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Design Build a Smarthome Prototype on House Type 36 with IOT-Based Smartphone Control

Ultra Prayogi[a] & Dahlan Abdullah[b,*]

[a]*Department of Electrical Engineering, Universitas Malikussaleh, Aceh, Indonesia*
[b]*Department of Informatics, Universitas Malikussaleh, Aceh, Indonesia*

Abstract

Technology's rapid development certainly benefits the people who use it. One example of technology today is the application of technology systems at home, with significant problems for homeowners, such as fire and theft. Incidents like this can result in losses for homeowners in terms of material and even to the point of causing loss of life. With such problems, it is necessary to have a system that can monitor these events. One solution to this problem is designing a smart home or smart home. The smart home or smart home is a term used to refer to a modern dwelling with remote control. The intelligent home prototype design for the type 36 house is an innovative home appliance design that uses automatic commands controlled by the homeowner's smartphone. This intelligent home prototype design research aims to be a reference for today's modern homes for the community, especially for type 36 houses. In this study, the five systems studied were automatic light control, automatic doors, gas leak detectors, fire smoke detectors, and room temperature detectors. Excess Commands from the prototype system are carried out using SMS from the GSM SIM900 module connected to the smartphone. The results of this study are an intelligent home prototype in a type 36 house that can be controlled via a smartphone. It is hoped that this automatic system device can make it easier for the community to carry out supervision at home to prevent unwanted things and help ease work so that people are more productive in carrying out other essential activities and provide a sense of security and comfort from danger in the house where they live beloved family.

Keywords: Smarthome, smartphone, SMS, monitoring.

1. Introduction

Progress technology at the moment is very rapidly participating, making a medium of communication as a delivery medium of information from something one place to the place others (Putra, Kurniawan, & Nasari, 2019). So that makes it easy for a man to use communication media. Convenient use of communication media for everyone, of course, will give impact security and require data management sufficient skills challenging to manage something center very minimal technology in knowledge (Negara & Febrianto, 2020). Along with technological developments, humans continue to think creatively and continue to explore discoveries by maximizing the performance of existing technology (Widianto, 2021). To make it easy for professional humans need will system security and control houses in a manner automatic very needed on era moment this, like control lamps via smartphones, detector if exists danger firehouse, and so on (Novelan, 2019). In other cases sometimes we forget to turn off the lamp when our traveling or even we feel restless with our house stay when our currently outside the house (Akbar, Gunawan, & Anwar, 2020), so we must return to the house To do great check throw away time and no efficient (Trimananda et al., 2020). Destination efficiency that's coming up with the so-called idea of a smart home with the concept of IoT (Internet of Things) (Stoyanova et al., 2020).

Smarthome or house clever is a design that installed the system on the device house in a manner automatic and efficient with the help destination computer from he made the design is for getting convenience, increasing security at home, saving power, and so on (Cvitic et al., 2021). Design house type 36 represents the wrong type of many houses that interest children young period now. It because of minimalistic design with relatively price cheap (Paramita, 2021) (Erliana & Abdullah, 2018).

* Corresponding author.
E-mail address: dahlan@unimal.ac.id

2. Literature Review

House type 36 represents the wrong desirable house to many people, p because the large building used not too wide and saves cost construction(Development et al. n.d.). House type 36 is a house that has a large building of 36 square meters. Design picture house type 36 can see in figure 1.

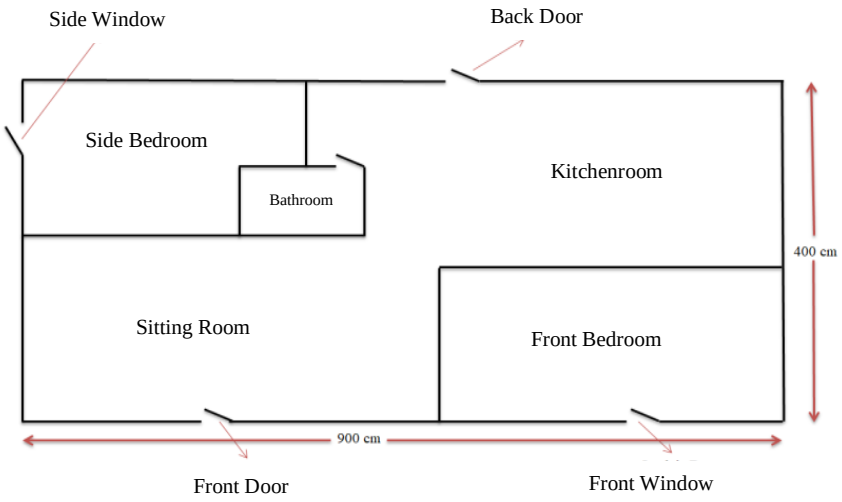

Figure 1. Design House Type 36

The Internet Of Things (IoT) is something purposeful concept for expanding connected internet connectivity in a manner Keep going continuously (Maswadi, Ghani, & Hamid, 2020). In other words, the Internet Of Things, or as it is known also IoT stands for the idea all objects could communicate With one object with another thing using the internet network as a link (Shafique et al., 2020).

