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Design of an Automatic Tomato Plant Watering System with Blynk Application Monitoring

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ABSTRACT:The Study This own objective designing system smart farming use Internet of Things form sprinkler planting automatic , in particularTomato. Making system This use NodeMC as brain from system , relay driver for turn on and off water pump , LCD (Liquid Crystal Display) as displays condition soil and pumps , Blynk For monitoring sensor data and Email For give information time sprinkling plant chili . Test results show tool This walk with ok. When conditions humidity land not enough than 50% then the watering process plant tomato will walk with automatic. Whereas condition land between 60% – 80% of the watering process plant tomato automatic No running, however can run with application. For condition land more of 70% then Goodsprinkling plant chtomatoilli automatic nor manual (application) is not walk. during the watering process plant happen so system will send the target e-mail For show when and how much occurring humidity. System This naturally will become part in development a smart farming system that covers more broad.

KEYWORDS: Smart farming, NodeMCU , Blynk , Internet of Things, Email.

I. INTRODUCTION

Revolution Industry 4.0 is based on the system production intelligent (intelligent manufacturing) with a business model built by networks, computers, technology information[1],Thus, resultsfarming depending on conditionsweather can improvedwith utilise intelligent manufacturing device soft as well as technology automation[2].For that is , development agriculture smart (smart farming) to be solution endure food For enhancement quantity and quality production agriculture[3]. Smart farming own a number of aspect important such as: sensing intelligent, planning / analysis smart , and control intelligent[4].In addition , a number technology Act as Smart farming enabler including Internet of Things (IoT), Big Data, robots, drones and Cloud Computing . IoT technology can lower cost and increase wide scale agriculture through time series data collection sensor networks , spatial data from imaging sensors , and observations recorded humans _ through application cellphone smart[5]. Based on the above problem conditions, this research aims to build a smart farming system using the Blynk application in the form of a chili sprinkler. The choice of chili as the garden object was chosen because of very high price fluctuations and the majority of people need chili as a complement to cooking. In addition, chili plays an important role in the Indonesian economy and has a multiplier effect when prices spike[6].In watering plants that must be considered is the level of soil moisture because the soil should not be dry, dry soil makes plants develop slowly, and vice versa plants that have too much water can cause plants to die because the roots are submerged in too much water, in the long run the roots will rot due to lack of oxygen intake to the roots which are hampered by the amount of water[7]. Using a website platform will certainly make it easier in terms of time and energy efficiency[8].The design of this tool is made with a function as a plant waterer automatically using a soil moisture sensor as a soil moisture detector and an application for monitoring plants by displaying the moisture value of the tool.

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II. RESEARCH METHODOLOGY

ThisSystem sprinkling automatic plant with Internet of Thing (IoT) based monitoring developed use NodeMCU ESP8266as a data processing system[9]. as a data processing system , as well as use Blynk application for monitoring and data storage with using a smartphone[10].

In this design it will require some hardware to be used such as NodeMCU ESP8266, YL-69 soil moisture sensor and Aquarium Water Pump and use C language in Arduini IDE Software. The output will be displayed on the 16x2 LCD interface and the blynk website application.

