



Application Internet of Things in Controlling Fan Based Telegram

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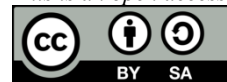
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ABSTRACT (10 PT)

IoT is a technology that is currently developing. IoT is used to control an electronic device remotely through a certain device. One of the IoT supporting devices for controlling electronic devices is Telegram. This study aims to create an Internet of Things (IoT) Application System in Telegram-Based Fan Control. The method used to create this system is to apply IoT to fans using the Arduino esp8266 which is a wifi module that functions as an additional microcontroller such as Arduino so that it can connect directly to wifi and make TCP/IP connections. This tool is used as a tool to process input data that will be sent to the output device on the system. This system also consists of a relay prototype that is used to control the electric current path on the fan. The results of the study show that smart phones can also be used to control electronic devices such as fans and other electronic devices.

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1. INTRODUCTION (10 PT)

A life with a high quality of life is everyone's dream. With advances in technology, humans hope to be able to live better and more comfortably. Seeing the increasing human needs, the development of technology is also increasing. Among the benefits of technology that can be used by humans is to create technology that can help them manage things easily and comfortably.

Various technologies that help and are also beneficial to life today are very much in accordance with individual needs, one of which is IoT technology which has many benefits. Like the case in controlling a certain tool into a tool that can be operated easily to help get the job done better.

However, today's society mostly depends on past habits where in terms of operating something they prefer to follow the previous methods, even though with the IoT technology system there are many things that can be done in operating an electronic device to make it easier and more interesting.

2. RESEARCH METHOD (10 PT)

The research method that the authors use is to use the waterfall method. The sequence of stages is as follows:

1. Identification of problems
At this stage, the author collects the necessary materials and data, groups the problems and performs problem solving.
2. System Analysis

analyze the information and problems obtained from the initial stage and also analyze the overall and detailed needs.

3. System planning

at this stage, the compiler begins to design programs, circuit models and flowcharts.

4. Assembly Tools

at this stage, the compiler assembles the tools that have been determined based on the design that has been made.

5. Program Testing

at this stage, the tool will be tested whether the program is in accordance with what was designed and carry out tests to detect existing problems and make improvements.

2.1. Internet of Things (IoT)

The internet model for Everything or in English: Internet of Things, also known as the acronym IoT is a concept that aims to expand the benefits of continuously connected internet connectivity.[1] As for its capabilities such as data sharing, remote control, and so on, this also includes objects in the real world. How the Internet of Things works is by utilizing a programming argument in which each command argument results in an interaction between fellow machines that are connected automatically without human intervention and at any distance. It is the internet that is the link between the two machine interactions, while humans only serve as regulators and supervisors of the working of the tool directly.

2.2. Control System

The control system is a combination of components that are interrelated and work together to achieve a goal. In addition, the control system also forms feedback so that the control system that has been made is in accordance with what is desired.[2]

2.3. Telegram

According to Wikipedia, Telegram is a free and non-profit cloud-based multi-platform instant messaging service application. The Telegram client is available for mobile devices (Android, iOS, Windows Phone, Ubuntu Touch) and computer systems (Windows, OS X, Linux). Users can send messages and exchange photos, videos, stickers, audio, and other file types. Telegram also provides optional end-to-end encrypted messaging.

Telegram presents a variety of features that users really need, one of which is Telegram launching a platform for developers (third party developers) to create bot accounts. A bot is a Telegram account operated by an automated program. For example, when a user sends a message to a Bot with certain commands on the Bot, the Bot will answer the message directly. Telegram bots have been developed for various needs, such as games, language translation, file downloads, to payment (payment) which are supported by certain providers such as Apple Pay, Payment wall . Money, Stripe, Rave pay, and others,

2.4. System Requirements Analysis

1. Arduino

Arduino is an open source electronic circuit board (electronic kit) which has the main component in the form of an AVR type microcontroller chip from the Atmel company. This microcontroller is an integrated circuit (IC) that can be programmed via the internet, with the aim that this electronic circuit can read and process various inputs, then produce the expected output.

2. Nodemcu Esp8266

NodeMCU Eep8266 is an electronic board using the ESP8266 chip that can connect to the internet. In many IoT projects that use NodeMCU, there are several input/output pins that can be used [3]. NodeMCU is a free platform, besides being able to connect to the internet, this board can also communicate from USB to serial [4].



