, S. B. Patil and A. Gugawad, "Home Security And Automation Using NodeMCU-ESP8266," 2020 IEEE Bangalore Humanitarian Technology Conference (B-HTC), 2020, pp. 1-6, doi: 10.1109/B-HTC50970.2020.9297917 (Ahmed's)

Problem that the author is addressing:

Users must physically interact with door locks in order to unlock them, hence the current configuration of existing home security systems, such as digital locks, mechanical locks, etc., follows a straightforward scenario. The current system appears to be fairly straightforward and easy to use, but it lacks internet and database connectivity.

Theories/methods/models used:

The biometric Fingerprint sensor is going to be used to determine and recognize the person who is trying to enter the house, if the fingerprint matches the fingerprint in the system, the solenoid lock will be opened, otherwise it will stay closed. All of this process is happening using NodeMCU ESP8266, which sends and update the information into the cloud, and then sent to the application.



Results:

The results are shown in two ways, in the cloud which shows the status of the door, and when the last time the status was changed. In the application, it shows if the lock and other devices are on or off.

Strengths:

- The reliability of the system as the user won't be able to enter the house until the entered fingerprint is matching with one of the fingerprints saved in the system.
- Remotely controlled system.

Weaknesses:

- The continuous operation of the fingerprint sensor uses more energy and shortens battery life.
- There is no records of the users.

S. Sinha, E. H. Teli and W. Tasnin, "Remote Monitoring and Home Security System," 2021 Innovations in Power and Advanced Computing Technologies (i-PACT), 2021, pp. 1-8, doi: 10.1109/i-PACT52855.2021.9696996. (Haneen's)

Problem that the author is addressing:

How can someone monitor their house if they forgot to lock their house before going for work?

Theories/methods/models used:

Design a home security system that will sound a buzzer to alert the neighbours right away if it notices any strange movement. A PIR sensor is used to keep track of the odd motions. The system also includes a mobile application, which receives notifications from the PIR sensor and warns the user via his or her phone. The circuit is connected to the ESP8266 module-based ThingSpeak IoT platform, which can be used to continuously monitor the system.



RESULTS:

When a resident is not at home, the mobile application dashboard screen displays the phrase "HOUSE IS SAFE" informing him that his home is secure.

The buzzer sounds and sends a warning signal when the PIR sensor detects an unexpected movement, and the LED indicator lights to alert the user to the activity.

By alerting about the break-in through pop-up and push notification with the word "BREAK IN ALERT," the mobile application also reports the status of the home.



Strengths:

- Alert system App indicates the status of the house like “BREAK IN” with the help of a PIR sensor which is used to track the odd motions and buzzer to make sound.
- continual remote home monitoring system to let residents keep an eye on suspicious activity when they're away from home.

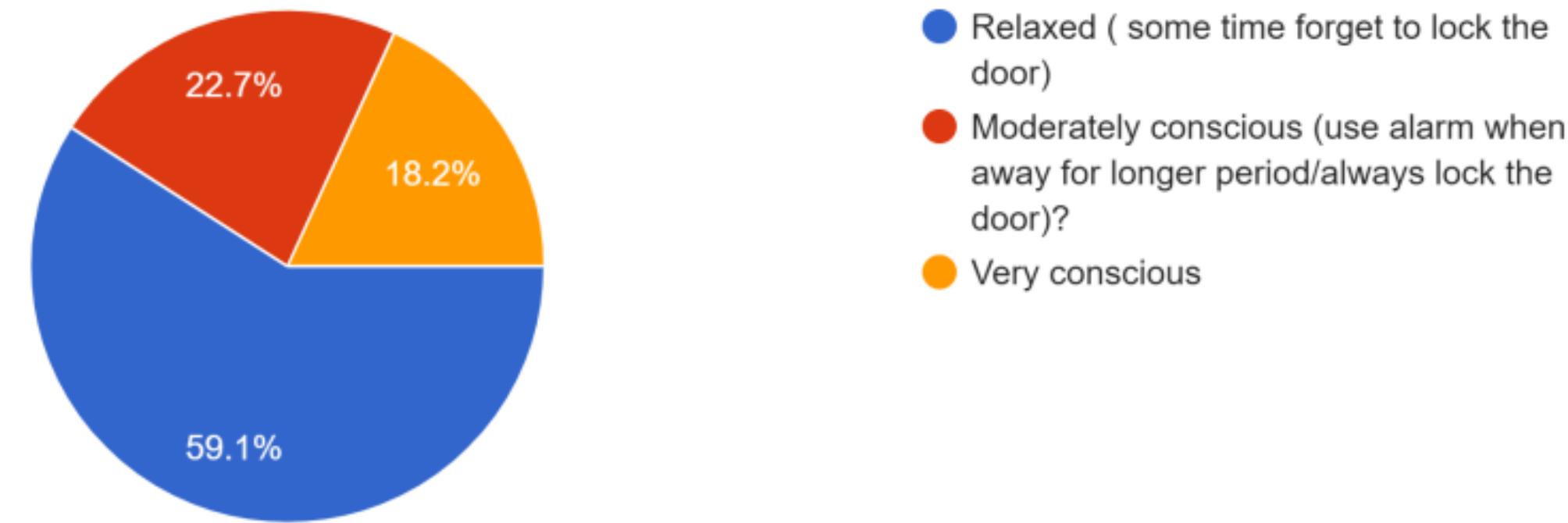
Weaknesses:

As the PIR sensor is very sensitive to any motion as mentioned on the paper it could be a false alarm.

