PROTOTYPE INTERNET OF THINGS (IoT) ON ANDROID-BASED DOOR ACCESS

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ABSTRACT

The use of conventional locks is currently less practical because they have to be carried when traveling and if the owner wants to open the door, he must come directly to the door. In today's fast-paced and automatic era, people often feel tired when they have to come directly to open the door because of the many activities and activities they do. This encourages the author to be able to overcome this problem by designing a tool that is more effective and efficient by utilizing the Internet of Things (IoT). This system is designed using a Wemos D1 Mini microcontroller and Smartphone Android-basede which is a remote control media for room door access. smartphones Android will be installed by the blynk application which is the controller to open the door, then the Wemos D1 Mini which is the control center for supporting components such as Magnetic Switch , Solenoid Door Lock, and Push Button . The trials that have been carried out give results that show that the system is working well.

Keywords: IoT, Android, Wemos D1 Mini, Door, Key

INTRODUCTION

The development of information technology has driven the changing times which are increasingly rapidly affecting all aspects of human life. Along with this, the need for effectiveness and efficiency is highly prioritized in various fields. Humans are required to be creative and innovate to create a tool that is more effective and efficient. Currently opening and locking the room door is still using a manual system, namely by using a conventional key. The use of conventional keys in this day and age is not practical because they must be carried when traveling from home and if the owner wants to open the door of the room, he must come directly to the door.

Smartphone is a phone that brings together advanced capabilities, it is a form of the ability of a *Wireless Mobile Device* (WMD) that can function like a computer by offering features such as *Personal Digital Assistant* (PDA), internet access, *e-mail* , and *Global Positioning. Systems* (GPS). *Smartphones* also have other functions such as camera, video, MP3 *players* , just like regular phones. In other words, *smartphones* can be categorized as mini-computers that have many functions and users can use them anytime and anywhere (Backer, 2010: 3). *Android is a smartphone* operating system by *Google Inc.* , which makes *smartphones*very popular all over the world today. *Smartphones* no longer function as telecommunications facilities, but are devices for human-computer interaction, therefore users are more interested in controlling or completing their tasks using *smartphones rather* than doing conventional methods.

It would be nice if the room door could be equipped with advanced technologyso that it can be controlled not necessarily from the room in question but through another computerized place. Only certain people can control it, so not just anyone can access the room.

1. Formulation of the problem

Based on the description of the background, the formulation of the problem to be discussed is as follows:

a) How to implement *Internet of Things* (IoT) on android-based door access?
b) How is an Android-based *smartphone* capable of being a medium for remotely controlling room door access?

2. Research purposes

Some of the objectives that will be discussed in this research are as follows:

1. Build a system that can be used as an effective and efficient substitute for conventional keys.
2. Implementation of a system that can support security in a room with the Wemos D1 Mini microcontroller.
3. Maximizing the function of an Android *smartphone* in an automation system and utilizing a microcontroller integrated with *a smartphone* to produce a creative and innovative tool.
4. It is no longer necessary to open the room door manually by pushing the door to open or close.

LITERATURE REVIEW

1. Internet of Things (IoT)

Internet of Things (IoT) can be thought of as a global network infrastructure consisting of many connected devices that rely on sensory, communication, networking, and information processing technologies. The underlying technology for IoT is RFID technology, which allows *microchips* to transmit identification information to readers via wireless communication. (Whitmore, A., Agarwal, A., & Da Xu, 2015).

2. Android

Android is an operating system developed for Linux-based *mobile devices.* Initially this operating system was developed by Android Inc. which was later purchased by Google in 2005. In an effort to develop Android, in 2007 the Open Handset Alliance (OHA) was formed, a consortium of several companies, *namely Texas Instruments, Broadcom Corporation, Google, HTC, Intel, LG, Marvell Technology Group, Motorola,Nvidia, Qualcomm, Samsung Electronics, Sprint Nextel, and T-Mobile*with the aim of developing open standards for *mobile devices* . On 9 December 2008, it was announced that 14 new members would join the Android project, including *PacketVideo, ARM Holdings, Atheros Communications, Asustek Computer Inc, Garmin Ltd, Softbank, Sony Ericsson, Toshiba Corp., and Vodafone Group Plc* (Hermawan S, 2011).

METHODS

1. System planning

At the design stage the system will be divided into two parts, namely block diagrams, and system *flowcharts* , which will explain how to design a system that is implemented on a tool made by the author.

a. System Block Diagram

Block diagram is one of the most important parts in the design of electronic components, because from the block diagram the working principle of the entire electronic circuit is made. Thus, the entire block of the tools made can form a system that works according to the plan. The block diagram of the room door access with Wemos can be seen in Figure 1.

