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TAM METİN KİTABI

(FULL TEXT BOOK)

SMART DOOR LOCK

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ABSTRACT

In recent trends, smart buildings have become the base for the Internet of Things (IoT). The usage of the internet is increased by connecting the devices in the homes to make the places more comfortable, provident, delightful, and secure. Traditional house locks are getting out of date. Smart door lock is commonly used nowadays in most homes. Smart door lock looks more sophisticated and makes home security safer. With smart door lock you don't have to physically open the door. Smart door locks are also not like other digital doors but are otherwise operated via Wi-Fi. Time is not wasted finding the door lock because the smart door lock can remotely lock the door. The proposed approach addresses a security aspect in smart home technologies, namely the door lock system. The door lock system determines the security by allowing the owner to monitor the buildings with a Smartphonecontrolled, Wi-Fi-connected system using NodeMCU ESP32. A microcontroller is chosen for this project is built to experiment and develop security breaches. Users can open or close the door lock by installing the developed android application on devices like tablets, smartphones, laptops, etc. by providing login credentials.

Keywords: Door lock, Wi-Fi, security, breaching

INTRODUCTION

The project I want to implement is smart door lock. The smart door lock project combines software and hardware where it is controlled through electric current and electronically controlled using applications on a smartphone. The function is the same as the traditional lock mango but the smart door lock does not require a regular lock. Locking or opening the door can be controlled on the app on a smartphone anywhere. Other additional features such as receiving notifications directly to the smartphone in the event of a hazard incident.

METHOD

There are two parts involved in this project which are hardware and software. For the hardware, this project uses a NodeMCU ESP32, solenoid lock, MC-38 door sensor and relay module. While the software is used to program the coding to the Arduino. An Arduino is used as a microcontroller. The relay Module is an electrically operated switch that is responsible for completing the connection of the solenoid lock and the power supply. To run the system, NodeMCU ESP32 should be powered by an electrical supply. For the security system, the MC-38 door sensor is used.