Customer Needs Analysis

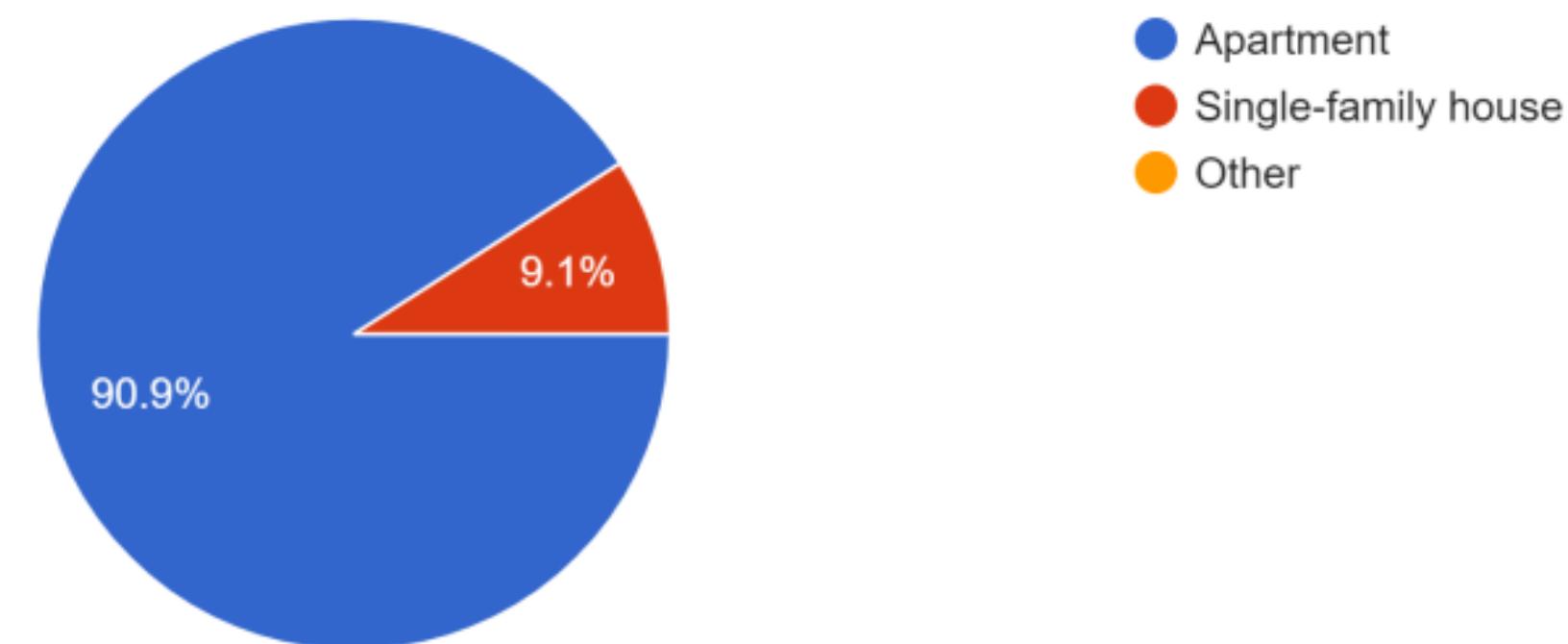
What is your attitude to home security?

22 responses



In which type of housing do you live?

