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Rain Detector for Cloth Hanger

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Abstract: In recent days, technology plays an important role in our daily life. The invention of things has shown its capabilities to ease the hectic of human daily life. This project is proposed to facilitate the need for humans to dry clothes. This functioning cloth hanger is constructed by a combination of rain detector circuits which included a Rain Sensor Module that sends the input to the DC Motor to move. Besides, it is also equipped with the breadboard and Node MCU for making the circuit complete. It works when the battery in the battery holder works as the power supply is inserted into the Node MCU and makes all the components in the circuit light up. The DC Motor will be moved when the rainwater touches the sensor plate. The system will activate automatically when the water touches the plate and will send the input to the Node MCU for making the cloth hanger move. In this project, the sensor will be tested to demonstrate its functionality and suitability.

Keywords: Node MCU Esp8266, DC Motor, Rain Sensor

1. Introduction

Due to unpredictable weather circumstances such as rain, some people may find it difficult to dry their clothes outside in an unstable climate [1]. Most people who work and live in a flat house are concerned about their clothes drying outside. If it's pouring, they don't have time to change their clothes.

There are many different clothes drying rack designs on the market. However, many of the designs are enormous and take up a lot of room. Some homes have a relatively limited amount of room. For drying clothes, they have a lot of volumes. As a result, they are having difficulty purchasing a clothes dryer rack based on their home conditions and bringing their clothes in while it is raining. A device that takes up little space saves time and relieves consumers of the concern of hanging clothes outside is required.

This project aims to create a rain detector for a cloth hanger to alleviate laundry problems for household use. When it rains, the moves automatically to assist individuals who hang clothes outside. Using DC power window motors and a microcontroller as the main function to control components, the clothes drying rack can move forward and backward automatically [2]. When it's pouring or dark

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outside, the rack moves backward. The rain sensor serves as a link between two circuits. The Blynk App [3] and the Node MCU ESP8266 are used to connect with the phone. When it is about to rain, clotheslines will be moved to a location where they will not be exposed to the rain.

2. System Development

2.1 Block Diagram of the Project.

Figure 1 shows the project's block diagram for the cloth hanger's initial and end operations rain detector.

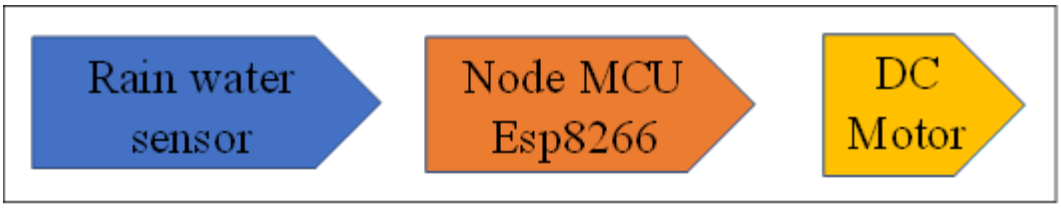

Figure 1: Block Diagram of the project

The rainwater sensor as input data to Node MCU ESP8266 [4]. The Node MCU ESP8266 responds process and compares the data. After comparing the data and getting the next process, it triggers the motor to operate as per setting to move the clothesline.

2.2 Rain Sensor

The rain sensor was a simple gadget to detect rain. The rains sensor's PCB is made of copper tracks that operate as a variable resistor. The resistance principle is used by the rain sensor module. Its resistance changed depending on how wet the raining board was. The rain sensor's sensitivity could be modified to be less or more sensitive [5]. Figure 2 depicts the rain sensor component utilized in this project.

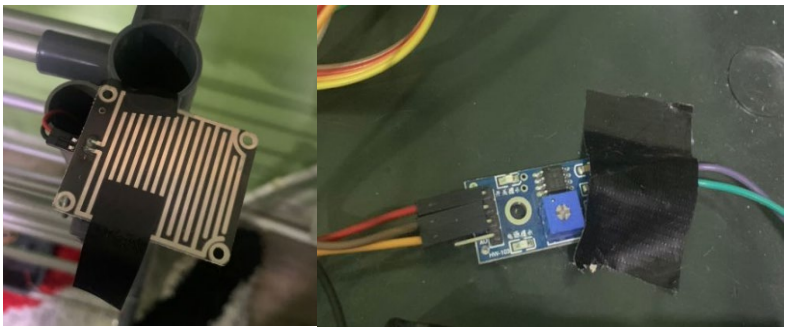

Figure 2: Element of the rain sensor

The resistance of the rain board surface was low when it was exposed to rainwater. As a result, the Node MCU ESP8622 activates the DC motors on the left and right to retrieve the clothes drying system.

