



## **Automatic Watering System for Oil Palm Seeds**

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**Abstract:** Nursery of oil palm is a period of preparing oil palm for approximately 3 months. However, in watering still using the manual method, this method still has a weakness, namely by pulling the water hose so that farmers of oil palm have to work hard and drain energy and also take a long time. From these problems, a solution was made by making an automatic palm seed watering system using the rtc module as the scheduling of the watering system and NodeMCU as the brain of the system's main process and using the blynk application as a notification output in the form of messages. As a result, the automatic watering system can work optimally if the time of the watering process has been determined and the system is able to send notifications to the blynk and display messages on the results of the watering process, with this automatic watering system it can help the work of oil palm nursery farmers.

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**Keywords:** NodeMCU, Seeds, Palm\_oil, Simplex

## **1. Introduction**

The development of technology and artificial intelligence systems that are increasingly advanced and sophisticated can make human tasks easier in terms of work. Not only in the field of health, defense. Technology has also penetrated in agriculture, especially oil palm nurseries. Nursery of Oil palm is a period of preparing oil palm for approximately 3 months starting from sprouts to become complete young plants [1].

To get good and quality nursery results, it is necessary to carry out a watering process for the maintenance of oil palm nurseries, in the watering process it is also necessary to pay attention to, because in the oil palm nursery process there cannot be excess water or lack of water. In the initial nursery, it is necessary to have sufficient water available so that the oil palm seedlings do not lack water, because basically in the early stages of oil palm seedlings have shallow roots (fiber roots) so that if there is a lack of water, the impact will look thin on the stems and do not develop or do not grow. properly, on the leaves will appear small brown spots accompanied by yellow circles and can cause death in oil palm seedlings.



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Oil palm nursery farmers still use the manual method of watering and monitoring oil palm nurseries, namely by using water hoses and gembors as a watering place, thus making farmers have to pull and pull the water hose. In this method of watering, it still has weaknesses that make oil palm nursery farmers have to work hard and drain energy and take a long time, so it is necessary to design a tool for monitoring and watering time automatically. For a fairly wide monitoring area, it is necessary to use technology that is connected via the Internet of Things (IOT). Internet of Things is a concept that has the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction [2]. Application of (IOT) on this tool to simplify and save time for farmers in the process of scheduling watering in oil palm nurseries.

## 2. Materials and Method

### 2.1 Internet of Things

The term Internet of Things is a concept where an object has the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Internet of Things is also very useful in automating all devices connected to the internet where the automation configuration can be adjusted easily without having to come to the location of the device. Both for security reasons for areas that are impossible for humans to enter, as well as for reasons of coverage of the device to be controlled [3].

### 2.2 Real Time Clock (RTC)

RTC (Real Time Clock) is a chip with low power consumption. RTC provides data in the form of seconds, minutes, hours, days, dates, months and years and programmable information. With the advantage of the chip on the RTC, it can calculate up to the year 2100 accurately. With various IC-IC interface capabilities, this chip is easily linked or connected to a microcontroller that has other build-in peripherals freely [4].

### 2.3 NodeMCU

NodeMCU is an IoT-based board and has an ESP8266 network support device with the ability to run a microcontroller function and can also be connected to the internet (WiFi). There are several Input/Output pins, in other words, they have advantages in developing a device to be controlling. Arduino-IDE is a compiler for one of these microcontrollers, the NodeMCU ESP8266. In simple terms the form of the NodeMCU ESP 8266 is very simple. NodeMCU ESP8266 is predicted to be one of the derivatives in the development of IoT (Internet of Things) [5].

### 2.4 Blynk

Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring hardware projects from iOS and Android devices. Blynk is an IoT (Internet of





Things Service) designed to make remote control and sensor data read from ESP8266 or Arduino devices very quickly and easily. Blynk is not only a “cloud IoT”, but blynk is also an end to end solution that saves time and resources power when building a meaningful application for connected products and services[6].

## 2.5 Framework

In the research methodology there is a framework, the framework is a description of the steps that affect the results of the system under study. To further clarify the research methodology, a framework of the research carried out is described. the steps of the research framework are as follows:

### 1. Identifying the Problem

The problem identified in this research is about the process of scheduling watering and monitoring contained in oil palm nurseries and can be seen through Blynk notifications.

