Prototype System of Temperature and Humidity Automatic in Oyster Mushroom Cultivation using Arduino Uno

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Abstract. Current technological developments make it easy to carry out maintenance of oyster mushroom cultivation. The maintenance can be done by setting the temperature and humidity automatically in the cultivation room. With automatic temperature control, it can facilitate the treatment of oyster mushrooms. In realizing the simulation of creation, automatic temperature and humidity controller consists of the hardware that are needed such as temperature and humidity sensor units, LCD display units, and Arduino Uno as the processors which are then combined into a system. The software part is designed to use C language as the programming language to regulate the temperature and humidity based on Arduino Uno which is based on 3 main circuits, there are Input circuit, Process sequence and Output circuit. The temperature and humidity sensor circuit as input, Arduino Uno as a processing, sprinkle as output. The advantages of this system are: farmers do not always have to stay in the garden to spray the farm in morning and evening.

Keywords: Arduino uno, Relay, DHT11 Sensor, Sprinkle.

1. Introduction
The development of oyster mushroom cultivation is currently increasing very rapid growth marked by the increasing number of breeder farmers or mushroom enlargement that is directly proportional to the amount concentrated in food in mushroom fields. Oyster mushrooms can produce leaf stems at optimal temperatures below 33 °C and an air humidity range of 80-90% [1]. Over time the farmers reversed the difficulty in controlling the temperature and humidity of mushroom kumbung every day [2]. Their efforts usually use a manual spray that is sprayed on the mushroom kumbung when morning and evening each brought. Besides being less practical, other disadvantages occur with such a method, that is if there is no temperature and humidity throughout the day as is usually the case at the change of the current season, it is not enough to just spray with a sprayer every morning and evening. To maintain moisture automatically, it is needed in addition to saving time and energy, the care needed is very so that the fungus grows perfectly. Automatic settings for temperature and humidity in oyster mushroom kumbung can use arduino uno and temperature sensor.
2. Method

Explanation of automatic temperature and humidity control systems, namely: Power bank provides electricity to the appliance to function, or arduino uno can operate properly the DHT11 temperature sensor reads the temperature and humidity of the oyster mushroom kumbung then sends it to arduino uno. After that arduino uno processes it by reading the DHT11 sensor then the temperature and humidity readings are sent to the LCD and after the LCD outputs the output in the form of a display then at arduino uno sends its commands to the relay in the form of high/low. The logic is that if the relay is high then the water pump dynamo will be active / on, it means the water pump directly pushes the water so that the sprinkle will rotate and spray the oyster mushroom kumbung. After the watering takes place until the sensor detects the temperature and humidity conditions are good enough, then the relay that is in the oyster mushroom kumbung will meet or sprinkle will stop automatically for the watering process.

Figure 2. Flowchart automatic temperature and humidity control system
Explanation of flowchart program for automatic temperature and humidity control system in oyster mushroom cultivation, Arduino Uno checks whether the DHT11 temperature sensor has been installed. If detected, the DHT11 sensor will scan the temperature conditions in the oyster mushroom tomb then the results of the detection are sent by Arduino Uno via relay and sensor results will also be displayed via the LCD screen. If detected by the DHT11 sensor is greater than 330°C and if the humidity is less than 85% the LCDs if the relay will light up, by igniting the relay then the adapter that has been connected to the Dynamo will be connected and the water pump dynamo will live, and sprinkle or 3 feet flush tool will water the backlog of oyster mushrooms.

3. Result and Discussion

The prototype for oyster mushroom consists of plywood that is designed similar to mushroom kumbung, in which there is a DHT11 sensor to detect the temperature and humidity conditions in the baglog and the sprinkle (sprinkler 3 feet) which sprinkles as a watering media on the baglog for the oyster mushrooms.

Results of a DHT11 sensor circuit (This tool is used as a detector for temperature and humidity)

![Figure 3. DHT11 Sensor Installation](image)

The LCD (liquid crystal display) assembly used is a type of character that has a 16 character x 2 line display. To display the state of temperature and humidity in the oyster mushroom kumbung room. The Arduino pin connection process is connected to the LCD pin, following the assembly between the LCD and the arduino uno board.
The current used in the circuit is DC. A relay is an electronic switch that can open or close a circuit by using controls from other electronic circuits. Assembly between the relay and the Arduino Uno board.

![Figure 4 Installation of 2x16 LCD](image)

This automatic temperature and humidity control system test table explains how the test system is carried out so that the system runs as expected.

| Temperature(°C) | Humidity(%) | Relay |
|---------------|-------------|-------|
| 31°C          | 95%         | OFF   |
| 32°C          | 91%         | OFF   |
| 33°C          | 85%         | ON    |
| 34°C          | 75%         | ON    |
| 35°C          | 76%         | ON    |
| 36°C          | 69%         | ON    |

![Figure 5. Relay Installation](image)
4. CONCLUSION

1. In the automatic temperature and humidity control system in the cultivation of oyster mushrooms using this Arduino uno, as a detector of the temperature in the mushroom kumbung room using a temperature sensor DHT11 and 16x2 LCD as a medium to display the temperature and humidity conditions in the room in the oyster mushroom

2. Sprinkle do automatic watering with temperatures above 33° C and humidity more than 85% if the temperature is below 33° C then the relay will turn off and will automatically stop the sprinkle for the watering process

3. By creating an automatic temperature and humidity control system in the cultivation of oyster mushrooms can provide convenience in the process of doing automatic watering on baglog oyster mushrooms effectively and efficient

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