Prototype Mobile-Based Smart Power Strip

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Abstract. Controlling electrical equipment within a certain time frame is one thing that is quite important. By controlling existing equipment in the house such as air conditioning, TV, fans, etc. It is often found that some electrical tools that survive are not used, in addition to waste also shortens the life of the electrical appliances. Therefore we need control and supervision of electrical devices using intelligent power strips. IoT or commonly known as the internet from things that are concepts that are intended to get the concept of the benefits of internet connectivity that is connected continuously. This concept can be used for monitoring and controlling electrical equipment that connects smart electrical terminals or power strips. By using an electrical terminal device that is paired with a system and module that can be controlled using a smartphone. Android is one of the many smartphone OSes that can bridge or facilitate all human work, one of which is in terms of control, which functions from this android as a remote control media that can be accessed by electronic devices in the home and certainly has connected first with the IoT module. This study discusses making smart sockets or smart power strips that can be rotated using a smartphone so that any electrical equipment can be used on users who do not use home.

1. Introduction

Electrical energy is one of the most important human needs and cannot be released from daily needs. Almost all human work requires electrical energy. Lack of electrical energy can disrupt human activities. Therefore the availability of electrical energy must be maintained. In Indonesia, when viewed from population growth, the need for electricity continues to increase. According to PLN's electricity sales data released by the Minister of Energy and Mineral Resources [1], it shows that the total number of customers in 2016 reached 64,282,493 customers.

Compared to 2015 this figure increased by 3,114,513 customers or 4.84%. Of the total number of customers, the largest group of households is 59,243,672 customers or 92.16%. From these data, the household sector has a major role in the use of electricity supply in Indonesia. But awareness from household sector customers about electricity savings is still lacking. According to the Director General of New and Renewable Energy and Energy Conservation (EBTKE), the lifestyle is not economical due to various factors, including ignorance and the disruption of the community with the amount of obligation that must be paid to obtain electricity [2]. According to PLN General Manager Babel Zulfarida Paluzi, public awareness of saving electricity needs to be increased through education and outreach to increase public awareness and knowledge of the importance of electricity savings [3]. The number of community activities every day that cause frequent negligence or not pay attention to how the use of electricity, for example not accidentally not turning off lights, televisions, and air conditioners

when going out [4]. Therefore, here the researchers tried to make a tool as well as a mobile-based software to control electronic equipment that was used but forgot to turn off with the name "smart power strip" or commonly referred to as smart electrical terminals.