Figures1 Nodemcu Esp8266

This wifi module functions as an additional microcontroller such as Arduino so that it can connect directly to wifi and make TCP/IP connections. This tool is used as a tool to process input data that will be sent to output devices.[5]

ESP8266 Specifications:

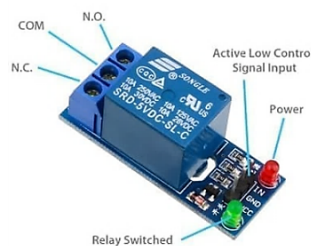
ESP826 specifications can be seen in table 2.1 and ESP8266 can be seen in Figure 2.1.

Table 1 ESP8266 specifications

Specification	Nodemcu v3
Microcontroller	Esp8266
Board Size	57mm x 30mm
Input Voltage	3.3 -5V
GPIOs	13 Pins
PWM channel	10 Channels
10 bit ADC Pins	1 Pins
Flash Memory	4MB
Clock Speed	40/26/24MHz
WiFi	IEEE 802.11b/g/n
Frequency	2.4 GHz- 22.5 GHz
USB Ports	MicroUSB

3. Relays

Relay is a device that operates based on electromagnetic principles to move the contactor to move the ON to OFF position or vice versa by utilizing electricity. The event of closing and opening of this contactor occurs due to the magnetic induction effect arising from the electric induction coil. This tool is operated electrically and is an electro component consisting of 2 main parts namely Electromagnet (Coil) and Mechanical (a set of Switch Contacts). which is used to control the electric current path on the fan.[6]



Figures 2 Relays 1 Channel

Based on the relay schematic image above, the following is a description of the three pins:

1. COM (Common), is a pin that must be connected to one of the two ends of the cable to be used.
2. NO (Normally Open), is the pin where the other cable is connected if you want an open initial position or the electric current is cut off.
3. NC (Normally Close), is the pin where you connect the other cable if you want a closed initial position or an electric current is connected.

4. Jumper Cable



Figures 3 Jumper Cable

Jumper wires are electrical wires that have connector pins at each end and allow you to connect two components involving an Arduino without the need for solder. The point is the use of this jumper cable is as an electrical conductor to connect electrical circuits. Usually jumper cables are used on breadboards or other prototyping tools to make it easier to tamper with the circuit. There are two types of connectors at the ends of the cable, namely male connectors and female connectors.[7]

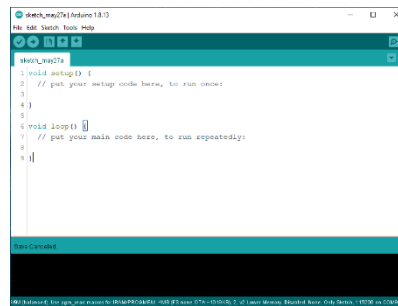
5. Fan

According to Wikipedia, a fan is a tool used to generate wind. The common function is for air conditioning. Fans are also distinguished from traditional fans, including hand fans and electric fans that are driven using electricity. The development of fans is increasingly varied both in terms of size, positioning, and function. Fan sizes ranging from mini fans (hand-held electric fans using battery energy), fans are also used in computer CPU units such as fans to cool processors, power supplies, etc. The fan functions to keep the air temperature from exceeding the set temperature limit.

2.5. System Design Aid

1. Arduino IDE

IDE (Integrated Development Environment) is a software that is used to develop microcontroller applications starting from writing source programs, compiling, uploading compilation results and testing on a serial terminal.[8]



Figures 4 Arduino IDE

Information:

1. The verify menu icon with a checklist is used to check the program written whether there is something wrong or an error.
2. The upload menu icon with an arrow pointing to the right functions to load / transfer programs made in Arduino software to Arduino hardware.
3. The Open menu icon with an arrow pointing up serves to open a saved program or open a program that has been made from the Arduino software manufacturer.
4. The Save menu icon with a downward arrow serves to save programs that have been created or modified.
5. The serial monitor menu icon with a magnifying glass image functions to send or display serial data communications when sent from Arduino hardware.

