

DESIGN AND DEVELOPMENT OF AUTOMATIC RETRACTABLE ROOF FOR CLOTHESLINE WITH NOTIFICATION SYSTEM

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Abstract: Nowadays because of corporate culture people spend less time at house, and some require the help of latest technologies for safety and other basic needs. Smart home automation gadgets are created to minimize these problems. This paper entitled 'Design and development of Automatic retractable roof for clothesline with notification solves such a solution. Main theme of this project is to prevent washed clothes becoming wet by rain while hanged in clothesline. This problem occurs when the user is not at reachable area when the rain occurs. A retractable roof which senses rainy condition and covers the clothesline from rain. Thus, the proposed hardware contains three modules sensing, driving, notification systems. Sensing and driving modules are controlled by Arduino UNO controller. Notification system comprises of user's login details and status of the retractable roof. As in many retractable roof the driving mechanism is by a tubular motor. Tubular motor works in servo mechanism, hence in this prototype servo motor is used for driving module. And this proposed method is more simple in design and low cost to construct than its previous versions.

Keywords: Arduino UNO, ESP8266, MG995 servo motor, rain sensor, retractable roof.

1. Introduction

At present people find difficult in fulfilling their daily basic work. Because of heavy work load and surge in growing industries many people couldn't reach a place on time. With a burgeoning technologies nowadays comes a solution for such problems. Many apparent to arduous problems are divulged using latest technologies. These elucidation make people of all formats comfortable and blithe. Similarly this project too gives solution to such problem.

Controlling weather is impossible. With these facet condition, hanging washed clothes in clothesline at open

ground or terrace anguish the user of raining probability. Thus this prototype solves and checks all the checklists of problems in this scenario. From the first in choosing the controller for this prototype Arduino UNO. It is a prototype platform based on affordability on all conditions. FC-37 rain sensor senses rain and acts an input module in this project. Servo motor acts as a driving module for roof. For user convenience a notification system is built with an IOT module, ESP8266.

1.1 Methodology

Servo Motor

Discordant of DC motors, servo motors able to position precisely at some angle with control signals. The motor shaft position depends control signal. Thus this principle servo motor is used for various applications. Servo motors vary in size and torque it drives. Mostly low voltage, mini sized servo motors are powered with the supply from Arduino. For the prototype of ARRC system MG995 servo is preferred as it has a shock proof double ball bearing design.

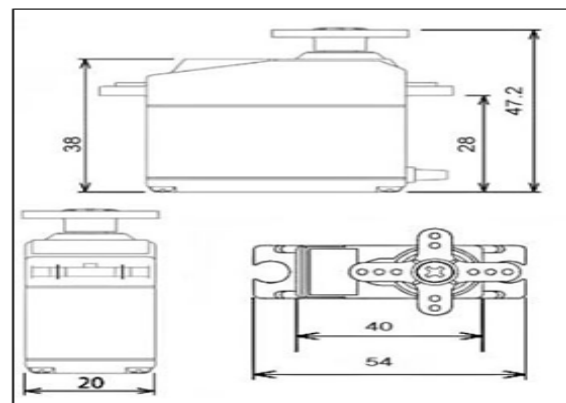


Figure 1.1. Servo motor design image

Water Sensor

Water sensor senses the rain activity. With the purpose of acting dual role, such as a switch and intensity measuring device is useful. This module has two boards detection board and control board. First the control unit has a LED indicator, potentiometer for other applications.

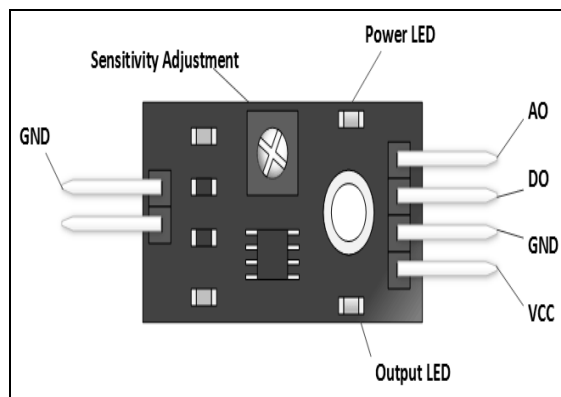


Fig. 1.2. Water sensor detection board image

The analog signals from the control board detects intensity of rainfall. On the other hand with digital signal rainfall presence is detected. This signal from rain sensor works in an inverse logic. As a high output is high, it indicates no rain.