### 2. Analyzing the Problem

The analysis in this study is to build a system that utilizes the simplex method for watering and monitoring oil palm seedlings automatically.

### 3. Setting Goals

Determining the purpose of this research is carried out so that the expected results can look better. The purpose of this study was to implement the simplex method in watering and monitoring oil palm nurseries.

### 4. Studying Literature

Studying the literature related to this research that can be used as a reference, the literature used is the simplex method, NodeMCU, RTC module and Blynk application.

### 5. Collecting Data

Collecting data, especially data in theory about the simplex method, data about monitoring the scheduling of oil palm nursery watering, and data about research to be made.

### 6. System Design

The process of designing the design system in 3D using the Google Sketchup application, determining the components to be used and using NodeMCU to control the system.

### 7. Simplex Method

The method used is the simplex method where this method performs the process as a liaison between the control system and the monitoring system.

### 8. Testing Tool

After designing the system, the next stage is the testing phase of the monitoring system for scheduling watering of oil palm nurseries, this is done in order to see the results of the performance of the tools made.

### 9. Analysis of Results





The results obtained from testing the tool are then re-analyzed in order to get more accurate results and in accordance with the tools made. The determination and accuracy of the system that works to inform the watering scheduling process is a target that can run optimally on the system.

### 10. Decision Making

After all the results of testing and analysis are obtained, the final stage is making a decision on the feasibility of the designed system, so that it can be implemented.

## 3. Results and Discussion

### 3.1 System Algorithm

At this stage of the data system process, the process starts from the NodeMCU as the main control system which becomes a mini radio transmitter equipped with a wifi connection. The NodeMCU will be connected to the power supply as a source of electric current, then the RTC module is also connected as a watering scheduling process and is active when the time has been determined for the watering process automatically, and also a servo motor as a control or driver for the watering process. Data from the results of the watering process will be displayed on the Blynk application.

In its application using unidirectional communication (simplex) in this watering scheduling system, it begins with the input process of sending data to the intended recipient and processed to output. In Figure 3.1 the process of receiving data on the RTC module input that has been detected as a watering scheduling process is then processed at the NodeMCU as the main control system to produce output. In its application, the blynk application is used to display the results of the watering scheduling system data sent from the RTC module and produces an output in the form of a watering process. Below is a block diagram of the system, in

Fig.3.1.

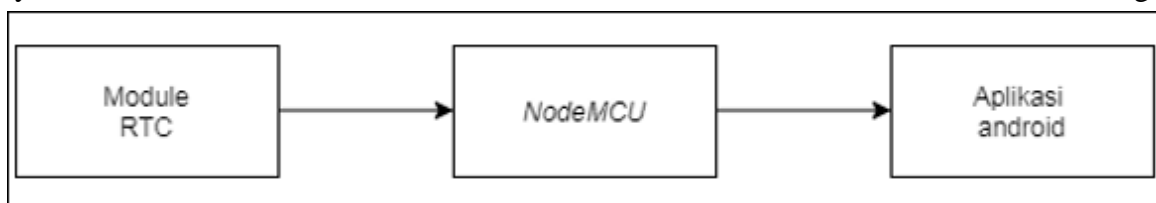


Figure 3. 1 One-way Communication (Simplex)

In Figure 3.2 the process of receiving data on the RTC module input that has been detected as a watering scheduling process is then processed at the NodeMCU as the main control system to produce output. In its application, the blynk application is used to display the results of the





watering scheduling system data sent from the RTC module and produces an output in the form of a watering process. Below is a block diagram of the system, in Figure. 3.2.

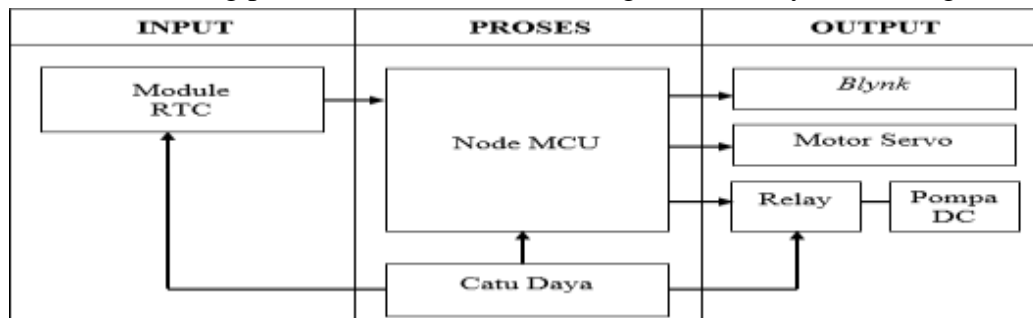


Figure 3.2 System Block Diagram

1. RTC Module

The RTC module functions as a scheduler in the process of watering oil palm nurseries.