2. Research methods / designs

2.1 Research Process

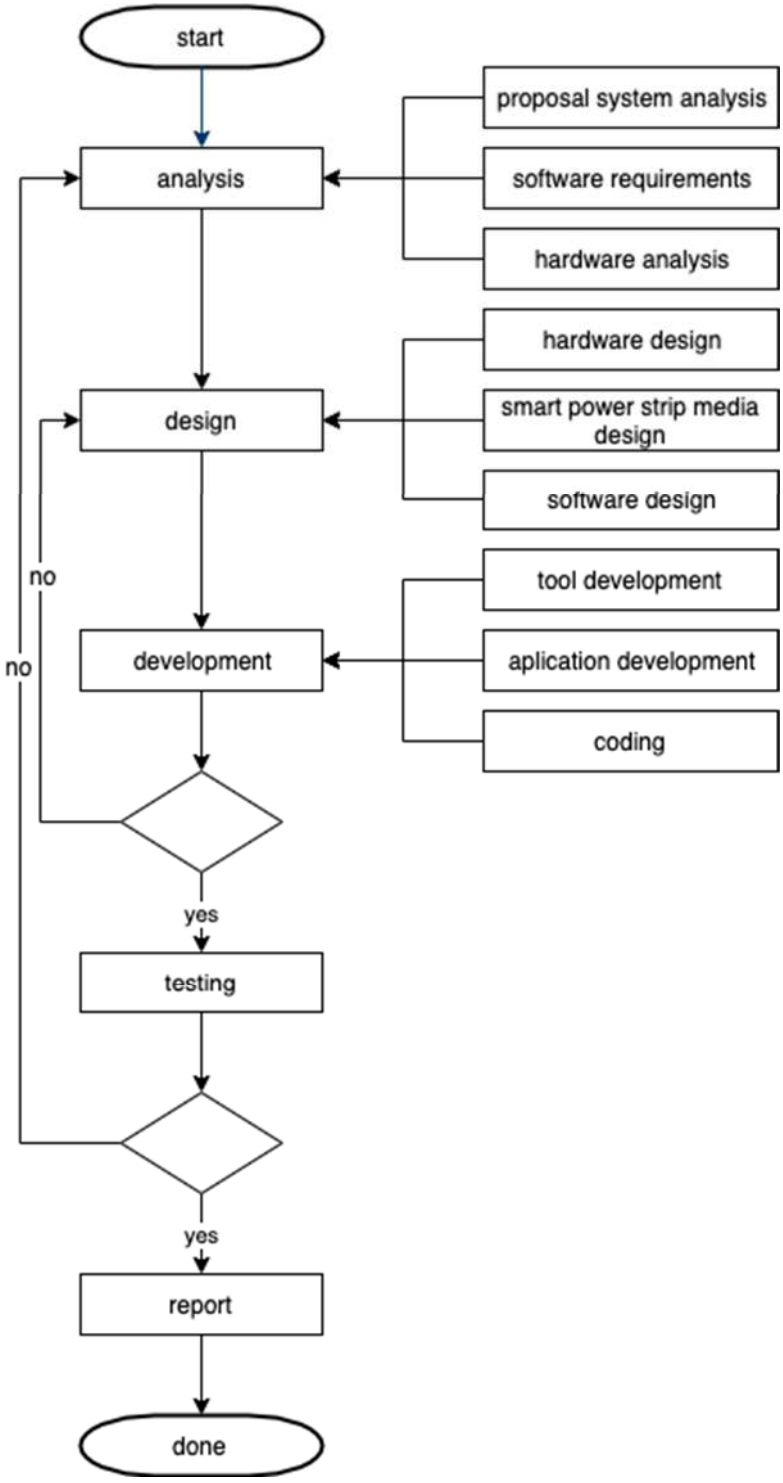

Figure 1. Research process

2.1.1. Requirement Analysis
The initial stage of the development of this multimedia learning system is to analyze the needs of users and the needs of the system that will be designed to overcome existing problems.

2.1.2. Design.
At this stage, device design, smart media outlet, and application design are carried out.
Tools used:
1). Terminal Socket outlet
2). Relay 4 Module
3). Node MCU. As the procecor, set the wifi network, and control the relay
4). Jumper wire

2.1.3. Making the system
At this stage the system is made including the manufacture of tools, applications, and coding. Where the expected results are the interconnection between software and hardware as the goal of the research is achieved.
The coding is done on the Arduino Sketch Application.

Figure 2. Researchers used the Blynk server to control the smart power strip using a smartphone

2.1.4. System Testing
After the system is successfully built, testing is carried out in accordance with the design results. If the results are as expected, it can be said that the research carried out successfully, but if there are obstacles or problems that cause this system can not run as expected, the researcher must review again from the initial stage, namely the analysis of the need to find out in detail where there is flaws or mistakes. At this stage the cycle will continue to be repeated if the results of the study are still not in accordance with what is expected.

2.1.5. Report Writing.
After successful testing, the research report is written. This report is the final stage of working on a study that aims to provide accountability for research that has been done to related parties.

3. Result and Discussion

3.1 Software

This smart strip system aims to be able to provide services to the community in terms of saving electricity usage. This system can control remote electricity usage based on Android, so users can activate and activate electronic devices that are used at home remotely.
The following is the application workflow:

