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Internet of Things as Media Control System

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Abstract— **The research aims to build a smart home based on IoT (Internet of Things). This smart home has three functions as follows. (a) Can control lights via the internet for smart home lighting, (b) Can control the clothesline over the internet because we have received information from the rain sensor that the smart home is raining, (c) Can monitor the temperature at the smart home and control the fan through the internet to control the temperature. From the three functions then, are tested the results of its performance by looking for time lag on each system. The test results of the control of lights in smart homes, the average longest lag time while controlling the lamp was 3.2 seconds while the fastest average when controlling the lamp was 2.8 seconds. On the performance test results servo motor and rain sensor on a smart home.**

The average time lag when controlling the servo motor for the open wash cover was 2.4 seconds and the average time lag when controlling the servo motor for closed covering was 2.8 seconds. While the average lag time response of the rain sensor when informed the time of rain (wet) was 6.6 seconds. While the average time lag response rain sensor when informing when no rain (dry) was 6.4 seconds. On the performance test results temperature and fan monitoring on smart homes. The temperature can be monitored every 20 seconds continuously. While the average lag time when controlling the fan to light up was 3.1 seconds. While the average lag time when controlling the fan to not turn on was 2.7 seconds.

Index Terms— **Internet of Things, Smart Home, Sensor.**

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I. INTRODUCTION

The world is always developing, especially in information technology and communication that increasingly requires us to keep up with the existing developments. Taking a step to not follow the development of technology and information is not the right choice considering Indonesia as a developing country. Following the development in the developed countries is a thing we must do.

IoT (Internet of Things) is a concept that aims to extend the benefits of continuously connected internet connectivity. The capabilities such as data sharing, remote control, and so on, also on objects in the real world. Examples like foodstuffs, electronics, collectibles, any equipment, including living things that are all connected to local and global networks through embedded sensors and always on.[2],[3].

Some international terms that refer to smart homes include smart home, smart house, home automation, domotique, intelligent home, adaptive home and aware home. The latest definition by Intertek, UK's leading institution that serves audits, certifications, inspections, quality assurance, testing, training and advisory organizations make it clear that smart homes are a blend of communications networks connected to home devices and are likely to be controlled, monitored and accessed remotely.[4],[5],[6].

A smart home can be characterized or identified as these following features.(a) Automation: the ability to accommodate automated devices or perform automatic functions. (b) Multifunction: the ability to perform various tasks or produce results. (c) Adaptability: the ability to adapt (or adjust) to meet user needs. (d) Interactivity: the ability to interact with or enable interaction between users. (e) Efficiency: the ability to perform functions in time-saving, cost-effective and convenient.

In this study, ThingSpeak was chosen as the IoT platform. ThingSpeak allows us to build applications from the collected data by sensors. Receive data in real-time, data processing, as well as simple visualization for its users. There is an important reason why ThingSpeak is chosen as a platform for IoT. First, ThingSpeak is open-source so we are free to use it. Secondly, ThingSpeak is among the easiest to use compared to other platforms including open-source eg. Skynet, SensorThings, and SmartObject which we must have enough programming knowledge to generate APIs. With ThingSpeak, to generate APIs we just need to sign in to Thingspeak.com website and then create a channel then API is ready to use. The initial appearance of the thingspeak platform.[6],[7],[8].

Hardware used in smart home was Arduino, temperature sensor (DS1820), rain sensor, ESP8266, servo motor, fan, and LED. While the software used in smart home was IDE Arduino 1.8.1, IoT Thingspkeak monitor widget, and internet relay control.[7],[8],[9].

II. METHOD

The approach in this research was quantitative, because this research is presented in the form of numbers. This is in accordance with the opinion which suggests quantitative research is a research approach that required to use numbers, ranging from data collection, interpretation of the data and the appearance of the results.

A. Research design

Stages of research design are described below:

1. Literature Study, Prior to doing this research, the researcher reviewed several well-connected studies.
2. Calculation of Component Determination, Before doing this research, calculate the first component to be used.
3. Collection of Tools and Materials, After performing component calculations, the next step is to gather tools and materials.