The microcontroller is a chip in the form of an IC (Integrated Circuit) that can accept input signal, process it, and give output signal accordingly with the loaded program there in (Hadi et.al., 2019). Microcontroller Arduino is a Suite of electronics that are open source, as well as have device hard and easy software used. Arduino could detect circumstances and environment surrounding through the type of sensor used. This MQ-2 sensor could detect easy gas concentration burnt and could detect smoke in the air (Danny & Sukma, 2018). These sensors contain ingredient-sensitive Lead Oxide (Sn02) which when in the air cleaner has a relative conductivity low. DHT22 is a sensor that can detect two object environments at once, that is temperature (temperature) and humidity (humidity) (Satya et.al., 2020). The PIR (Passive Infra-Red) sensor is an infrared-based sensor that can read energy from existing passive infrared emitters on every detected object, wrong one radiance existing object's passive infrared emission that is the body humans (Andrews et al., 2020). Magnetic switches are switches that can respond to the existing magnetic fields around them. In the planning system smart home the function of the magnetic switch sensor is as a detector open/closed on door or window. The SIM900 GSM (Global System for Mobile) module is a GSM module for microcontroller working Arduino as sending SMS (Short Massage Sending) (Leekongxue, Li, & Page, 2020). Mp3 VS1053 is a module Arduino that functions as expenditure order packed sound in voice format (Cameron, 2021). MP3 files will be played by the content from the code entered. The light alarm is a device's possible indicator Secreting lamp and voice when exists vibration next electricity will be converted Becomes a vibration voice and lamp warning (Yunia, 2022). Seakers are device arranged hard from metal that has coil, membrane and magnets as mutual parts connected (Susanto & Sulistyo, 2022).

3. Methods

Methodology study is a specified step in a manner systematic and scientific for observing and analyzing something problem used by researchers to research conceptualized with good as well as more structured so that produce something useful conclusion for find, develop, and test knowledge. Flow study could be seen in figure 2.