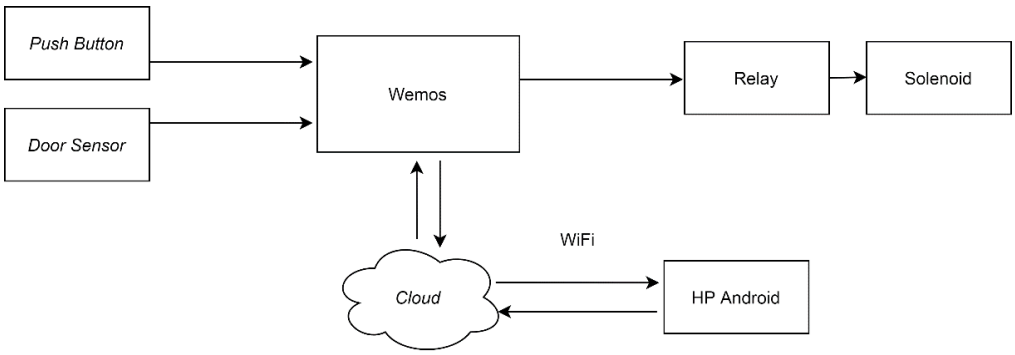

Figure 1. System Block Diagram

b. System Flowchart

A flowchart is a chart that uses the logical flow of data processed in a program from start to finish. *Flowchart* design on *hardware* is the design process for making programs that will be run by Wemos. The system *flowchart* can be seen in Figure 2

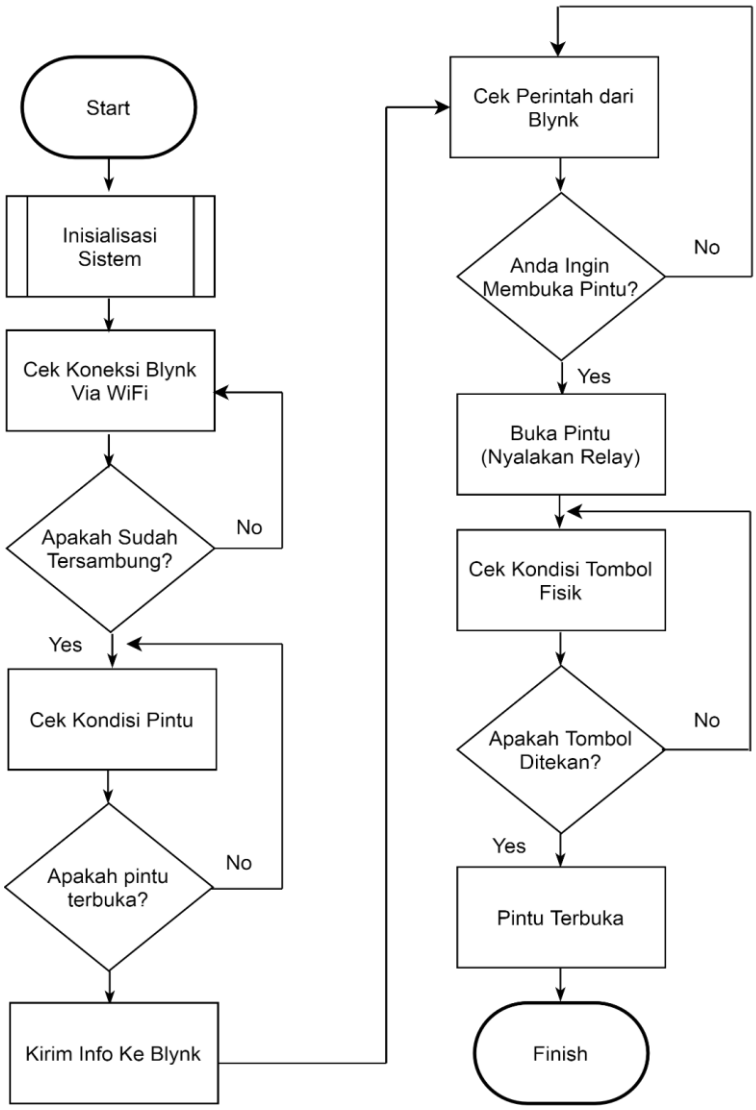

Figure 2. System Flowchart

2. Software Design

In software design or software design, the author uses the Arduino IDE *(Integrated Devloper Environment) software* . This Arduino IDE software uses the Java programming language.

a. Installing Wemos on Arduino IDE

Wemos is an Arduino *compatible development board* specially designed for IoT purposes. There are some initial setups before programming Wemos using the Arduino IDE. How to set Wemos so that it can be programmed using the Arduino IDE is as follows:

a. Open the Arduino IDE application then click the File menu *->Preferences*
b. Then in *Additional Board* Manager URL enter the following URL http://arduino.esp8266.com/stable/package_esp8266com_index.json