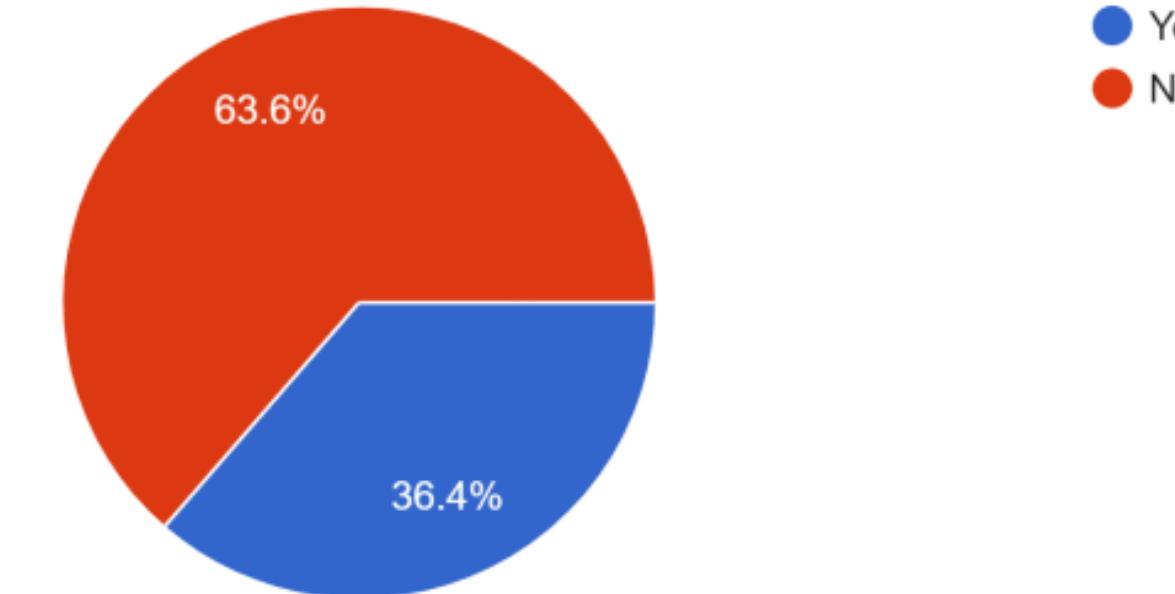
22 responses



Customer Needs Analysis

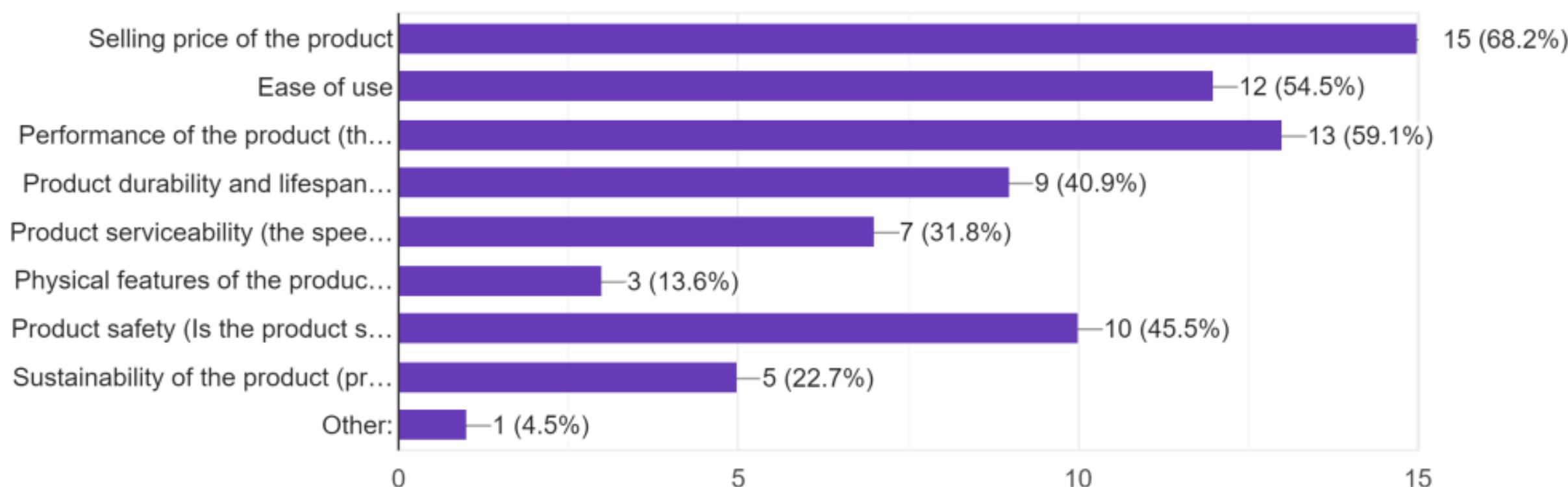
Would you hesitate to buy a smart lock?

22 responses

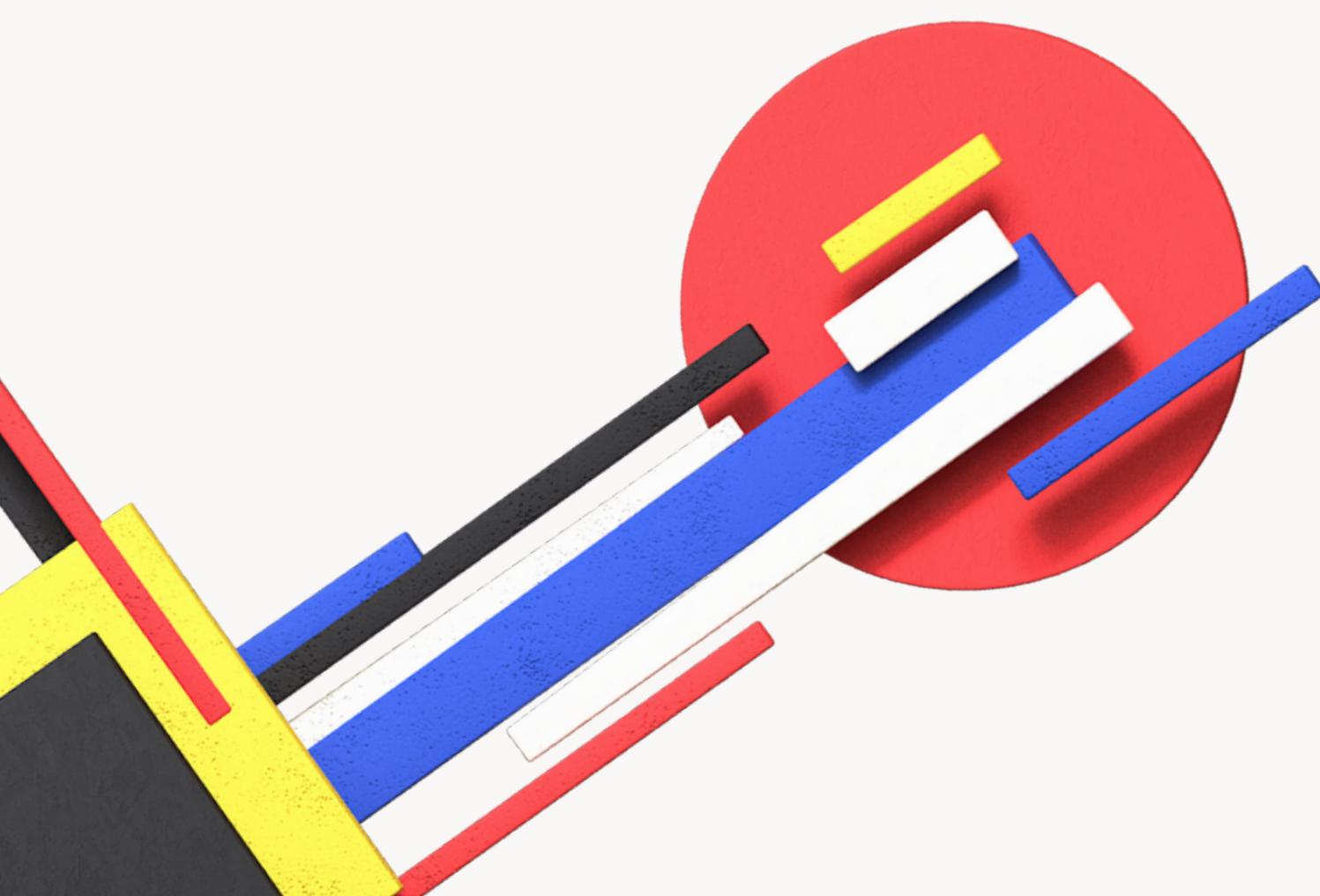


What are the THREE (3) major concerns that will be considered when you purchase or install a product similar to "Cypher"? Please select only THREE (3) concerns from following list.

