System Security And Monitoring On Smart Home Using Android

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Abstract. Home security system is needed for homeowners who have a lot of activities, as a result, they often leave the house without locking the door and even leave the house in a state of lights that are not lit. In order to overcome this case, a system that can control and can monitor the state of the various devices contained in the house or smart home system is urgently required. The working principle of this smart home using android is when the homeowner sends a certain command using android, the command will be forwarded to the microcontroller and then it will be executed based on the parameters that have been determined. For example, it can turn off and on the light using android app. In this study, testing was conducted to a smart home prototype which is equipped with light bulbs, odour sensors, heat sensors, ultrasonic sensors, LDR, buzzer and camera. The test results indicate that the application has been able to control all the sensors of home appliances well.

1. Introduction

Due to tremendous growth in the present day emerging technology, humans are adapted to these technologies in many ways. Communication is the process of transferring information from one point to other point [1,2]. It can be done by wireless communication to control smart home.

A smart home is a house which is integrated with communication network using electrical equipment that can be controlled and monitored or accessed remotely. The main purpose of creating a smart home is to provide comfort to the homeowner in terms of controlling and monitoring the state of his home when they are away [4]. The simplest example is the house lights, turning them on and off are easily done by using a wall-mounted switch. However, it also grants us a slight drawback that when we are away we cannot control the lights in our homes as we cannot touch the switch at home[6].

If Android is used as the remote control of the smart home, homeowners can turn on and off lights regularly eventhough they are not at home, as if we were at home. Another advantage of implementing smart homes is that it can help the elderly and also the disabled as they can switch off and on electronic equipment and home doors more easily without the need to walk first[5,8].

This study aims to build smart home that has capabilities as what follows: detecting gas leakage, turning on the fan when the room temperature is hot, opening and closing the gate if there is a car in front of the fence and turn on the lights on the fence and garden automatically at night. This smart home system can also open and close the door of the house, turn on the lights and monitor the state of the house surroundings and environment using android [10].
2. Methodology

Mechanical System Design

The mechanical system is designed as the system protector, electronic component supporter and as a initiate prototype of smart homes. In designing this mechanical system, multiplex and acrylic are used as the basic material so that the prototype of this Smart Home can run well as if it were a real house. Smart home prototype as shown in Figure 1.

![Prototype of Smart Home](image1)

**Figure 1.** Prototype of Smart Home

Electronic System Design

The electronic component of this Smart Home uses an arduino as a circuit regulator and is equipped with several sensors that can work automatically, for instance [3]:

1. LDR sensor, this sensor will work if the LDR sensor receives a little amount of light or no light at all (dark conditions / night), so it can activate the lights on the fence.
2. Ultrasonic sensor 1, this sensor will work if the sensor detects objects or cars located in front of the fence.
3. Ultrasonic sensor 2, this sensor will work if the sensor detects the object located in front of the car garage.
4. DHT11 sensor, this sensor will activate the fan if the indoor temperature is hot enough or around 30 C
5. Sensor MQ2, this sensor will activate the buzzer if the sensor detects the smell of gas.

All the electronic components in this Smart Home, connected with the arduino, so that the sensors can work properly, as shown in Figure 2.
This system is also equipped with nodeMCU and laptop connected to the internet so that the system can be controlled by using android. Some equipments that can be controlled with android include:
1. Garage Lamp
2. Lower Floor Lamp
3. Upper Floor Lamp
4. Up Front Lamp
5. Upstairs balcony light
6. Lower Balcony Lamp
7. Decorative Lamp
8. The Upper Door
9. Bottom Door
10. Camera

3. Results and Discussion
The objective of this study is to produce a smart home prototype system that can be controlled through android. The trials results of some equipments that can be controlled by android as shown in Table 1:

| No | Equipment                  | Condition | Condition |
|----|----------------------------|-----------|-----------|
| 1  | Garage Lamp                | Success   | Success   |
| 2  | Floor Bottom               | Success   | Success   |
| 3  | Top Floor                  | Success   | Success   |
| 4  | Top Lights                 | Success   | Success   |
| 5  | The Top Balcony Lamp       | Success   | Success   |
| 6  | The Lower Balcony Lamp     | Success   | Success   |
| 7  | Decorative Lamps           | Success   | Success   |
| 8  | The Top Door               | Success   | Success   |
| 9  | The Bottom Door            | Success   | Success   |
In order to figure out whether or not the system is running well, then several tests were conducted such as testing the gas sensor, ultrasonic and heat dal LDR. An example of the test is shown in Figure 3. Overall, the results of the sensor testing can be seen in Table 2.

![Image of a smart home system](image)

**Figure 3. Sensortesting**

| No | Name Censors     | Condition          | Action                | Success / No |
|----|------------------|--------------------|-----------------------|--------------|
| 1  | Gas Sensor       | If any Gas         | Buzzer sounds         | Success      |
| 2  | Ultrasonic Sensor 1 | If there are cars | Open Door            | Success      |
| 3  | Ultrasonic Sensor 2 | If there are cars | Open Garage Door     | Success      |
| 4  | Temperature Sensor | If temperature > 30° C | Fan Active | Success |
| 5  | LDR              | If the Night Lights and Living Garden | | Success |

**Table 2. Sensory testing on smart home**

4. **Conclusions**

From the results of tests, the conclusions are as follows:

1. In this study, the Smart Home system can control the home appliances such as lights and doors using android.

2. In this study, the Smart Home system can monitor the state and condition of the house by using the camera through android.

3. In this study, the Smart Home system can alarm a warning sign when there is a gas leak by turning on the buzzer.

Suggestions for future development is a security system that is built required additional security such as motion detection as well, add notifications to the user in the form of sms or email to the home owner.
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