Figure 1 below shows the flowchart of the overall activities in developing the smart door lock.
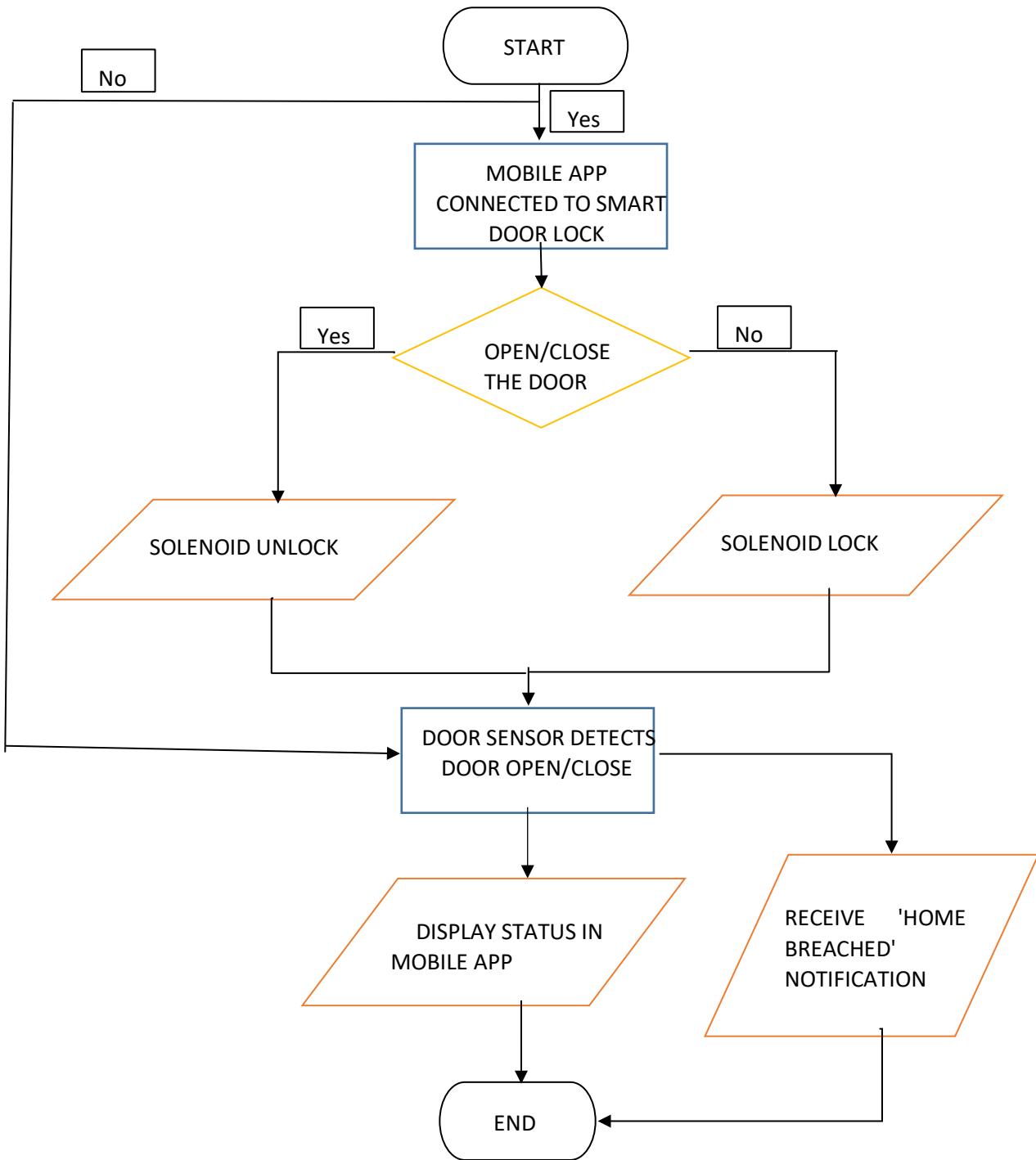
```
                              ┌──────────────┐
                              │    START     │
                              └──────────────┘
   ┌────┐                            │ ┌─────┐
   │ No │                            │ │ Yes │
   └────┘                            ▼ └─────┘
              ┌────────────────────────────┐
              │      MOBILE APP            │
              │  CONNECTED TO SMART        │
              │      DOOR LOCK             │
              └────────────────────────────┘
                            │
  ┌─────┐                   ▼              ┌────┐
  │ Yes │          OPEN/CLOSE             │ No │
  └─────┘          THE DOOR               └────┘

   SOLENOID UNLOCK              SOLENOID LOCK

         DOOR SENSOR DETECTS
         DOOR OPEN/CLOSE

   DISPLAY STATUS IN          RECEIVE    'HOME
   MOBILE APP                 BREACHED'
                              NOTIFICATION

              END
```

Figure 1. Flowchart of the Project

The flowchart shows the process of the smart door lock functioning. At first, people with a mobile app that is connected to a smart door lock have to open or close the door.

If people choose to open the door, the solenoid is unlocked which is the door is open. Then, the door sensor detects the door has opened it will display the status unlock in a mobile app. If people choose to close the door, the solenoid is locked which is the door is closed. Then, the door sensor detects the door has closed it will display the status lock in a mobile app.

In case their people want to open or unlock the door without a mobile application the people who own the mobile application will receive a 'home breached' notification.