22 responses



Cypher features

- 
- 1** A full remote control to the system
 - 2** A notification and buzzer alarm when there is something suspicious
 - 3** History list with time and name
 - 4** Easy to use
 - 5** Affordable price

Proposed solution

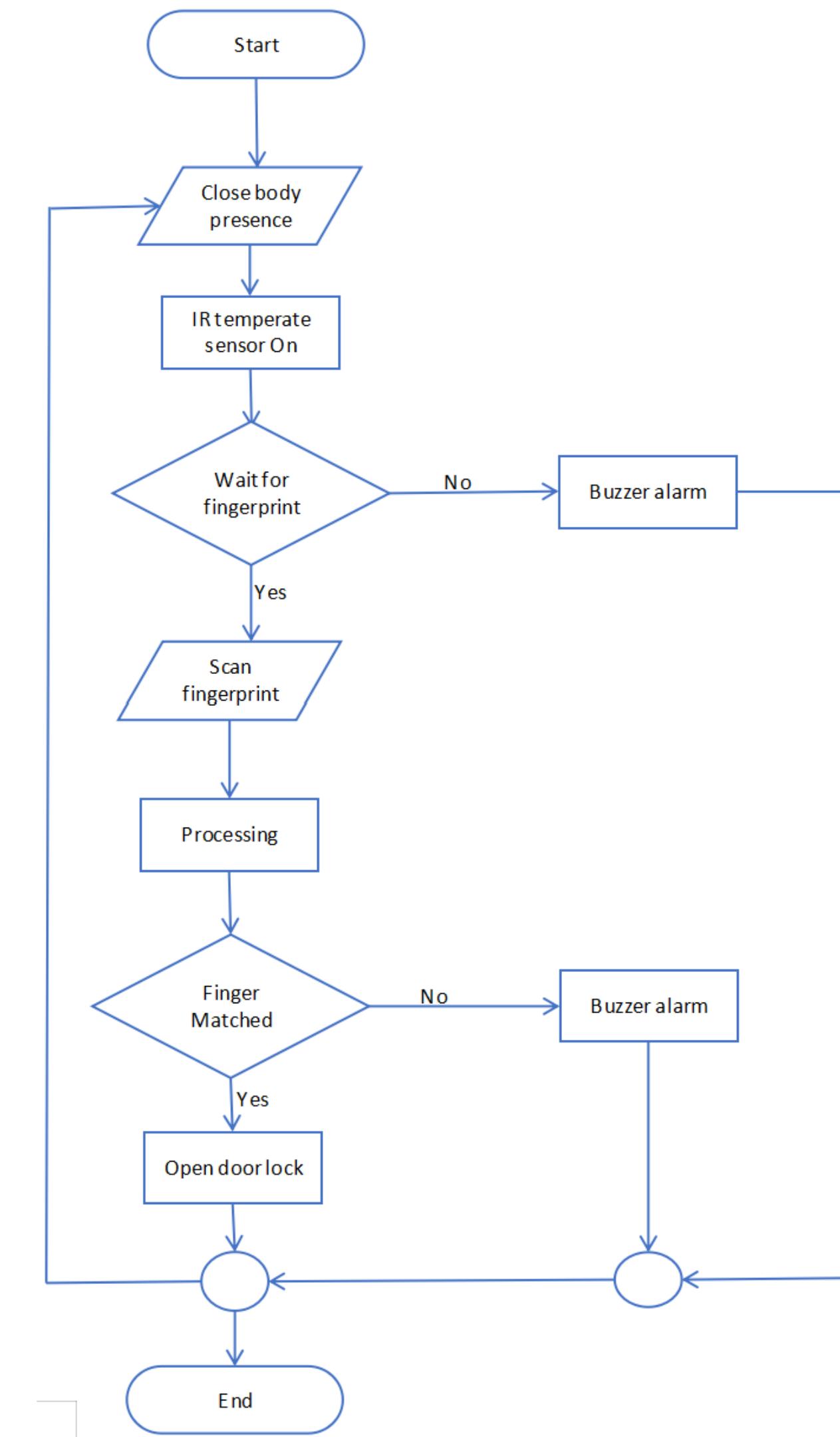
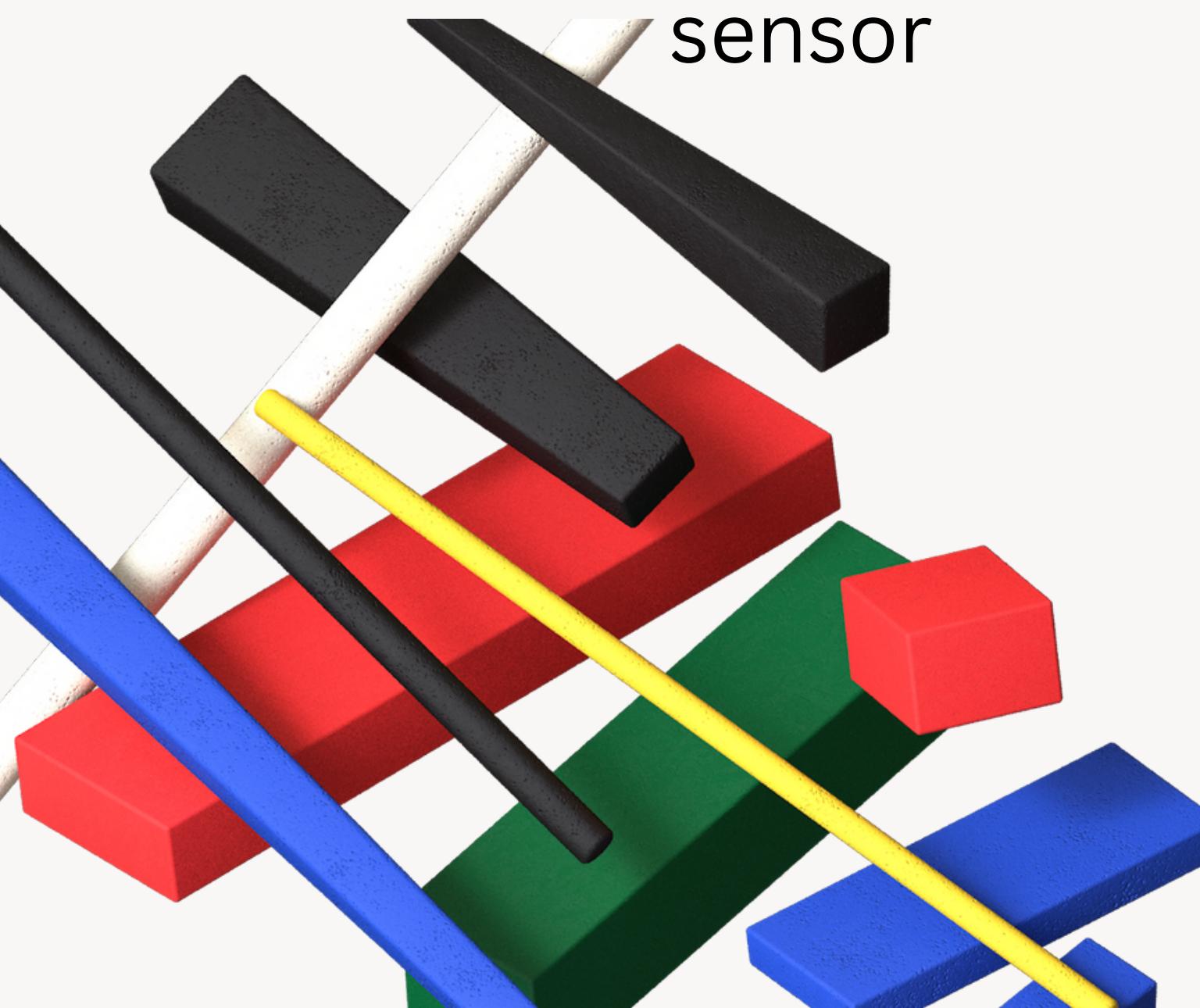
In our project, we'll make use of the Internet of Things(IoT) great ability to monitor, detect, and respond with a microcontroller to give a house an extra layer of security. To give homeowners a greater sense of security by enabling them to use their smartphones to detect any motion outside their homes that might indicate burglars. We'll create a system that monitors time for each activity, notifies the owner, and operates in response to the owner's choices. In order to conserve energy and ensure that only authorised residents can enter by unlocking the door, the home is also guarded by a fingerprint sensor that only activates when movement is detected. When the user returns home, a fingerprint-connected LCD will welcome him. Additionally, buttons will be added to make it easier for the user to add or delete a fingerprint rather than using the Arduino IDE and code.

