

Remote Control Trough Internet

G Gunawan, S Prayudani



Abstract: In this paper will explain the use of the Raspberry Pi as a remote control via the internet. By utilizing a web server that is embedded in the Raspberry Pi Facilitate the design and implementation process. Remote control using the internet is commonly used today Because The microchip has been the development of technology and the internet speed is quite high and stable are available in almost all countries in the world. Benefits of remote control using the Raspberry Pi is that it can save costs for the Raspberry Pi cheaper than devices that include a web server computer. The other advantage is not required input and output devices specifically for the Raspberry Pi is equipped with a GPIO (General Purpose Input Output).

Keywords-Raspberry Pi; remote; control; Internet; the web server.

I. INTRODUCTION

Development of Internet technology is closely related to the findings of the Internet network infrastructure. The invention of fiber optic technology is dominant in increased speed internet access. Back when they use regular telephone cable networks, Internet access speeds only reach 28 Kbps. While the fiber optic internet speed increased to 100 Gbps researched by the company Mitsubishi display in the event CIATEC (Cutting-Edge IT and Electronics Comprehensive Exhibition) in 2013.

Research on this continues to grow following the technological developments in the field of information and telecommunications. In previous studies, the remote control (remote control) are making use of DTMF signals (Dual Tone Multi Frequency) and SMS (Short Mesage Service) on mobile phones as a medium. So far the use of DTMF signal sent through cellular phones and coded into digital signals for controlling home appliances and office still uses microcontroller as its main hardware [1].

The same study also conducted by Soufil [2]. They utilize DTMF signal as media control. Then other studies using SMS as a text-based media control where the data in the form of SMS text encoded into data for controlling remotely [2]. In their study as a server used microcontroller for the control center that runs all of the commands sent either via DTMF or SMS and modem devices as a medium for data transmission DTMF or SMS.

The block diagram in Figure 1 represents the general working principle-based remote control system DTMF and SMS via mobile phone media [1].

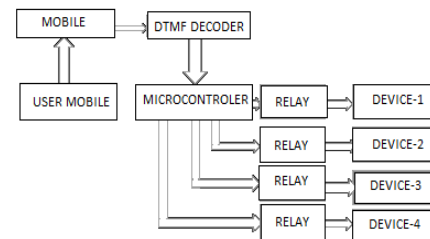


Figure 1. Block Diagram of Remote Control System Using Cell Phones.

Along with the development of the Internet network infrastructure remotely control began to shift using the internet, and this research was done .. Research on controlling remotely through the Internet are already using a regular computer server equipment (PC) as a web server. But still use microcontroller as an interface to connect to other devices [3]. The block diagram of the control system remotely using Zigbee [4] shown in Figure 1.

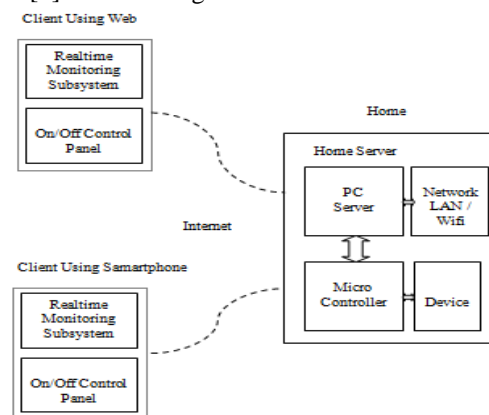


Figure 2. Block Diagram Remote Control System Using Internet Network

The results of previous studies in its application in the field it seems there are still many experienced problems. One problem is that the quality of remote control via the Internet is determined by the condition of the server device being used. With this research the possibilities with these constraints can be overcome. One way is to utilize the Raspberry Pi device as a server for controlling remotely via the internet.

A. Formulation of the problem

This paper will discuss the design of a web-based remote control to make the implementation of Raspberry Pi as a web server.

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* Correspondence Author

G Gunawan*, Department Computer Engineering And Informatic, Politeknik Negeri Medan, Medan, Indonesia. Email: gunawan@polmed.ac.id

S Prayudani, Department Computer Engineering And Informatic, Politeknik Negeri Medan, Medan, Indonesia. Email: santi.prayudani@gmail.com

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B. Scope of problem

Due to time constraints, resources, funds and ability science writer, so in this study will only do things as follows:

- To do trials with the server device in the form of a mini computer that can be connected directly to the LED (Light Emitting Diode) that require low power consumption.
- Limit measurement quality only at variable speed and success controlling the number of times the test sample.
- Research using open source-based resources that do not require financing.