The RTC module

will work when it detects the time that has been set in the watering process.

2. NodeMCU

NodeMCU functions as a processor from the RTC input module as a watering schedule for oil palm

nurseries.

3. DC Pump

The water pump functions to pump and spray water on oil palm nurseries according to data processing.

4. Relay

The relay functions as controlling and flowing current in a dc water pump and as a time delay.

5. Servo Motor

Servo motor functions as a driver or control in watering oil palm nurseries.

6. Blynk

Blynk functions as a notification viewer of data that has been processed by NodeMCU to find out whether

the oil palm nursery has been watered or not.

3.2 Overall Circuit



The system circuit can be seen starting from the RTC module, MCU Node, DC pump, Relay and Servo Motoras shown in 3.3 below.

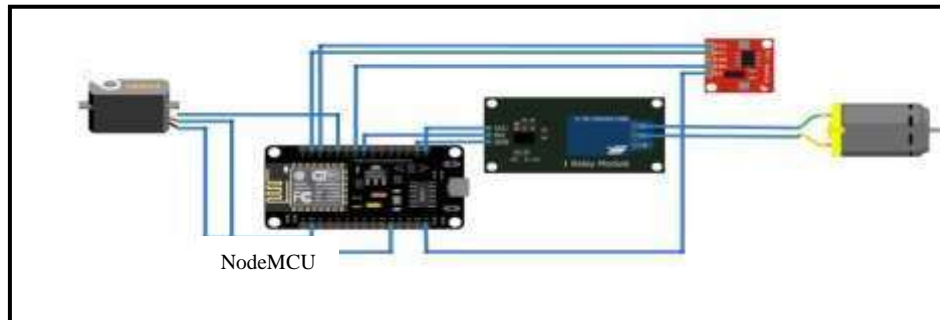


Figure 3.3 Overall Circuit

#### 4. Implementation And Testing

In the circuit drawing of the entire automatic watering system, all components are combined so that they become a single unit and can be implemented and tested for the system. All components such as the rtc module, relay module, dc water pump and servo motor are interconnected with the NodeMCU as the main processing brain of the system, and connected to a 9V 2 ampere power supply adapter as a source of system voltage and power so that the system can run. Figure 3.4, below



Figure 3.4 Overall Circuit

Testing this system using the blynk platform, this test is carried out to find out whether the system can send data to the blynk platform, system testing is carried out by displaying notifications in the form of messages that result from the process starting and finishing watering. The following is a description of the blynk platform interface according to Figure 3.5



Figure 3.5 Blynk Platform Interface Display

The first test is carried out by activating the system with the aim of carrying out the watering process, at the time of the watering process that has been determined, the system will be active and the water pump will run for one minute. Based on the tests carried out, the system is able to send notifications to Blynk and display an incoming message notification in the form of "Spraying On". As shown in Figure 3.6



Figure 3.6 System Testing Displays "Watering On" Notifications

After the one minute watering process is complete, the system will turn off and the water pump will turn off. Based on the tests carried out, the system is able to send notifications to blynk and display an incoming message notification in the form of "Sweeping Off". According to Figure 3.7, below



Figure 3.7 System Testing Displays "Watering Off" Notification

## 5. Conclusion





The conclusions that can be drawn from the Automatic Watering System for Palm Seeds are as follows:

1. Based on the results of tests carried out all components can be interconnected with the main processor as expected and the system can run well.
2. This design uses the blynk application as a notification or notification of watering results. From the results of tests carried out the blynk application is able to display incoming message notifications in the form of on and off watering results.
3. This system uses the RTC module as the scheduling of the watering process. The rtc module will work if the time for the watering process has been determined. From the results of testing the watering scheduling process as expected with the morning and evening watering process
4. This design uses NodeMCU as the main process of the system. Based on testing NodeMCU is able to work as expected and can be connected to internet network access stably.

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