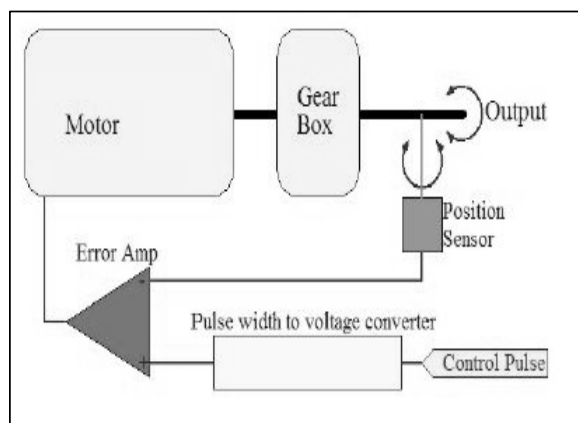


Figure 1.3. Rain sensor controller mechanism image

2. Literature Review

Prabhakarhegade *et al.* presented a technique of protecting clothes from rain. This system protects clothes in rainy weather automatically. The controllers used is 8051 IC and a driver ULN 2803. ULN 2803 is used to control relay for switching between drivers. This system

works in complex circuitry. The design ARRC is simple. This prototype is easy to build and understand.

Abhijit G Kalbande *et al.* contemplated a concept of smart automation using GSM module. By the accession of notification module with the automation is laudable. But the module with notification is under deemed. GSM module has some demerits withal. GSM is not secure, and has a fixed maximum cell site range of 35km. Gsm becomes outdated with intervention of new telecommunication networks. In ARRC, notification module is built with Wi-Fi enabled system. This system notifies the command with the web server designed for the user. In every successful operation the data is sent to server which the user can view it at anytime, anywhere, with a smartphone or computer.

Manan Mehta *et al.* adduced a journal on ESP8266 entitled as 'ESP 8266: A BREAKTHROUGH IN WIRELESS SENSOR NETWORKS AND INTERNET OF THINGS'. In this paper issues of technology is untangled via a small Wi-Fi to serial module, ESP8266 is explained. It is economic and simple to use this module. Thus ARRC uses this module for notification system.

In the same degree, from sensing module to roof design all patents and journals are verified.

3. Design Methodology

3a. Block Diagram

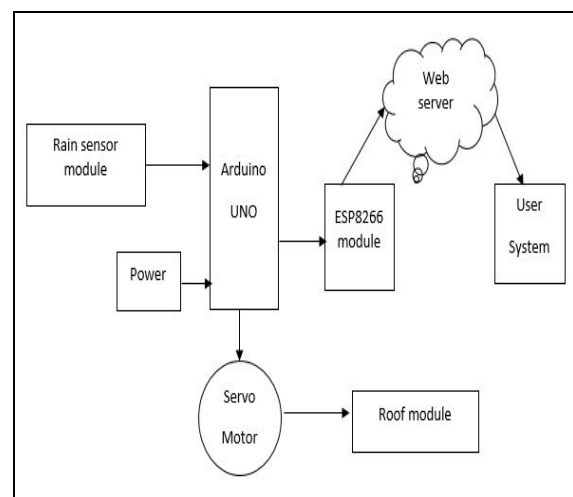


Figure 3.1. Block diagram of ARRC image

Arduino Uno acts as a controller in this project. Rain sensor as an input senses the rain continuously. Interaction with web server is accomplished by ESP8266 Wi-Fi module. MG 995 servo as an output device to drive roof mechanism.