C. Research purposes

This research aims to:

- Utilizing Raspberry Pi as a controlling device remotely via the Internet.
- Knowing the quality improvement by implementing Raspberry Pi as a web server to a web-based remote control applications.
- Getting a better quality than those from the results of previous studies.

D. Benefits of Research

The expected benefits of this research are:

- Utilization in the field of industry, the implementation of the research results are expected to improve the quality of the server device that serves as a controller so that the equipment of industrial machines remotely controlled more efficiently.
- Utilization in the field of defense and security (military), the expected results of this study can be applied to control war machines remotely with a smaller form factor.
- For the management of office buildings, hotels and households can take advantage of this research for controlling and securing buildings, offices and homes..

- Transmission voice data using methods that are susceptible to noise and the quality of the transmission cable.
- Voice data transmission speed is relatively slow compared with the data keceptan internet.
- Limited use only on compatible devices only.
- Require dialing process and requires a delay time of transmission.
- Voice and SMS network depends on the network on the mobile operator used.
- network internet can be accessed from mobile phones allowing remote control from a mobile phone (smartphone) which is connected to the Internet network. With this system platform differences do not become a problem again.

In this study, the authors use a wireless Internet network (wireless network). These networks use a Wifi hotspot sourced from smartphones Samsung Galaxy Y Duos that can be set as a Wifi hotspot.

By using the Wifi network then obtained some advantages, namely:

- Does not require a long UTP cable.
- Does not require relatively expensive cable installation.
- Utilizing wifi notebook existing server
- On Raspberry Pi needs to be increased wireless network adapter that uses a device *WNC0305USB*.

B. Computer Mini Raspberry

In this study, the authors use a mini computer that only by credit card. This mini computer manufactured by Raspberry Foundation, which is in the United Kingdom (UK). This mini computer requires only a very small electrical power is only 1.5 watts to 3.5 watts models A and B. So for a model suitable for continuous use. Raspberry Pi used in this study is shown in Figure 3.

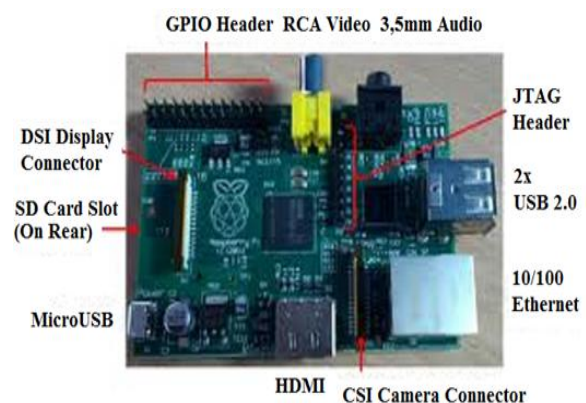


Figure 3. Raspberry Pi

Research conducted by the author do not require an external microcontroller as an additional interface. This is possible because the Raspberry already contained input output port GPIO (General Purpose Input Output). GPIO with 8 pins can serve the control of 8 pieces of different devices.

II. LITERATURE REVIEW

A. Computer network

In this study, the Internet network is necessary as control of data transmission media (controled code). The protocol used is TCP IP with a web server as a web domain controllers. Internet network interfaces used are USB Wifi module that is compatible with the Raspberry server.

As with previous studies conducted by Soyoung Hwang and Yu Donghui, they use the Zig Bee Network as a Wifi module to transmit the data controller. Weakness Soyoung research still use ordinary PC servers that require an external microcontroller interface devices.

In this study include web security passwords with MD5 (Message Digest 5) as the encryption method. Election is due MD5 method has a high security level and is a facility of the open source PHP programming.

Previous research many media utilize cellular transmissions to the method DTMF (Dual tone multifrequency) and SMS (Shot Message Service), which has several disadvantages, among others:

C. Linux Operating System Raspbian

This study uses the open source operating system is Linux. Raspbian. Raspbian has been designed specifically for use Raspberry device with 512 Mb RAM. This capacity is smaller than that possessed by the device server PC. External memory can be expanded up to 16GB using an external SD card installed in an SD Card Slot provided on board Raspberry. In this study, the authors chose Raspbian because it is easy to implement. In addition Raspbian supports experiments with remote controlling software using the Internet. Raspbian suitable for use with this system can be installed due to the components necessary for controlling electrical appliances via the web. As for other software to be installed on this Raspbian are:

- Apache2 Web Server
- MySQL's database server
- PhpMyAdmin as a regulator of the database
- Control.php as a regulator of equipment
- GPiOSever.sh as controller Pin Input Output Raspberry

III. METHOD

A. stages Research

In this study, the whole procedure must first start of the study has been conducted as a literature study and conducted a series of experiments, Having found that the problems can be overcome and formulate the research can be continued on the next process.