2. C language

C language is a programming language that can be said to be between low-level and high-level languages. Low-level languages mean machine-oriented languages and high-level human-oriented languages. Low-level languages, such as assembler language, this language is written in code that is understood by machines only, therefore it is only used for those who program microprocessors. Low-level languages are languages that require meticulous precision for programmers because instructions must be detailed, plus each manufacturer has its own command code. High languages are relatively easy to use, because they are written in human language so they are easy to understand and are not machine dependent. High-level languages are commonly used on computers.[9]

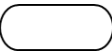
3. Flow chart

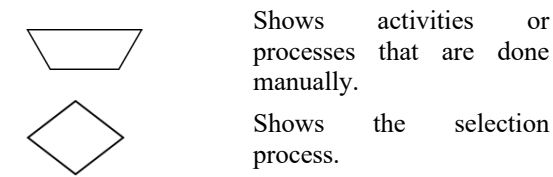
Flowchart (Flowchart) is a collection of symbolic diagram notation that shows the flow of data and the sequence of operations in the system. Flow chart (flowchart) is a method of analysis techniques used to describe a number of aspects of the information system in a clear, concise, and logical.[10]

Document flowcharts are standard symbols used by system analysts to describe a document flowchart of a system.[11]

The symbols used in this research chart are as follows:

Table 2 Flowchart symbol

Symbol	description
	Indicates the start/end of the process.
	Towards the flow of data or information.
	Indicates computer activities or processes.

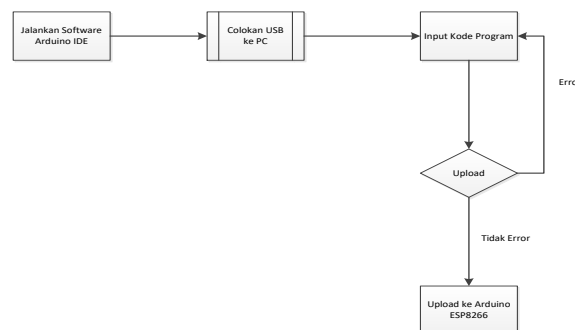


4. Microsoft vision

According to Wikipedia, Microsoft Visio is a computer application program that is often used to create diagrams, flowcharts, brainstorm, and network schemes released by Microsoft Corporation. This application uses vector graphics to create its diagrams. The original Visio was not made by Microsoft Corporation, but by Visio Corporation, which was acquired by Microsoft in 2000. Versions that have used the name Microsoft Visio are Visio 2002, Visio 2003, Visio 2007, Visio 2013, and Visio 2016 which is the latest version. Visio 2007 (or later) Standard and Professional offer the same user interface, but the Professional series offers more template options for advanced diagramming and layouts. Besides that,

5. Software Design

This software design is useful as the main controller on Arduino to carry out the functions of other device tools. Here's the concept of uploading a program to Arduino:

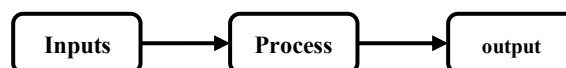


Figures 5 Software Design

5.6. System Basic Concepts

1. Tool Working Principle

This system is made for controlling the fan through the Telegram application so that it can turn on the fan only by sending a special message via the Telegram application. The basic concept of the system is:

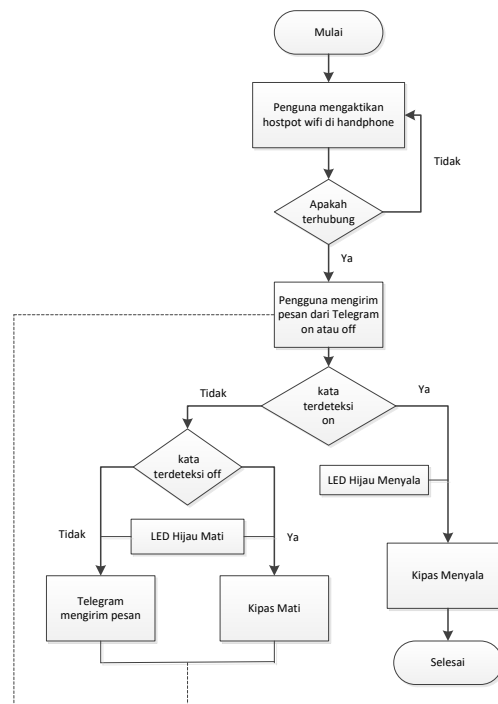


Explanation :

1. *Inputs* is a special message sent from the telegram application.
2. The process is the management of data / messages from the telegram application which is processed into a program on Arduino then processed by the relay.
3. *Output* is the result of data that has been processed by Arduino which will activate the relay, then if the data/message is detected, the relay will process the on/off path on the fan.