3b. Flow Chart

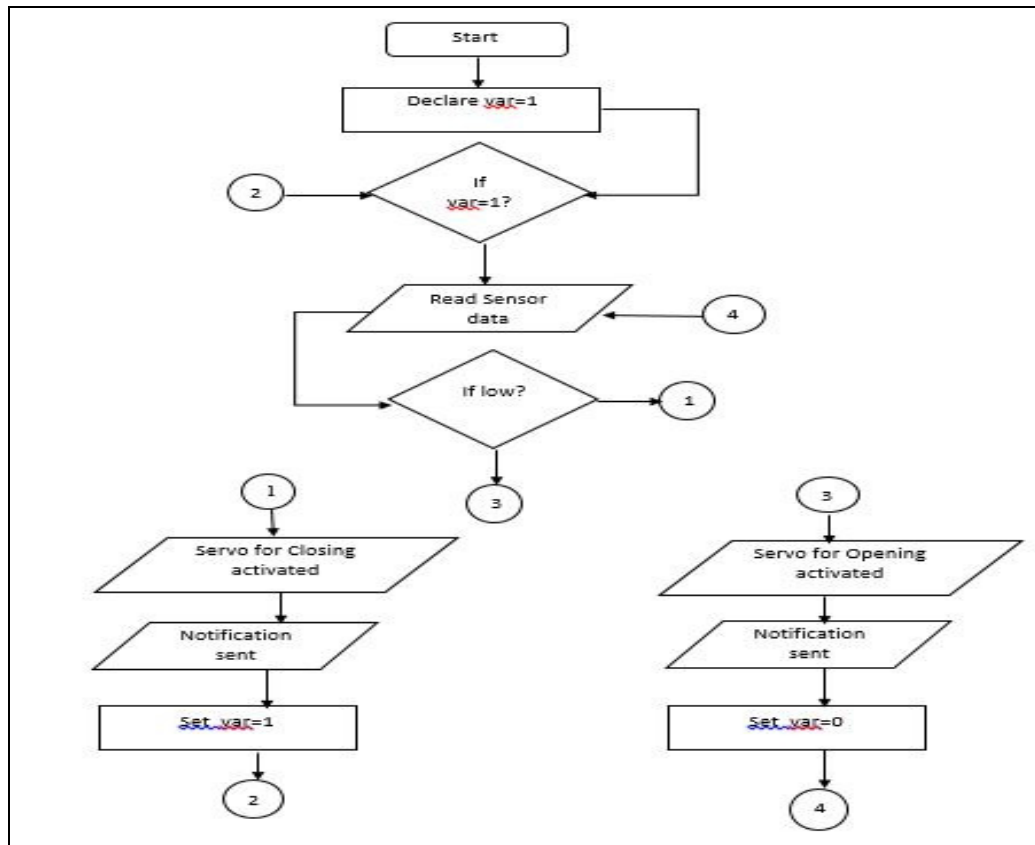


Figure 3.2. Flowchart of Arduino programming image

As the output of the motor depends on rain sensor. The controller is programmed in a continuous loop to monitor the rain and it results in motion of the servo.

5. Results

a) Circuit connection

4. Specification

4a. Hardware Prerequisite

- Arduino UNO
- ESP8266 WIFI MODULE
- MG995 Servo motor
- Power Supply

4b. Software Prerequisite

- Arduino IDE
- Web server with apache tomcat enabled.
- Webpage created using HTML & bootstrap and hibernate for DB connection.

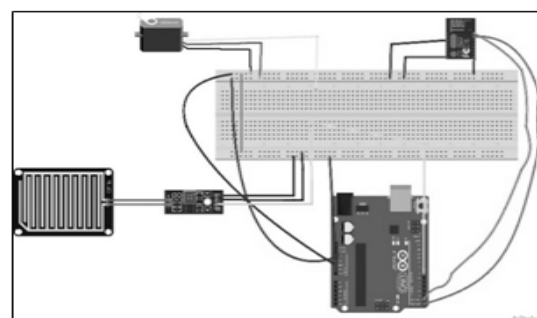


Figure 5.1. ARRC schematic image

The above image describes the breadboard connection of the circuit of the system.

b) Notification Module

Figure 5.2. Notification module- login image

From the above fig 5.2, displays login form in web page.

Figure 5.3. Notification module- registration image

From the above fig 5.3., shows the User registration form for notification credentials.

ARRC - NOTIFICATION SYSTEM		
S no.	Messages	TimeStamp {yyyy/MM/dd HH:mm:ss}
1	Opened successfully	2018-01-23 22:25:02.0
2	Closed successfully	2018-01-23 22:25:12.0

Figure 5.4. Notification module- Output table image

From the above fig 5.4., displays the user's notification details with timestamp of roof mechanism.

6. Conclusion

Automatic retractable roof for clothesline with notification system is contrived in cinch to a facile problem. If this project needs further implementation, it must be in design section. As due to user's needs and environmental surroundings controller part can vary. Raspberry pi, a system on chip conceit and a purpose computer. This computer can be used for better controlling and improved performance than Arduino. Combination of Arduino and Esp8266 module for notification combined with a single Raspberry pi. As R-pi acts a computer with both built-in processor and plugins of internet connection. Finally ARRC with notification system built with an economic and simpler design.

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