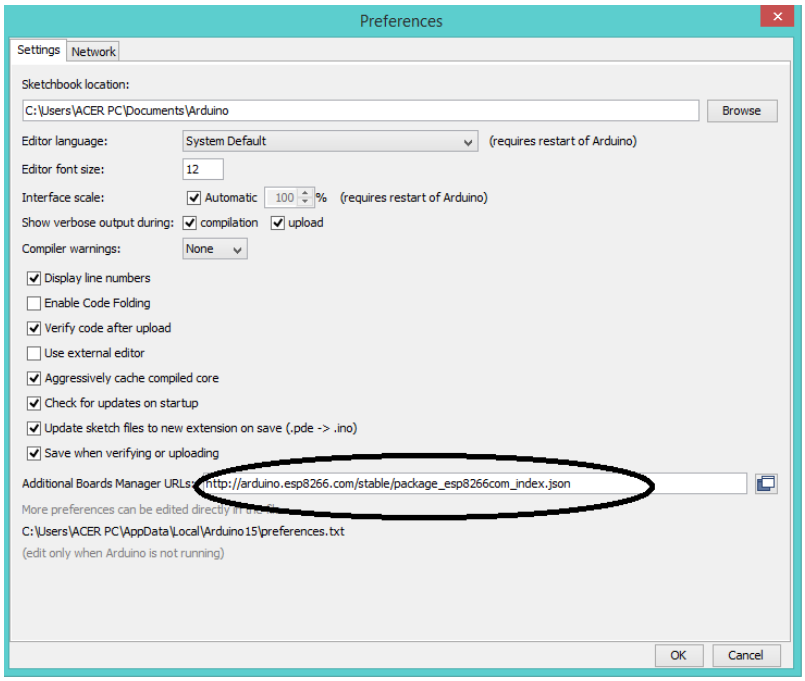

Figure 3 . Input URL esp8266 in Arduino IDE

c. After that, click *Tools ->Board* : *->Boards Manager*
d. Type "esp" in the search field, then the esp8266 by ESP8266 *Community option will appear* . Click *Install* and wait for the installation to complete.

Figure 4. Installing esp8266 on Arduino IDE

e. After the above process is successful, the Arduino IDE application in the *Tools* – *Board section* : there is already a Wemos option so you can already use the Arduino IDE to program WEMOS.

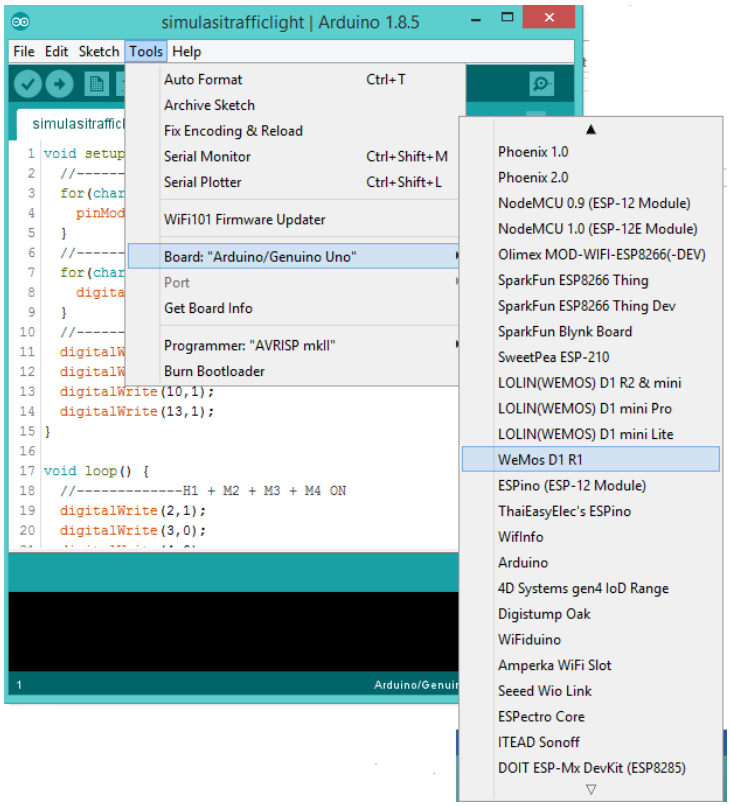

Figure 5. The Wemos board has been installed on the Arduino IDE

3. Designing on the Blynk App

The Blynk app can be downloaded for free from Google Play on Android. Next, the *user* creates a new account and project on the Blynk Application. After that, the "Auth Token" will be sent via *the user's email* , later the "Auth Token" is used as verification so that the *user 's device* can connect to the "Blynk Cloud" server.

On the Projects page, the Blynk Application provides a large selection of *widgets* that can be used in the project to be created. Each *widget* can be obtained by exchanging *"Energy Balance"* for a free service provided 2000 *energy balance is provided* .