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4. Smart Home Block System

This smart home has 3 functions as follows. (a) Can control lights via internet for smart home lighting, system block can be seen in figure 1. (b) Can control the clothesline over the internet because we have received information from the rain sensor when it is raining, system block can be seen in figure2. (c) Can monitor the temperature at the smart house and can control the fan via internet to control its temperature, system block can be seen in figure 3. Lamp 1 is used to manipulate ambient temperature to make it more varied of the temperature data obtained.

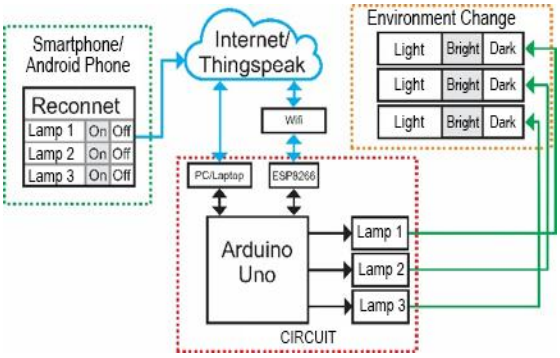

Fig.1.block system controller in the smart home's lamp

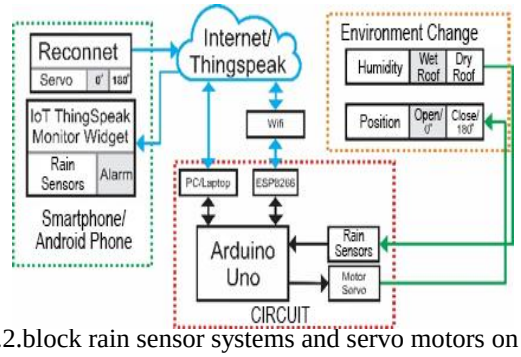

Fig.2.block rain sensor systems and servo motors on smart home

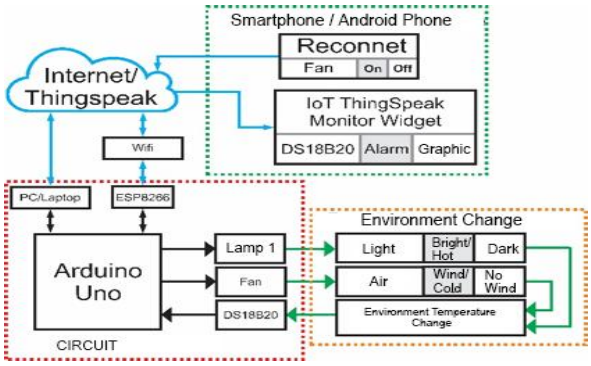

Fig.3.block temperature monitoring system and fan control on smart home

B. Smart Home Design

The Smart Home is certainly not a real home but a miniature one that has a smaller scale than in general. The smart home design along with the size that can be seen in Figure 4.

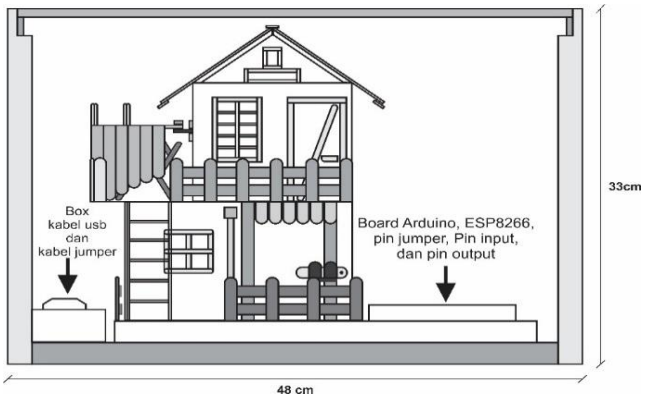

Fig.4.Front appearance of the smart home design

III. RESULTS AND DISCUSSION

This study produces IoT-based smart home products, This product is in accordance with the design and function that has been described previously.

A. The test result of the performance of the control lamps in smart home

This research has done analysis and testing to IoT based smart home function which can control lamp through internet. Here is the test results by displaying a table showing the smart home response time lag when controlling the lamp by taking 10 samples to determine its performance can be shown in Table 1.