An IR temperature sensor and an ultrasonic sensor are used to monitor the unexpected movements. The system also includes a mobile application that receives alerts from the IR temperature sensor and ultrasonic sensors and then notifies the user through cell phone as well as the nearby neighbours via buzzer. The Firebase IoT platform, which is linked to the circuit using an ESP8266 module, will be used to continuously monitor the system.

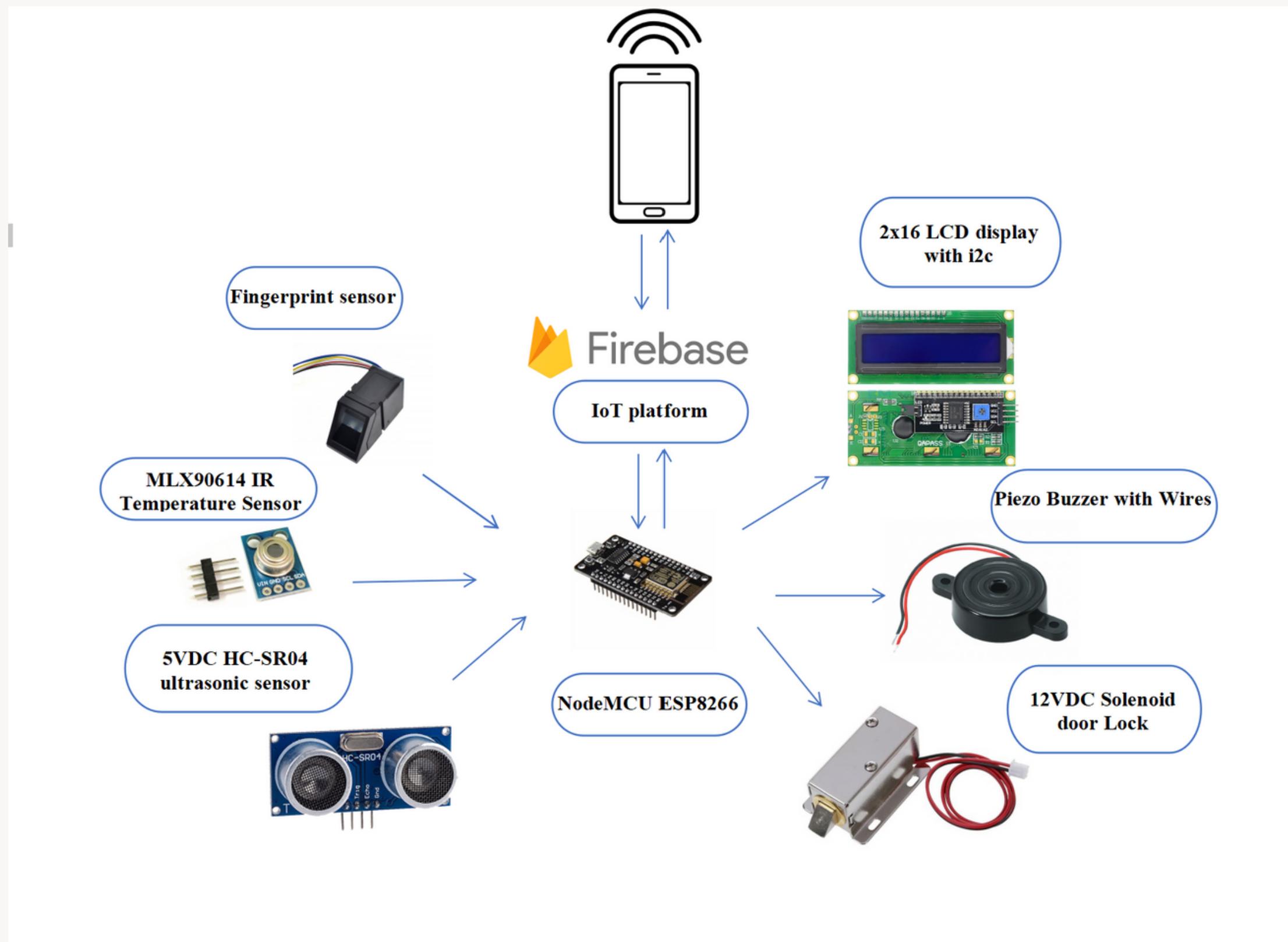
Block diagram

Door lock, Ultrasonic, IR
temperature and Fingerprint

sensor



Our proposed set up

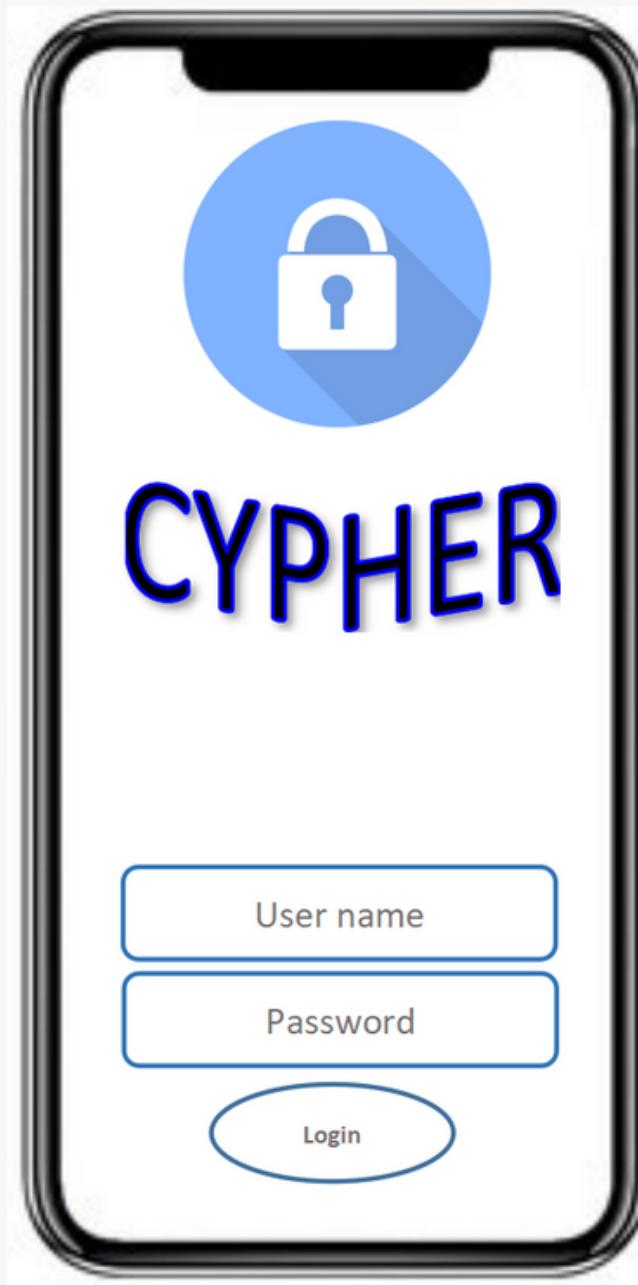


Proposed Methodology

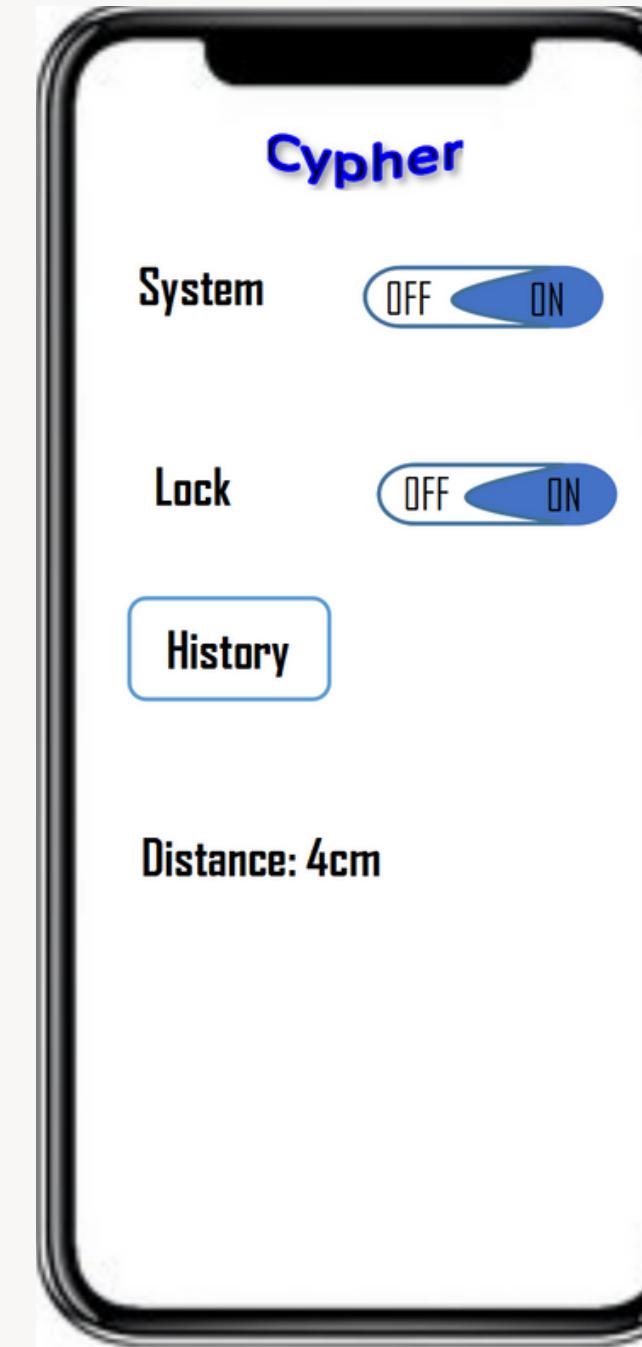
software tools and technologies:

