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Plant Monitoring Using Microcontroller And Social Media

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Abstract: *Generally, plant monitoring is still done manually, many farmers or irrigators do not understand technology, do not have enough time, and consider technology expensive for irrigating rice fields, so that in carrying out irrigation they do not know how much water is needed by plants. Based on these problems, this research was designed to design a rice field irrigation control system using microcontroller technology and social media based on NodeMcu ESP8266 and Telegram to facilitate human work in terms of irrigation, and at an affordable price. This research was conducted by designing a device that can control soil moisture using a soil moisture sensor which is controlled via the NodeMCU ESP8266 and instructed by a Smartphone Device via the Telegram Application to display the soil moisture value. The smartphone will receive a message from the soil moisture value if the soil moisture conditions are good then the green LED will light up, and if the soil moisture conditions are not good then the red LED and buzzer will light up. A plant watering control system that has been created can control and monitor plant watering devices which are controlled with check, on and off commands to control the condition of the relay to either turn on or turn off the water pump based on commands from the cellphone.*

Keywords: *plant monitoring, social media, microcontroller, telegram.*

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I. INTRODUCTION

The rapid development of science and technology today has created a variety of electronic equipment that is very helpful to ease human work. These electronic devices have become part of human life because they can help speed up or be more efficient in meeting human needs.

Along with the development of technology, there are not a few innovations in the development of information technology. For example, products from ESP2866, one of which is NodeMCU and this device uses ESP-12E. This device can be used to perform activities with automated systems and remote monitoring. Without a doubt, today's humans can be said to be very close to technology and smartphones due to flexibility in use, with maximum results.

At this time, there have been many uses of Android sartphones in controlling household appliances by utilizing the social media Telegram application. For example, controlling home appliances such as lights that use a relay driver component that functions as an automatic switching so that it is possible to use it in irrigating rice fields. Telegram is a cloud-based, multi-platform instant messaging service application that is free. Telegram clients are available for mobile phone devices and computer system devices.

The purpose of this research is to design a tool "Design and build monitoring plant system using technology based on NodeMCU ESP8266 and social media Telegram, the focus of research is on helping to monitor plants, which are one of the living things that need water for their development. Fertile soil is a prerequisite for plants to grow well. The level of soil fertility can be influenced by the intensity of the water contained in it. This tool can monitor soil moisture and can also be used to control the water pump machine so that it can water plants remotely.

II. EXPERIMENTAL PROCEDURE

The research method used uses several series, as shown in the following figure

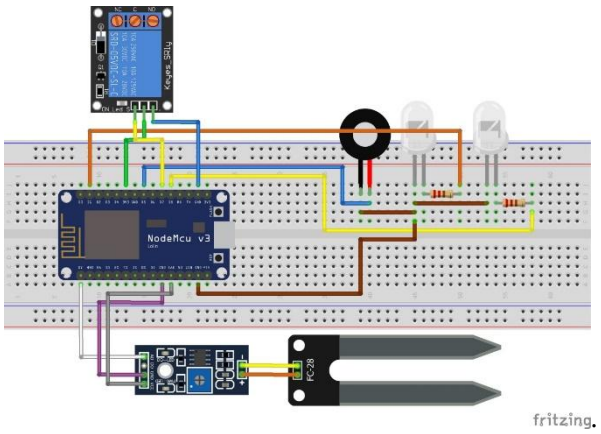

Figure 1. Research Design

In the picture above, you can see in detail the configuration or electronic devices such as the Soil Moisture Sensor, NodeMCU ESP8266, Relay, Buzzer and LED (Light Emitting Diode). In this section, the input components of the circuit before installation consist of a humidity sensor connected using a jumper.

- Resistor and Green LED are attached to pin D8
- Resistor and red LED are attached to pin D1
- Pin Relay Vcc to 3V
- Pin Relay GND to G
- Pin Relay IN to D7
- Buzzer pin positive to pin D5 and negative to pin G
- On Humidity sensor – to pin G
- On Humidity sensor + to pin 3V
- On the Humidity sensor A to pin A0

1. Tool Operation

The NodeMcu ESP8266 voltage source can be via an adapter or power bank to the NodeMcu ESP8266. NodeMcu will initialize the pin and read the program that has entered the Password and Wifi Username used in it.