B. Mechanical Development

Technique development in this research following the steps as follows:

- Conduct experiments using Raspberry Pi mini computer server. Further testing the system by using the Raspberry Pi with Raspbian operating system and application software that has been designed. Then the process of sending and receiving files from the server Raspberry Pi.
- Analysis and evaluation of outcomes.

At this stage, the analysis of the test results and evaluation errors

C. stages Trial

On Step This is done by applying a series of experiments Raspberry Pi as a server. Raspberry Pi model B is used by the processor CPU: 700 MHz ARM 1176JZF-S core. Memory used is 512 MB. The operating system used is Raspbian. Steps experiments were conducted:

- To install a webserver on Raspberry Pi, the tool used is Apache2 and Mysql.
- Creating a test program using the programming language PHP.
- Run the program and apply the settings to connect to the client.
- Client device used is the smartphone Samsung Galaxy Y Duos.

- Tested the system and observe and record the results of measurements carried out.

D. variables measured

In this study, there are several variables to be measured, namely:

- Delivery speed (upload) files from client to server
- Speed file retrieval (download) from the server to the client.
- The server response speed when controlled by the client.

In this study measured kecepatan control process by using server Raspberry Pi has done the configuration and installation of the required programs. Testing block diagram shown in Figure 4.

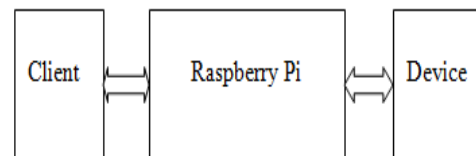


Figure 4. DiagramBlock Testing Using a Raspberry Pi

Before testing the things that are done to prepare the server on both servers are as follows:

Preparation on the Server Raspberry Pi:

- Apache2 enabled web server
- Menginstall MySQL Server
- installing phpMyAdmin
- Establish a database for control via web
- Build control.php program

IV. RESULTS AND DISCUSSION

A. Data Test

Anto.io is Server Internet of things open source. AT Singer Research Tools Electric appliance controller connected at Server anto.io shown Figure 1.

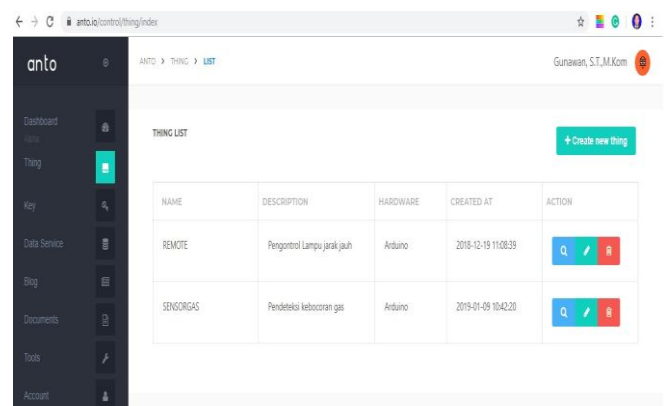


Figure 1 Preview Web anto.io

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The dashboard preview shown at figure 2.

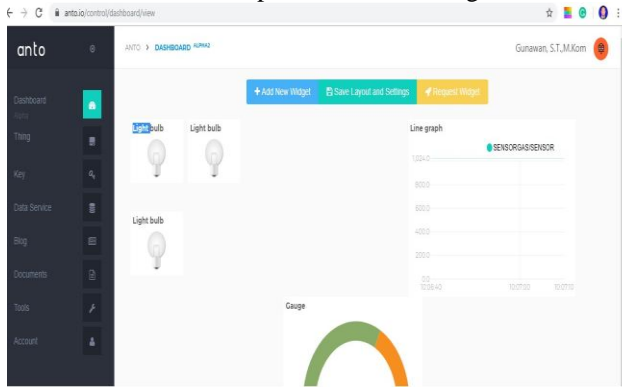


Figure 2. Preview dashboard anto.io

The result of measurement shown at table 1.