- 1** Android studio
- 2** Visual studio code
- 3** Arduino IDE
- 4** Cloud: Firebase (Realtime Database) - Backend

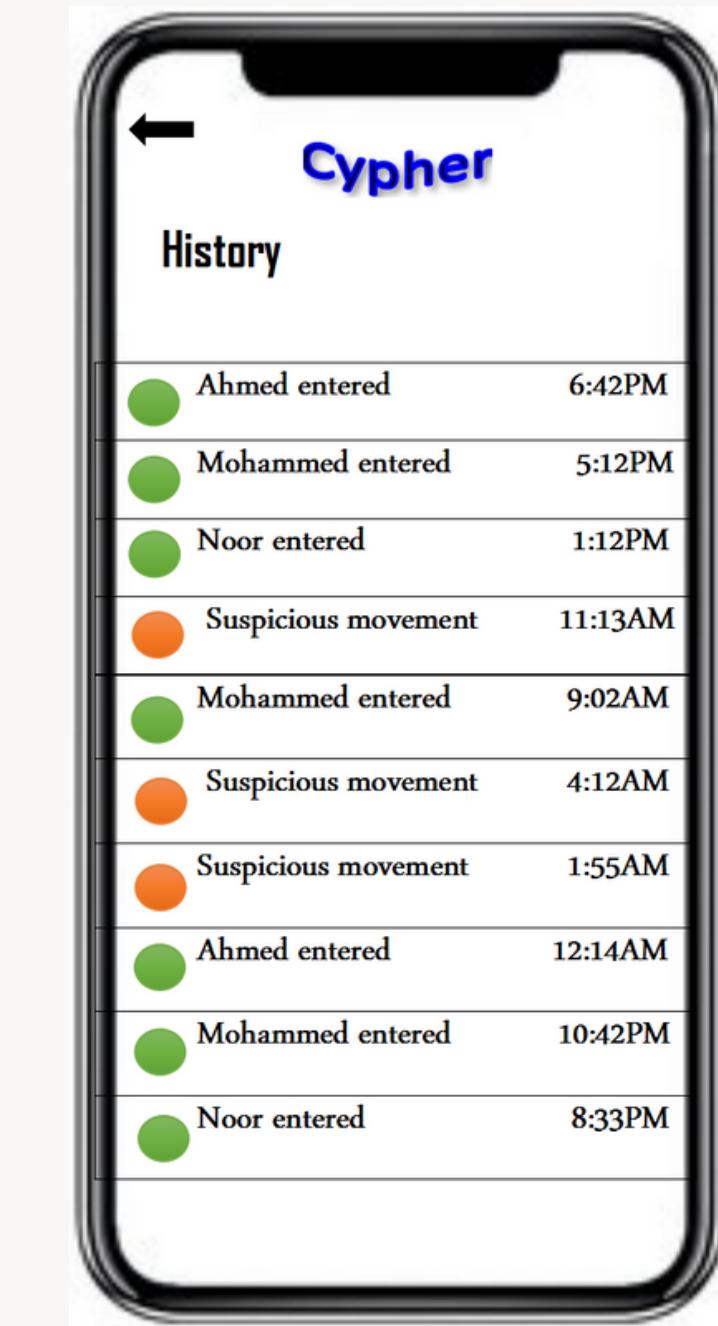
A sample of our user interface application



Login authentication



Monitoring and control



History

Equipment/tools

- 1 Multimeter**
- 2 Power supply**
- 3 Soldering iron**
- 4 3D printer – uncertain**

COST COMPARISON

ALTERNATIVES

Item	Price (RM)
Arduino Uno Rev3-Main Board	38.9
ESP-01 WiFi Serial Transceiver Module (ESP8266)	7.90
M5Stack Fingerprint Sensor Unit - FPC1020A	99
US-015 Ultrasonic Sensor	9.90