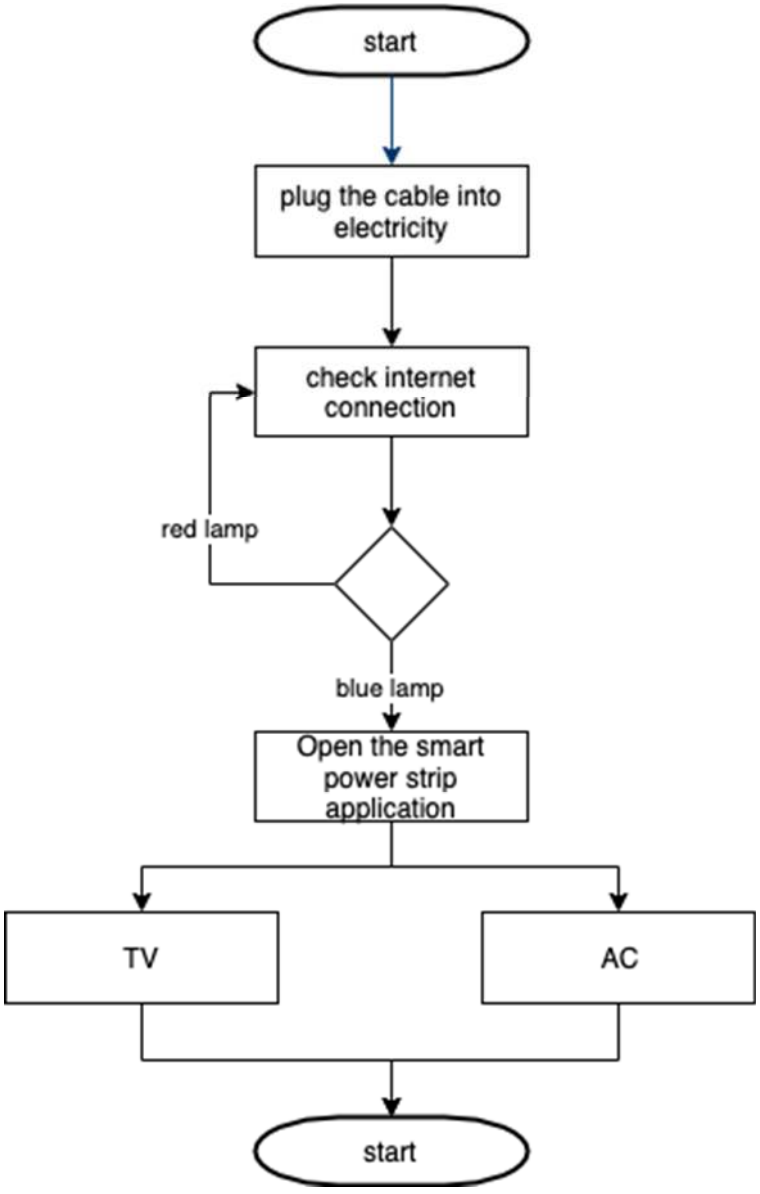

Figure 3. Application workflow

The system workflow image above shows how the smart plug control system is accessed using an application program that is installed on the Android OS. The first thing to do is that the user must first ensure the terminal is connected to an electric current through a power line, then the device that is already connected to the electricity must be connected with the internet media, the internet is useful as a liaison between the device to be controlled with an android smartphone. Then after connecting to the internet, the user must confirm the connection again through the lights contained in the relay, if the lights are on red then it means the internet has not been connected, and vice versa, if a blue light is on, it means that the device to be controlled is connected to the internet. Then after everything is sure to be

connected, then the user opens the TICO application on the android smartphone as a control device from the terminal device remotely. There will be several options for electronic control in the application whether you want to turn it ON (ON) or turn it OFF (OFF). For more details can be seen in the picture below.

a). Node MCU and Relay

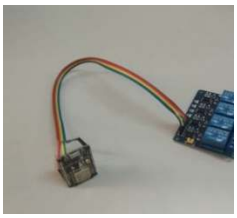

Figure 4. Node MCU and relay

Display the picture above shows part of the basic material for the formation of a smart plug. This material is known as the MCU node (left of the screen) and the relay (right of the screen) that mediate the signal to be captured by the terminal so that the terminal can execute whether we want to turn on or turn off the electrical electronics we connect

b). Smart Plug Device

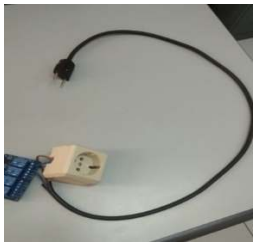

Figure 5. Smart Plug Device

Display the picture above shows the MCU Node device and the relay has been connected to the terminal, which is then connected between the two devices is also connected by a cable that is used to conduct electrical current. This means that the cable will be the intermediate main or main current of the electric current that will be received by an electronic device, and the device above is called the Smart Plug.

c). The initial appearance of the Application

Figure 6. Initial appearance

Having built hardware that is useful as a tool that we will control, then after that programming is done with Android Studio tools which of course can be implemented on Android smartphone devices as well. In the picture above we can see a simple prototype of the results of the program which shows 2 simple buttons and the number of buttons can be added according to how much electronics we want to control. And after being modified according to how many pieces of electronics we will control, the page display will change as below.

Figure 7. Initial display

The display above shows that the application that was built earlier is also equipped with any type of electronics that we want to control remotely. It can also be seen that when we want to turn on the television then all we have to do is press the button that has the television's information and the button's writing automatically turns off to on.

4. Conclusions And Suggestions

4.1. Conclusions

The Smart Power Strip application can control electrical equipment using a Smartphone.

4.2. Suggestions

The suggestions that can be delivered are: there needs to be a monitoring feature for each use of electrical equipment used.

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