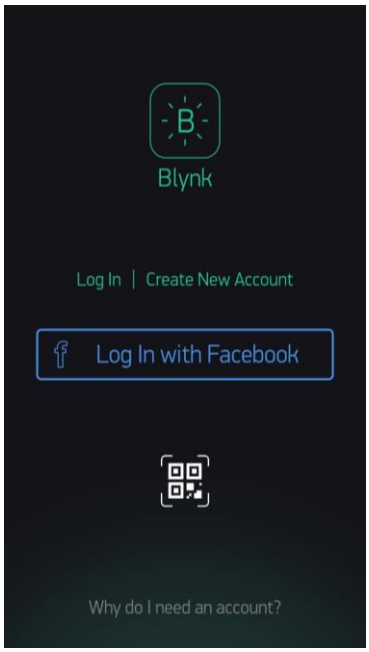

Figure 6. Login Display on Blynk

RESULTS AND DISCUSSION

Research result

1. Software and Hardware Testing

System testing aims to determine whether the system is working as planned.The purpose of this stage is to find out whether the system created is in accordance with the objectives or not. Before testing begins,make sure the tools are installed properly. Like*smartphone* and *hotspot* have been connected to a good network.

a. Testing Door Opening System with Android *Smartphone*

This test is carried out to find out whether the solenoid will open if the *On/Off Button* on the Blynk Application on the Android *smartphone is* pressed. Testing to open the door with an Android *smartphone* can be seen in Figure 7 and Figure 8 below.

Figure 7. Opening the Door with an Android *Smartphone*

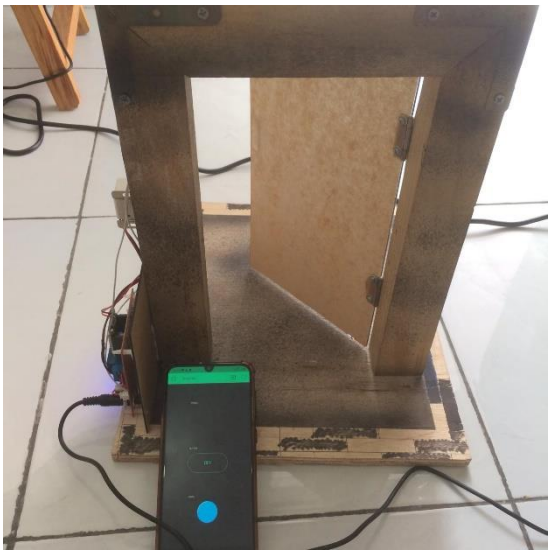

Figure 8. The door has been successfully opened

b. Testing the Door Opening System with a *Push Button*

This test is carried out to determine whether *the solenoid* will open when *the Push Button is* pressed. Testing to open the door with a *Push Button* can be seen in Figure 9 and Figure 10 below.

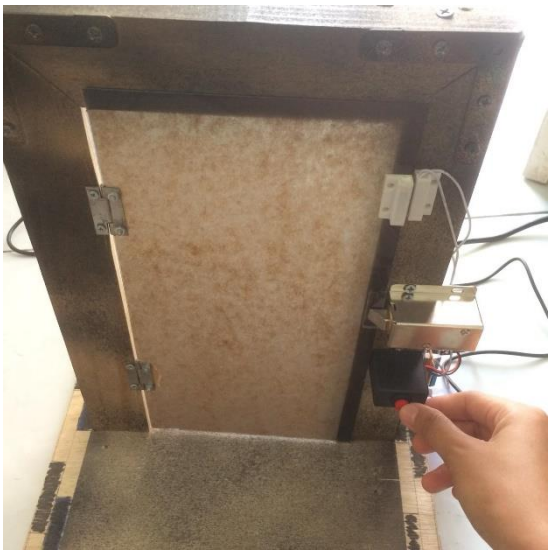

Figure 9. Solenoid is locked before the *push button* is pressed

Figure 10. Open Solenoid After *Push Button* Pressed

Discussion

Contains a discussion of research results that are described to answer research hypotheses by presenting research results related to research findings in the field, expert opinions, related theories to previous research that supports this research.

CONCLUSION

Based on the results of research and discussion of "Implementation of the *Internet of Things* (IoT) on Android-Based Door Access", the following conclusions were obtained:

1. This system is built to control door access remotely with the application of IoT using Android.
2. This system uses the Wemos D1 Mini Microcontroller and runs on an android *smartphone* that has the Blynk application installed.
3. The door can be opened from the inside using the *Push Button* .
4. solenoid locks automatically when the door is closed and the *Magnetic Switch is* brought near.
5. All device tests at all distances with 99% success rate.

6. *Auth Token* is a code that is sent by the blynk application to the user *'s e-mail* so that the level of system security can be guaranteed properly.

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