Figure 2 Plant Watering Tool

In the picture above, we can see the communication between NodeMcu ESP8266 and telegram using Bot which is another word for Robot where this robot functions in sending messages, providing Code API (Application Programming Interface) which is a communication bridge between NodeMcu ESP8266 and telegram in exchanging information.

To be able to control and monitor this plant watering tool, the Smartphone and NodeMCU are connected in a network, where to connect the NodeMCU ESP 8266 with a Smartphone via the Telegram application by entering the Telegram Bot Token after that, we open the Telegram application then enter the bot chat display which we have created, after that to start or activate the tool we press Start on the initial chat screen on the Telegram application, it will automatically display a welcome message and then display a description of the options for the operation of the tool.

There is a command "/Check" to check the condition of the components, both the LED, Buzzer and water pump and to read the soil moisture value which is read by the soil moisture sensor and " /On" to change the relay condition so that it can stop the water pump if the soil is dry. or not good and will change the relay condition back if the soil condition is in a moist/good condition. The condition of the Green LED (Light

Emitting Diode) will light up if the soil conditions are good and if the soil conditions are not good/dry or too humid then the Buzzer will make a sound and the Red LED (Light Emitting Diode) will interrupt.
When the NodeMcu ESP8266 microcontroller is active, all components and indicator lights will light up and if the soil conditions are not good, the user will automatically receive a notification in the form of a message on Telegram

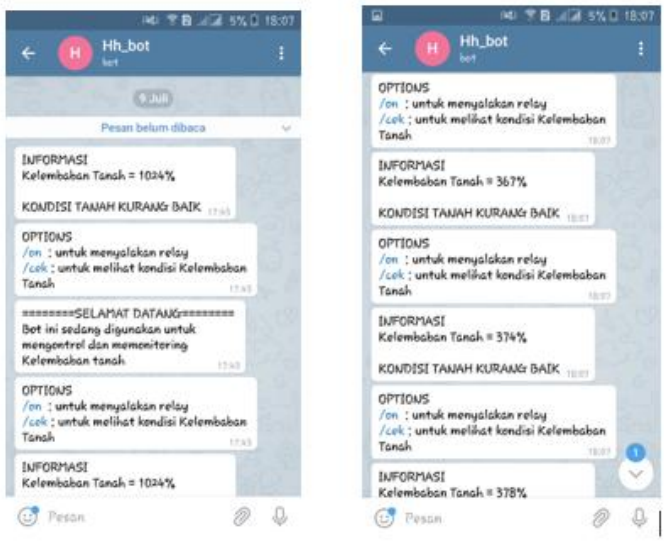

table 1. Component respon

No	Task	Code	Component Respoon			
			Led Green	Led Red	Buzzer	Pompa
1.	Cek	(msg.text.equalsIgnoreCase("/cek"))	on/off	on/off	on/off	on/off
2.	On	(msg.text.equalsIgnoreCase("/on"))	off	on	on	on
3.	Off	(msg.text.equalsIgnoreCase("/off"))	on	off	off	off
4.	/random	-	on/off	on/off	on/off	-

In Table 1 we can see that when we send the "/check" command, the Led and Buzzer are in Standby which will always work based on conditions of soil moisture whether dry, wet or moist. when executing the “On” command, the Pump is on, the Red Led and Buzzer are on, because it indicates that the soil moisture conditions are not good. On the other hand, when the soil conditions are good, the Green Led will turn on and the Water Pump will be inactive. Then if we use random words or typos it will not display any response. And it can be seen that when sending a command, either check, on or off, the case has no effect because it uses the equalsIgnoreCase function. With this function, the passed string object will be compared with the string object in the function parameter, regardless of the difference between uppercase and lowercase letters**.**

III. CONCLUSION

From the prototype of this tool, it can be concluded that the design tool for monitoring plan control system uses technology based on NodeMCU ESP 8266 using a soil moinsture sensor, relay, and a water pump that is controlled through the Telegram social media application, which can be operated using a smartphone. Where the Telegram application has a Bot Feature which will later work to help make it easier for users to send messages. Code API (Application Programming Interface) which is a communication bridge between NodeMcu ESP8266 and Telegram which allows us to exchange information.

This tool can read soil moisture with a soil moisture sensor obtained from analog data input and will display the percentage of soil moisture in the Telegram application. Telegram functions to control soil humidity, if the soil moisture is not good, it will display the option to activate the relay. Then the pump will drain the water. If the humidity has returned to normal then the pump will automatically turn off

Conflict of interest

There is no conflict to disclose.

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