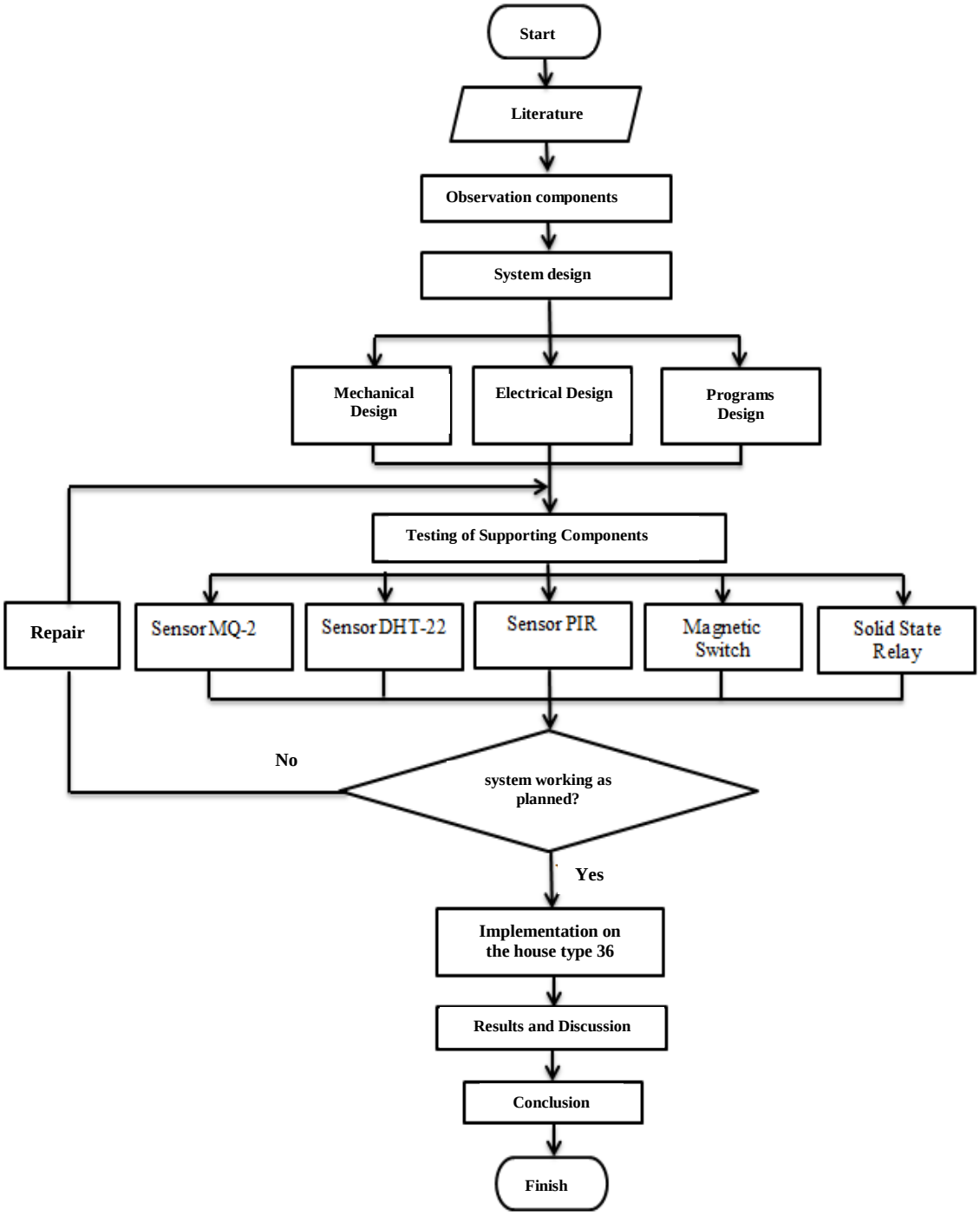

Figure 2. Flow Study

Block diagrams are wrong one part most important in planning equipment electronics because from the block diagram the could is known principle work from the whole Suite electronics made. So that the whole block diagram of the system created could form a working system by the design. Figure 3 represents block diagrams of the Suite system smart home on house type 36.

4. Result and Discussion

The testing power supply needs voltage input from PLN is 220 Volt AC with output 5 and 9 Volt DC voltage. In testing this expected results output from the power supply in accordance score the required output of all modules and the sensors used to study this. The results of testing the power supply done can see in Table 1.

Table 1. Test Results Power Supply

No	Inputs	Output	Status
1	220 Volts AC	224 AC	Well
2	5 Volts DC	5.19 Volts DC	Well
3	9 Volts DC	9.02 Volts DC	Well

The table 1 is only to test the readiness of all tools to be used in subsequent tests where are the AC and DC currents tested on the power supply.

Table 2. Results Testing Lamp

No	Lamp	Order	Status			Performance Status System
			LCD	Mp3 Shield	SMS	
1.	Lamp 1	ON	✓	✓	✓	Well
2.	Lamp 2	ON	✓	✓	✓	Well
3.	Lamp 3	ON	✓	✓	✓	Well
4.	Lamp 4	ON	✓	✓	✓	Well
5.	Lamp 5	ON	✓	✓	✓	Well
6.	Lamp 6	ON	✓	✓	✓	Well
7.	Lamp 7	ON	✓	✓	✓	Well
8.	Lamp 1	OFF	✓	✓	✓	Well
9.	Lamp 2	OFF	✓	✓	✓	Well
10.	Lamp 3	OFF	✓	✓	✓	Well
11.	Lamp 4	OFF	✓	✓	✓	Well
12.	Lamp 5	OFF	✓	✓	✓	Well
13.	Lamp 6	OFF	✓	✓	✓	Well
14.	Lamp 7	OFF	✓	✓	✓	Well
15.	ALL	ON	✓	✓	✓	Well
16.	ALL	OFF	✓	✓	✓	Well

In this test, the GSM SIM900 Shield module, lights, MP3 VS1053 module, 16x2 LCD and alarm will be tested. This test must be carried out simultaneously because each of the components will be involved with one another. The initial stage of this test starts with giving orders on SMS via smartphone to the system, then the system will receive information and respond back by replying to SMS and forwarding commands to the related module.

This test begins with giving an SMS command to the number that has been installed on the GSM Module. By entering the message "1ON", where the message sent is in accordance with the coding that has been made. After that, the message received by the GSM module will be processed by the microcontroller and will provide output to the lamp so that the lamp turns on. After the light is on, the LCD will give an indicator in the form of a text display "Lamp 1 is Activated. . .", Mp3 also responds by giving a sound indicator through the speaker and homeowners can know that light 1 is on from a feedback notification sent via SMS to the number we have programmed. The following are the results of testing the lights used in this study.