2.3 NodeMCU ESP8266

NodeMCU is an open-source platform based on the ESP8266 that allows things to be connected and data to be transferred using the Wi-Fi protocol as shown in Figure 3. Furthermore, it may solve many of the project's demands on its own by providing some of the most important functionalities of microcontrollers such as GPIO, PWM, ADC, and so on. In this project, if the rain sensor detects rainwater it will signal to the NodeMCU and it will alert the handphone using the Blynk App. The NodeMCU needs specific coding to make this project work.

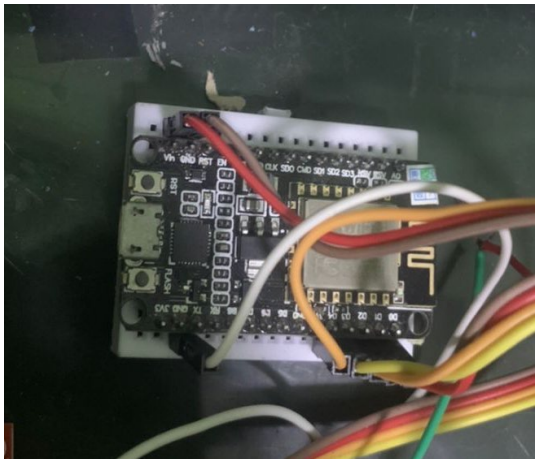

Figure 3: Element of NodeMCU ESP8266

2.4 DC Motor

Any rotary electric motor that converts direct current electrical energy into mechanical energy is referred to as a DC motor [6]. The most common varieties rely on magnetic fields to produce forces. Because they could be supplied by existing direct-current lighting power distribution networks, DC motors were the first type of motor to become widely employed. The speed of a DC motor can be varied across a large range by varying the supply voltage or adjusting the current intensity in the field windings. This project used two DC motors on the left side and right side of the drying rack as shown in Figure 4. It is powered by a 12 V DC power supply.

Figure 4: Element of DC Motor

2.5 Software Development.

The program for this project is written using the Arduino Software (IDE) software. The code was written down and compiled using the Arduino Software (IDE) interface, guided by the flowcharts created prior. Using a USB cord, the compiled code was then uploaded straight to the NodeMCU ESP8622 board. [7]

The flowchart of the rain detector for the cloth hanger is shown in Figure 5. Initially, the clothes' drying system is placed outside, when the rain sensor detects raindrops and the clothesline retrieve-in. In the other case if the rain sensor is dry and the weather is sunny, so the clothes move outside and dry.

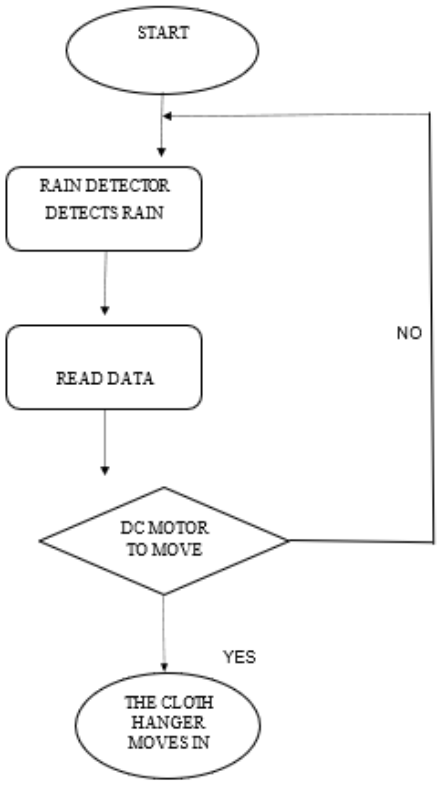

Figure 5: Flowchart of rain detector for cloth hanger

3. Result and Discussion

This project contains only one sensor as shown in Table 1 (Results). There are two conditions of rain for cloth hangers to operate. The sensitivity of the sensor is set by adjusting the sensitivity level sensor. The situation started in the first case when the circuit detected water, it automatically becomes a close circuit, and the clothesline retrieve-in it. In the second case, when the NodeMCU ESP8622 receives the signal that the rain sensor is dry, it will automatically retrieve-out and dry the clothes.