TABLE 1. THE TEST RESULT OF THE PERFORMANCE OF THE CONTROL LAMPS

		Time (Second)										
Experiment											**10**	$\bar{X}$
Lamp 1	On										4	3.2
	Off										2	2.8
Lamp2	On										4	3.1
	Off										2	3.2
Lamp3	On										1	2.8
	Off										2	2.9

From table 1 it can be seen that the average longest time lag in controlling the lamp is 3.2 seconds while the fastest average when controlling the lamp is 2.8 seconds.

B. The test result of the performance of servo motors and rain sensors in smart home

In this research, we have analyzed and tested the IoT based smart house function which can control the clothesline that

has been installed servo motor and respond to rain sensor response. Here is the test result by showing the smart home time lag when controlling the servo motor and rain sensor response by taking 10 samples to know its performance can be shown in table 2**.** From table 2 it is found that the average lag time when controlling servo motor for open cover is 2.4 seconds. While the average lag time when controlling the servo motor to cover the closed washcloth is 2.8 seconds.From table 2 also found that the average lag time response of rain sensors when informed when the rain (wet) is 6.6 seconds. While the average time lag response rain sensor when informing when no rain (dry) is 6.4 seconds.

TABLE 2. TEST RESULT OF SERVO MOTOR AND RAIN SENSOR

		Time (Second)										
Experiment											10	$\bar{X}$
Motor servo	Open										2	2.4
	Close										4	2.8
Sensor	Wet										8	6.6
	dry										9	6.4

C. The result of temperature and fan monitoring performance at the smart home

In this research, we have analyzed and tested the IoT based smart home function which can monitor temperature and control the fan. Here are the results of the test by displaying the temperature monitoring graph taken by the data every 20 seconds shown in Figure 6 and the table showing the smart house time lag when controlling the fan by taking 10 samples to know its performance can be shown in Table 3.

TABLE3. THE RESULT OF FAN'S PERFORMANCE

		Time (Second)										
Experiment											10	$\bar{X}$
Fan	On										1	3.1
	Off										4	2.7

Figure 6 shows the graph of temperature for about 7 minutes. From the picture, the temperature can be monitored every 20 seconds continuously.From table 3 also found that the average lag time when controlling the fan to light up is 3.1 seconds. While the average lag time when controlling the fan to not turn on is 2.7 seconds.

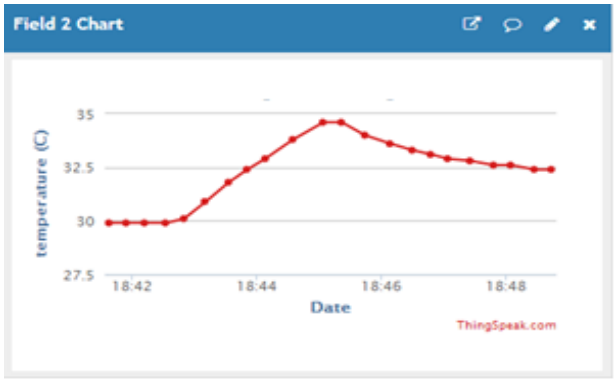

Fig. 6.Graph of temperature monitoring

IV. CONCLUSION

Based on the research conducted, then we got the following conclusion.On the performance test results of the control of lights in the smart home.The average longest lag time while controlling the lamp is 3.2 seconds while the fastest average when controlling the lamp is 2.8 seconds.On the performance test results servo motor and rain sensor in the smart home. The average time interval when controlling the servo motor for open wash cover is 2.4 seconds and the average time lag when controlling the servo motor for closed cover is 2.8 seconds. While the average lag response time of the rain sensor when informed when it rains (wet) is 6.6 seconds. While the average lag response time of the rain sensor when informed when there is no rain (dry) is 6.4 seconds.

On the performance test results temperature and fan monitoring on the smart home, the temperature can be monitored every 20 seconds continuously. While the average lag time when controlling the fan to light up is 3.1 seconds. While the average lag time when controlling the fan to not turn on is 2.7 seconds.

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