Table 3. Results Testing Fan and Alarm

No	Order	Function Order	Status				Performance Status System
			LCD	Mp3 Shield	SMS	Alarm	
1.	Fan	ON	✓	✓	✓	-	Well
2.	Fan	OFF	✓	✓	✓	-	Well
3.	Alarm	ON	✓	✓	✓	✓	Well
4.	Alarm	OFF	✓	✓	✓	✓	Well

Testing the MQ-2 gas sensor aims to find out how the sensor performs in detecting the presence of gas around the house where the MQ-2 sensor is installed. In this test the sensor will be tested using the gas in the lighter which is brought closer to the sensor. The following are the results of testing the MQ-2 gas sensor used in this study.

Table 4. Results MQ-2 Gas Sensor Testing

No	Test	Detected Gas	Status				Performance Status System
			LCD	Mp3 Shield	SMS	Alarm	
1.	First	20 %	✓	✓	✓	✓	Well
2.	Second	12 %	✓	✓	✓	✓	Well
3.	Third	10 %	✓	✓	✓	✓	Well
4.	Fourth	16 %	✓	✓	✓	✓	Well
5.	Fifth	17 %	✓	✓	✓	✓	Well

Testing the MQ-2 smoke sensor aims to find out how the sensor performs in detecting the presence of smoke around the house where the MQ-2 smoke sensor is installed. In this test the sensor will be tested using cigarette smoke which is brought closer to the sensor. The following are the results of testing the MQ-2 smoke sensor used in this study.

Table 5. Results DHT-22 Sensor Testing

No	Temperature detected	Humidity detected	Status				Performance Status System
			LCD	Mp3 Shield	SMS	Alarm	
1.	31ºC	36 %	✓	✓	✓	✓	Well
2.	30ºC	40 %	✓	✓	✓	✓	Well
3.	34ºC	34 %	✓	✓	✓	✓	Well
4.	33ºC	33 %	✓	✓	✓	✓	Well
5.	29ºC	40 %	✓	✓	✓	✓	Well

The DHT-22 sensor test aims to find out how the sensor's ability to detect the presence of hot temperatures around the house where the DHT-22 sensor is installed. In this test the sensor will be tested using the heat from a match that is brought close to the sensor.

This PIR sensor test aims to find out how the sensor's ability to detect the presence of humans around the house where the PIR sensor is installed. In this test the sensor will be tested using a simulation by providing input in the form of a finger brought closer to the sensor.

Table 6. Results PIR Sensor Testing

No	Test	Sensor Status	Status				Performance Status System
			LCD	Mp3 Shield	SMS	Alarm	
1.	First	detected	✓	✓	✓	✓	Well
2.	Second	detected	✓	✓	✓	✓	Well
3.	Third	detected	✓	✓	✓	✓	Well
4.	Fourth	detected	✓	✓	✓	✓	Well
5.	Fifth	detected	✓	✓	✓	✓	Well

Table 7. Results Magnetic Switch Sensor Testing

No	Test	Detected	Status				Performance Status System
			LCD	Mp3 Shield	SMS	Alarm	
1.	Door	Open	✓	✓	✓	✓	Well
2.	Window Front	Open	✓	✓	✓	✓	Well
3.	Window Side	Open	✓	✓	✓	✓	Well

After data is obtained from the results testing system, the step next that is To do the calculation to look for the score percentage appropriateness system. Step calculation like following this.

The formula for looking for score percentage is as follows:

$$\text{eligibility percentage (\%)} = \frac{\sum \text{Number of successful tests}}{\sum \text{many tries}} \text{ x } 100\ \%$$

$$= \frac{46}{46} \text{ x } 100\ \%$$

$$= 1 \text{ x } 100\ \%$$

$$= 100\ \%$$

Acquisition from the whole testing rated system-level success in a manner whole by the researcher based on category success function system classified use scale as follows.

Table 8. Category Function System Based on Rating Scale

No	Score in Percent (%)	Category System
1	0% - 25%	Not It works
2	>25% - 50%	Not enough It works
3	>50% - 75%	Works
4	>75% - 100%	Very Works

Viewed from acquisition results testing performed by the researcher obtained results percentage 100%. So performance from a design gets up smarthome prototype on house type 36 with control smartphones IoT (internet of things) based function with very good.

5. Conclusion

In conclusion from results study design build a smarthome prototype on house Type 36 with IoT (Internet of Things) based smartphone control as follows:

a. Designing and making a Smarthome Prototype system On House Type 36 with IOT (Internet of Things) Based Smartphone Control has succeeded and by destination early to get monitoring an activity process house in a manner automatic from deed theft, fire home, and gas leak.

b. Based on the results of testing from the performance system Smarthome, the system this succeeds gives information with fast when exists theft, fire, and internal gas leak house.

c. From existing signs of firehouses like existing excess smoke and gas leaks, the system could neutralize the condition room house that has installed fans as waster smoke and excess gas leak, as well as system smart home, could give indicator danger for owner house.

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