2. Program Flowcharts

Flowchart program is an overview of the logic system flow showing the data processing process in accordance with the instructions that have been prepared in the form of an application program. The algorithm contains the processes of the application stages that have been prepared. Program flow describes the information stages of several operations.



Figures 6 Flow chart

In Figure 4, is a Flowchart diagram of the system, the system starts with starting then the user activates the wifi hotspot on the smartphone, if it is connected, then the user sends an on/off message on the telegram application, if the message is not detected then the LED relay will light up red and will there is an incoming message in the form of an undetected message, and if the message is detected then for the on message the green light on the relay will turn on and there will be an incoming message the fan turns on, and for an off message the green light turns off and there will be an incoming message the fan turns off.

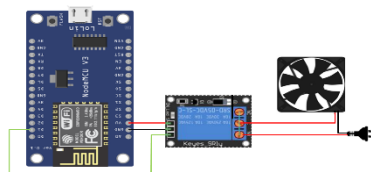
3. RESULTS AND DISCUSSION (10 PT)

3.1. Device Installation

The steps for installing this system are as follows:

1. The user installs the telegram application on the smartphone.
2. Then log in to the telegram application using the cellphone number.
3. Add the "BotFather" account from the Telegram search field and start the conversation by writing "/start"
4. To start creating a Bot account that will be used in this study, type "/newbot".
5. Then create a Bot with the name "FAN BOT".
6. To add a Bot to a Telegram account, enter the Bot username according to what will be created, namely "fan2095_bot".
7. After the username is created, BotFather will send a token which will later be entered in the programming section (Arduino IDE).
8. Enter the token into the code on the Arduino IDE along with the wifi username and password on the smartphone, then upload it to nodemcu esp8266.
9. Type a message on the Telegram Bot that has been made to control the fan according to the commands in the code.
10. The fan will turn on or off according to the message or command sent.

3.2. System Network



Figures 7 System Network

From Figure 5 it can be explained that there are 3 pins on the relay that are connected to Nodemcu by using jumper cables, the first pin is the acc relay pin which is connected to the acc pin on nodemcu, then the ground relay pin is connected to the ground pin on nodemcu, and the input pin adjusted to the input pin on the source coding in the Arduino IDE. Then the AC/DC cable on the fan is inserted into the COM and NO slots on the relay.

3.3. Arduino logic

Table 3 Arduino logic

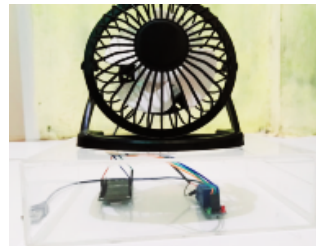
	Telegram	Green LEDs	Red LEDs	Fan
Fan Condition	Message On	Life	Life	Move
	Detected			
	Message Off	Dead	Life	Not movin
	Detected			g

Explanation:

1. If the on message from the telegram is detected, the green LED lights up, the red LED stays on, then the fan moves.
2. If the message is off or the message is not detected, the green LED is off, the red LED is still on, and the fan is not moving.

3.4. Hardware Suite

After the system has been analyzed and designed, the system is ready to be implemented or implemented. The following series of systems that have been made can be seen in Figure 8.



Figures 8 Hardware Suite

3.5. Program Usage Guide

How to use this system are:

1. The user activates the wifi hotspot.
2. If already connected to the ESP8266 wifi, the user sends an on or off message on the Telegram application to the Telegram Fan BOT that has been made.
3. If the on message is detected, the green led on the relay will light up. then the fan moves.
4. If the off message is detected, the green led on the relay will turn off and the fan will not move.

4. CONCLUSION

After conducting system analysis, design, and testing, it can be concluded that the system design made successfully turns on and off the fan according to system functions, and nodemcu esp8266 can be used as a data processing microcontroller for fan control systems with the Telegram application as the controller.

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