Table 1. Result of measurement

No	Control Button	Led			Response Time (det)
		Led1	Led2	Led3	
1	RELAY1-3 OFF	OFF	OFF	OFF	0,3
2	RELAY-1 ON	ON	OFF	OFF	0,3
3	RELAY-2 ON	ON	ON	OFF	0,2
4	RELAY-3 ON	ON	ON	ON	0,5
5	RELAY 1-3 ON	ON	ON	ON	0,3
6	RELAY-1 OFF	OFF	ON	ON	0,5
7	RELAY-2 OFF	OFF	OFF	ON	0,2
8	RELAY-3 OFF	OFF	OFF	OFF	0,3

2. Server Testing

For test of speed of file transfer using command ping server (download). Proses pengukuran ini dilakukan dengan bantuan sebuah PING.

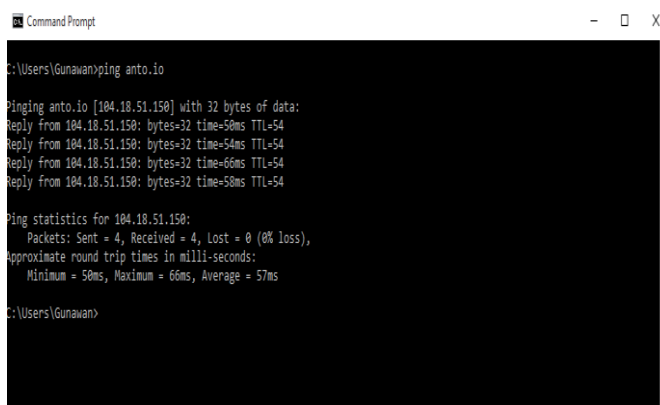


Figure 3. Ping testing anto.io

The result shown at table 2

Table 2. Ping Result anto.io

Ping	bit	Time (mS)
1	32	50
2	32	54
3	32	66
4	32	58
Rata-rata		57

Describe speed of anto.io = $32 \text{ bit} / 57 \text{ ms} = 561,4 \text{ bit /second}$

3. Data Testing Thingsboard.io

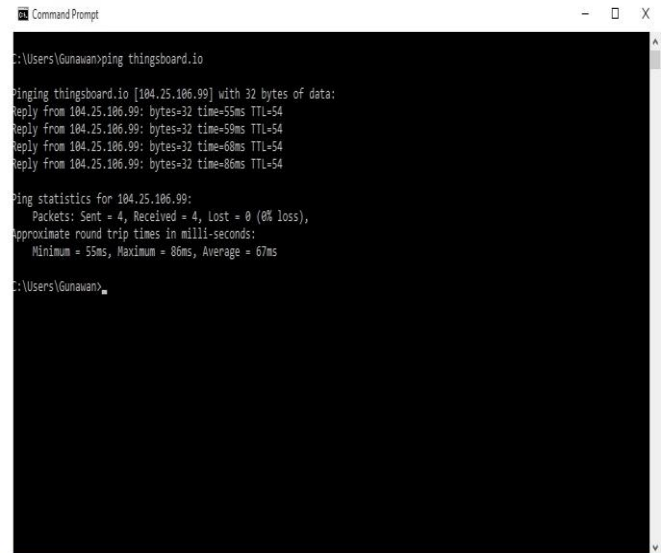


Figure 4. Ping result Thingsboard.io

The ping result of Thingsboard.io shown at table 3.

Table 3. Ping Result of Thingsboard.io

Ping	bit	Time (mS)
1	32	55
2	32	59
3	32	68
4	32	86
Rata-rata		67

The fast of server = $32 \text{ bit} / 67 \text{ ms} = 477,6 \text{ bit /second}$

V. CONCLUSION

From the research known to Server Anto.io Above So Fast compared more Thingsboard.io. In Singer Testing may be obtained The Changing Value depends Of Network Condition of testing.

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AUTHORS PROFILE



Senior Lecture at Politeknik Negeri Medan. Email: gunawan@polmed.ac.id. Phd candidat at Universitas Sumatera Utara. Skills and expertise: Machine Learning, Pattern Recognition, Java Programming, Object-Oriented Programming, Internet of Things, Embedded Systems, Microprocessor Programming.



Lecture at Politeknik Negeri Medan. Magister Information Teknologi at Universitas Sumatera Utara.s, Skill and expertise: C++, Java Programming, SQL.