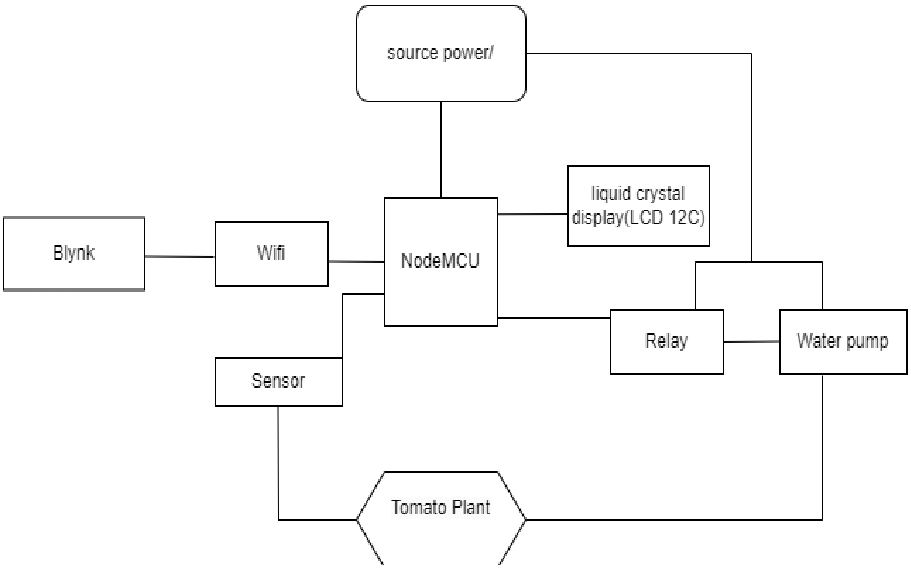

Figure 1. Blok Diagram

System design includes the process of designing block diagrams and flowcharts. Design system contents is steps operation in processingsystem and process procedures For support system operation . Figure 1 is a block diagram and Figure 2 is a flowchart. The block diagram in Figure 1 is explained that microcontroller NodeMCU and Water Pump given Genre electricity ranging from 5–12volt for move system. After That NodeMCU and Blynk will connected with wifi To use send and receive humidity data information ground. humidity sensor soil planted in plants function count humidity soil[11][12].

The I2C LCD will display the condition of the water pump and soil moisture with dry or wet indications. In the flowchart of Figure 2 it is explained that the program begins with initializing wifi with a username and password as well as a soil moisture sensor. After all is initialized, the sensor will read the soil moisture value and the LCD will display data from soil conditions. Soil moisture data and LCD will be sent to Blynk with connected wifi.

according to [13] research, soil moisture ranges from 60% to 80%, with that if the soil moisture is below 60% then the sensor will send information to the NodeMCU controller then instruct the water pump so that the pump is active then it will also be visible on the LCD and the Blynk platform. the pump will drain the water into the ground until the humidity conditions reach the point of 60% then the water pump will automatically turn off. the mechanism is for the sensor to read the soil moisture and then send it to the NodeMCU controller so that it can then control the water pump to stop.

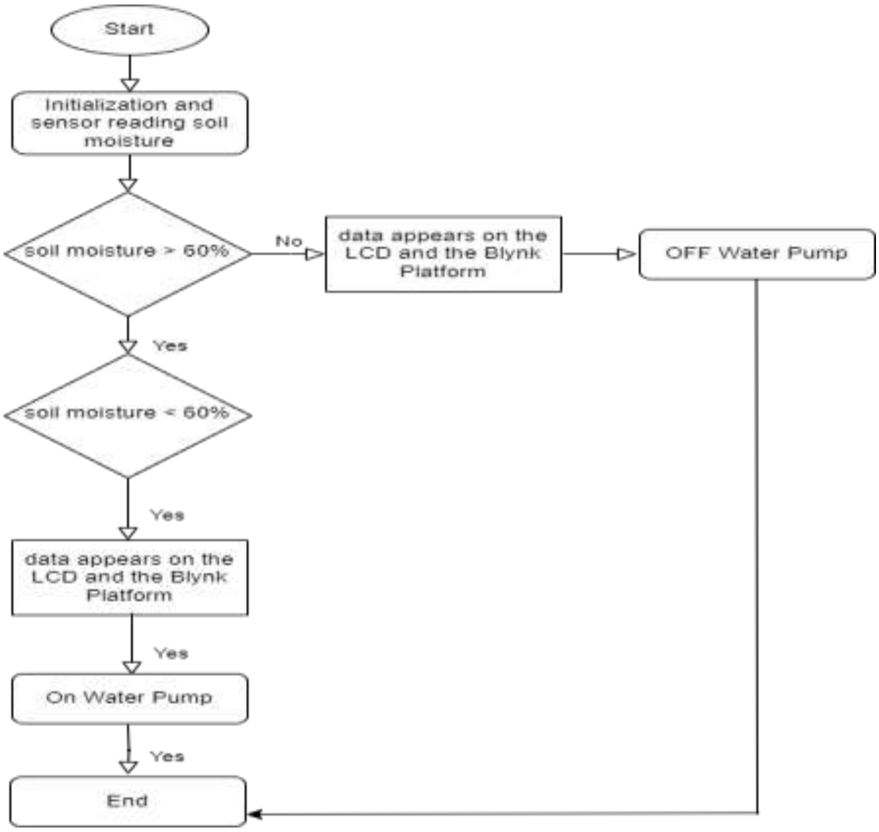

Figure 2. system flow chart

The control system is a system whose system output is controlled at a certain value or to change some conditions that have been set by the input to the system, for example, is a control on industrial or factory equipment such as controlling when the conveyor device automatically controls the pipe separator machine automatically.[14]