Table 1: Result of the situation

Time	Output for Rain Detector	Condition	Actual Weather	Explanation
12.00 pm	Not raining	OFF	Sunny	The cloth hanger moves outside
1.00 pm	Not raining	OFF	Sunny	The cloth hanger moves outside
2.00 pm	Rain warning	ON	Cloudy	The cloth hanger moves inside
3.00 pm	Raining	ON	Rainy	The cloth hanger moves inside
4.00 pm	Raining	ON	Rainy	The cloth hanger moves inside
5.00 pm	Not Raining	OFF	Cloudy	The cloth hanger moves outside
6.00 pm	Not Raining	OFF	Cloudy	The cloth hanger moves outside
7.00 pm	Not Raining	OFF	Cloudy	The cloth hanger moves outside

3.1 Hardware of Procedure

This project aims to create an autonomous method for retrieving clothes from a clothesline in different weather conditions. There was a technical and mechanical aspect to it. A retractable clothesline is shown in Figure 6.

Figure 6: The rain detector for the cloth hanger

On the market, there were numerous clothesline machines. A drying rack with three layers of clothesline was chosen for this project. According to my research, the two-layer clothesline bars are suitable for people who live in an apartment with limited space.

Figure 7: DC Motor

To connect the DC motor to the current drying rack, you'll need technical abilities and mechanical ideas. Figure 7 shows how the DC Motor was mounted utilizing the cable tight method. The NodeMCU ESP 8266 decides and controls the motor rotation as a setting.

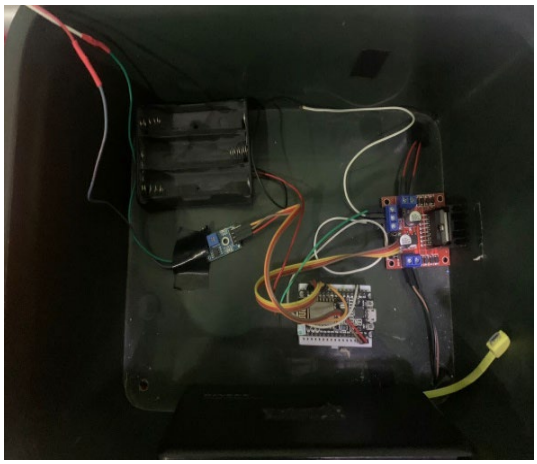

Figure 8: Electrical Part of the drying rack

The electrical element of the rain detector for the cloth hanger is shown in Figure 8. The system's instructions are coded in Arduino Software and uploaded to the NodeMCU ESP8622 board. In terms of the conditions specified, both sides of the cloth hanger were successful in retrieve-in and retrieve-out. During this operation, the rain sensor's sensitivity and troubleshoot are modified.

3.2 Methods

Figure 9: Full construction build of the project

Refer to Figure 9 to show the project's final product. A professional rain detector for cloth hangers is utilized. The DC motor is located on the left and right sides of the cloth hanger, respectively. The distance length of the cloth hanger retrieve-out is less than 1 meter when the circuit control is turned on. Wet clothes can be hung on them. The DC motor has shown to be sufficiently powerful, allowing the retractable cloth to be retrieved in and out quickly and smoothly. Based on the condition that has been set, both sides of the DC motor are functioning synchronously.

The cloth hanger has a three-layer clothesline bar that can hang ten to fifteen pieces of clothing at a time, depending on the size of the clothes. The DC motor would move the cloth hanger forward when the control circuit triggers the rain sensor when it is dry. The DC motor pushes the cloth hanger backward when the rain sensor detects precipitation.

4. Conclusion

One of the answers to the laundry problems that busy people and working couples have is a rain detector for cloth hangers. Because the weather can shift from sunny to rainy days and vice versa, it's difficult to schedule a washing day where the clothes can dry for the entire day. When it's sunny outside,

the clothesline is automatically retrieved, and when it's raining, the clothes are automatically retrieved. This project can handle wet garments weighing less than 5 kg on the road.

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