Figure 2 below shows a block diagram of the IoT door lock system. It consists of the battery, solenoid lock, Arduino, relay module, Wi-Fi and NodeMCU ESP32. When the switch button is ON, the Wi-Fi will start blinking and connect to the Blynk. The door will lock or unlock the wheel when controlled through a smartphone. MC-38 door sensor will be attached to the door for the security system. The 'home breached' notification will be received on a mobile application.
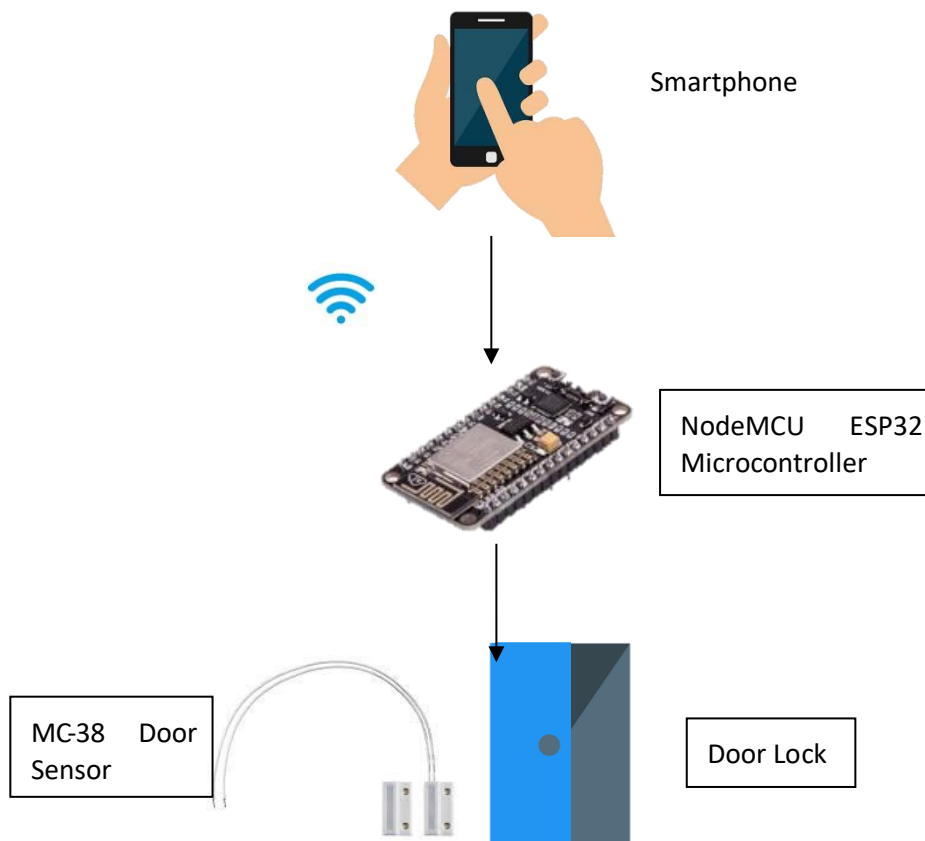

Figure 2. Block Diagram of the IoT Door Lock System

HARDWARE DEVELOPMENT

This project will undergo the process of design development. The process of designing is one of the crucial parts of developing foldable smart door lock. The hardware that use in this project is divided into 4 types which are NodeMCU ESP32, MC-38 Door sensor, solenoid lock and relay module. A relay module is used to lock or unlock the door. This relay module will be connected to the solenoid lock. Next, Arduino Uno. Arduino Uno allows to construct of programs in code segments to perform individual tasks. The code will be programmed in Arduino Uno to give instructions to other hardware to work. Then, the next hardware is the door sensor. The MC-38 door sensor will be used in this project. The door sensor is used for a foldable part and it is two magnetic sensors that are attached to the door. A Wi-Fi module is used to connect the device to the Blynk application. A 12V battery is also used as a power source for the relay module.