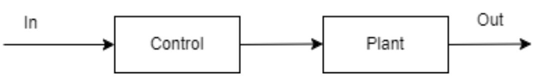

Figure 3. Open Loop Sytem

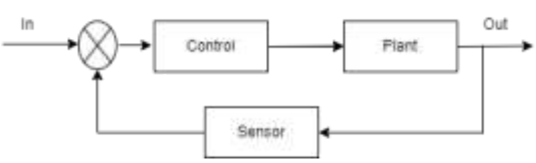

Figure 4. Close Loop Sytem

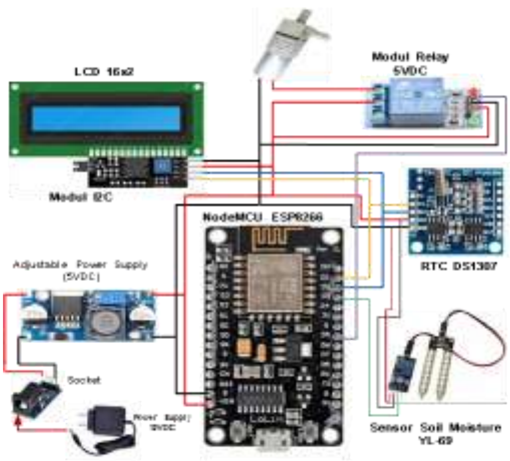

Figure 5. Overall Tool InstallationSchematic[15]

The final design is the overall design, namely the incorporation of the entire series of system installations designed into a unified whole forming the system.

The electronic devices on the outside are just mini water pumps and soil moisture sensors, while the electronic devices on the inside are NodeMCU esp8266, I2C LCD with modules, and relays. A soil moisture sensor will be attached to the

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plant object and a mini water pump will be attached to a hose and immersed in a container full of water.

III. RESULT AND DISCUSSION

A. Testing

The sensor consists of a copper plate as an electrode to measure soil moisture. The measured soil moisture is a conversion of electrical voltage which is converted into digital data[16].

Table 1.Measurement Result For Soil Moisrure Sensor Test

No	WaterVolume(cc)	Moisture(%)
1	2	36
2	4	42
3	6	49
4	8	56
5	10	63
6	12	70
7	14	77
8	16	84
9	18	91

This LCD test is to find out what percentage of soil moisture is displayed by the LCD. In this test the LCD can display the results from the Soil Moisture sensor with soil moisture values. The test results can be seen in Figure 6 LCD Testing

Figure 6. Liquid Ctystal Display Testing

The results of testing the automaticwatering system.testing the system aims to make the suitability of the end result of the tool.System testing is done by conducting experiments.

a. Testing of tool components is carried out by connecting to the power supply, all components function normally and are stable.
b. testing the YL-69 soil moisture sensor to test the results of sensor readings on soil moisture in plants, then the sensor will be plugged into the soil in a dry state, so the water pump will automatically turn on, nowhereas if the ground is damp or wet then the water pump will not turn on

Table 2. System Testing

No	Soil Conditions	LCD display	Water Pump	Blynk Aplication
1	Dry	Displays "Dry, Water Pump active" Information	Automatically active until the humidity level shows humidity or a percentage of 60%	Displays sensor data (%, condition, Chart)
2	Moist	Displays "Moist, Water Pump is not active" Information	The automatic water pump is not active	Displays sensor data (%, condition, Chart)
3	Wet	Displays "Moist, Water Pump is not active" Information	The automatic water pump is not active	Displays sensor data (%, condition, Chart)

The Results of Sensor Measurements can be seen in Table 2

No	Sensor Reader %	Soil Conditions	Water Pump Status
1	16%	Dry	active water pump
2	30%	Dry	active water pump
3	45%	Dry	active water pump
4	60%	Moist	the water pump is not working
5	72%	Moist	the water pump is not working

6	78%	Moist	the water pump is not working
7	80%	Moist	the water pump is not working
8	82%	Wet	the water pump is not working
9	84%	Wet	the water pump is not working
10	90%	Wet	the water pump is not working

Based on the data above, the humidity value between 16% and 45% is included in dry soil, so the pump will actively water it. at a humidity value of 60%to 80% the soil is moist with that the water pump is not active as well as with a humidity value of 82% to 90% the soil is wet and the water pump is not active.

IV. CONCLUSION

An automatic chili watering system has been successfully developed to monitor things based on the internet of Things (IOT), namely using Blynk as an information provider, information viewer and data store. From the results of tests carried out by this tool goes well. If the soil moisture condition is less than 60%, the process of watering the tomato plants will run automatically. Meanwhile, if the soil condition is at a humidity value of 60% or more the process of watering the tomato plants will not automatically run, or stop because it is already at a good humidity level of 60%. This system will certainly be part of the development of a smart farming systemwhich has a wider scope by using.

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