TOTAL PRICE: 155.7RM

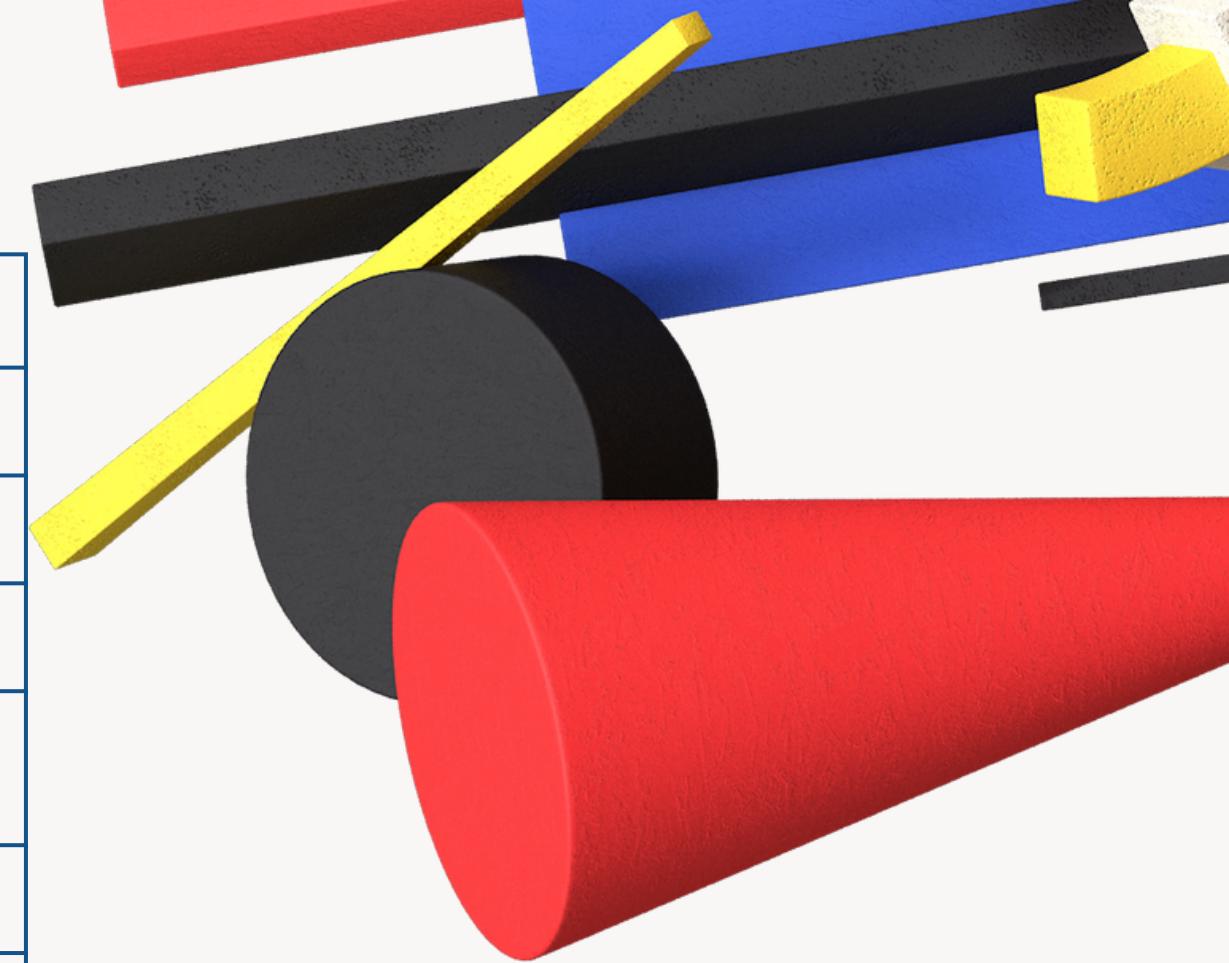
PRODUCTS WE ARE USING

Item	Price (RM)
NodeMCU ESP8266	14.90
AS608 Fingerprint Reader Sensor	54.50
5VDC HC-SR04 ultrasonic sensor	4.50

TOTAL PRICE: 73.9RM

Components List

No.	Component name	Per unit price (RM)	no. units	Total price (RM)
1	Fingerprint sensor	54.50	1	54.50
2	NodeMCU ESP8266	14.90	1	14.90
3	Relay channel	5.90	1	5.90
4	12VDC Solenoid door Lock	17	1	17
5	Jumper wires M-M	2	1	2
6	Jumper wires F-M	2	1	2
7	MLX90614 IR Temperature Sensor	62	1	62
8	5VDC HC-SR04 ultrasonic sensor	4.5	1	4.5
10	2x16 LCD display with i2c	12.5	1	12.5
11	Piezo Buzzer with Wires	1	1	1
12	10k ohm resistor	0.05	1	0.05
13	220 ohm resistor	0.05	1	0.05



**TOTAL PRICE:
186.3 RM**

Gantt Charts

Ahmed's Gantt Chart	Week3	Week4	Week5	Week6	Week7	Week8	Week9	Week10	Week11	Week12	Week13	Week14
Customer Needs Analysis Survey	■											
Plan and proposal	■	■										
Buying components			■									
Design schematic circuit diagram for Sensors			■	■								
Milestone1				■								
Work on hardware connections					■	■						
Work on door lock coding						■	■					
Work on Buzzer and LCD system and coding							■	■				
Integrating Actuator system with the cloud								■	■			
Testing connections									■	■		
Perform Customer Feedback Analysis										■	■	
Work on presentation and report										■	■	

Proposed Task Distribution

Mobile app development (MARAWAN ASHRAF FAWZY AHMED ELDEIB – 1181102334)

- Set up the cloud for the system
- Develop an user interface on mobile phone to communicate with sensors and actuators via cloud.
- Create a Username and Password Authentication for the app
- Receives notification from the cloud to app.

Actuator (AHMED MOHAMMED AHMED KHUDHAIR – 1191302289)

- Buzzer – Alarm
- Door lock – connect with fingerprint to open/lock
- 2x16 LCD display – To welcome/refuse the person who is using the biometric sensor.

NodeMCU: collects and quantifies data of the actuators and sends to the cloud via ESP8266

Sensors (ALJUHANI, HANEEN RADI – 1181303150)

- Ultrasonic sensor – Adjust distance far from home to detect movement
- IR temperature sensor – adjusting to temperature detect human
- Fingerprint sensor – for authentication

NodeMCU: collects and quantifies data of the sensors and sends to the cloud via ESP8266



Do you have any
questions?