Figure 3 below shows the circuit diagram of the IoT door lock system.
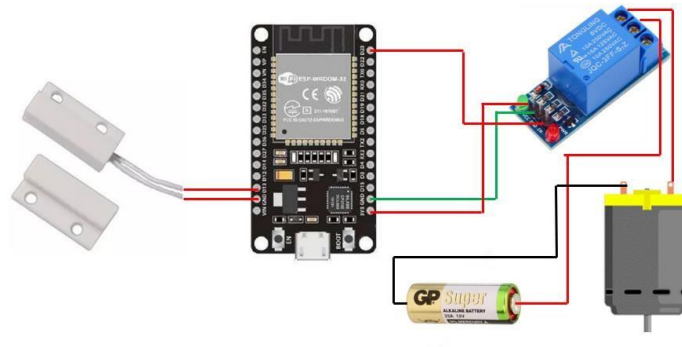

Figure 3. Circuit Diagram of IOT Door Lock System

PROJECT DESIGN

Figure 4 shows the design of the Smart Door Lock. Figure 5 shows the prototype of the project. The project consists of a door lock, a door sensor and a smartphone. The smartphone is connected to the project and the device operation is controlled by using the Blynk application on smartphone.

Figure 4. Design

RESULT & DISCUSSION

DATA	RESULT
Times period to lock or unlock the door using an application on a smartphone	LOCK = 2 second UNLOCK = 2 second
Times period to receive a notification when the door is breached	Less than 1 minute
Range of Wi-Fi connection between application and ESP32	1 kilometre

CONCLUSION

In conclusion, this project was accepted by the public. Even though at the beginning of the project there are some problems such as difficult use and lack of value, the project can eventually be fixed and generally accepted. Such a project will take a long time to meet the established criteria. With the cooperation and guidance provided by the project supervisor, the project can be completed successfully. After various studies and experiments that have been done on this project, I was able to prove that the use of smart door lock has successfully helped all homeowners, all shop owners and all office workers as well as positively impacted the public as a whole, our project has met the criteria or objectives of the project as it can facilitate and can help people live a safe life. The system used is well received because it is easy to operate. Comparison with other methods further strengthens the usefulness of this project.

REFERENCES

[1]   Kiranmai Chigurupati. (2021). Smart Door Lock System – Prototype. (1st ed.) [Online]. Available:

https://www.learnelectronicsindia.com/post/smart-door-lock-system-prototype

[2]   ArduinoGetStarted.   (2021).   Arduino-Door   Sensor. (1st   ed.) [Online].   Available: https://arduinogetstarted.com/tutorials/arduino-door-sensor

[3]   Arun. (2018). WiFi Smart Door (Simplest Method). (1st ed.) [Online]. Available: IOT Smart Door (Simplest Method) - Arduino Project Hub

[4]   IoT Design. (2020). IoT-based Smart Door Lock System using NodeMCU (1st ed.) [Online]. Available:

https://iotdesignpro.com/projects/iot-based-smart-door-lock-system-using-nodemcu

[5]   Ummi Annisa Binti Norarzemi, Mohd Shamian Zainal, Omar Abu Hassan, Mohd Hakimi Zohari, Danial MdNor,

Shipun Anuar Hamzah, Masnani Mohamed, "Development of Prototype Smart Door System With IoT Application," Universiti Tun Hussein Onn Malaysia, Johor, Vol. 1No.1(2020) 245–256, 2020

[6]   N. Hashim, N. F. A. M. Azmi, F. Idris, N. Rahim, "Smartphone Activated Door Lock using WiFi," Universiti Teknikal Malaysia, Melaka, OL. 11, No. 5, 2016

[7]   G. Sowmya, G. Divya Jyothi, N Shirisha, K Navya, B Padmaja, "Iot Based Smart Door Lock System," Institute

Of Aeronautical Engineering, Hyderabad, Telangana, 7 (3.6) 223-225, 2018

[8]   Aleksander IBRO, Augusto WONG, Mario ZYLA, "Smart Door Lock," Worcester Polytechnic Institute, MQP MXC – 0580, 2019

[9]   Shashidhar Rudregowda, " Smart Door Lock System," International Journal for Modern Trends in Science and Technology, Karnataka, India, ISSN: 2455-3778, 2019