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Rain Detection and Clothes Protection using Arduino

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Abstract: *This paper presents an automatic rain detection and clothes protection system utilizing an Arduino microcontroller, a rain sensor, and a servo motor. The system is designed to safeguard clothes hung outside by detecting rainfall and automatically moving them to a sheltered location. When the rain sensor detects precipitation, it signals the Arduino, which then triggers the servo motor to reposition the clothes. Once the rain stops, the system reverses the process, restoring the clothes to their original position for drying. This automated approach ensures convenience, reduces manual intervention, and can be integrated into smart home systems*

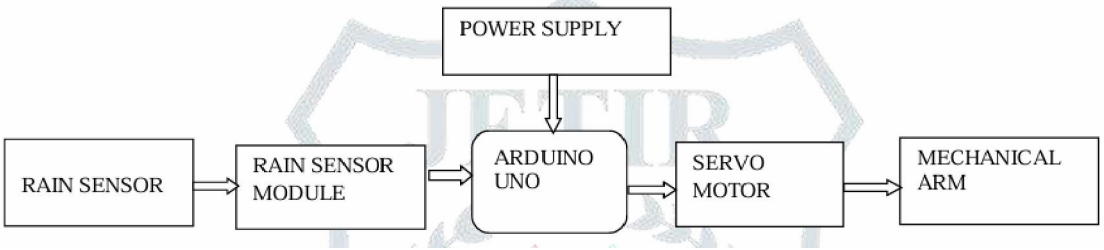
Keywords: Automation, Arduino UNO, Rain Sensor, Servo Motor, Clothes Protection, Smart Home System

I. INTRODUCTION

With increasing automation in daily life, smart home systems have gained popularity. One of the common challenges faced by individuals is the sudden onset of rain, which can damage clothes left outside for drying. This project aims to solve this problem by introducing an automated rain detection and clothes protection system that functions efficiently with minimal human intervention. The system uses a rain sensor to detect precipitation and a servo motor to relocate clothes under a protective shelter when rain is detected. Once dry conditions resume, the system automatically moves the clothes back into the open for continued drying.

II. SYSTEM DESIGN AND COMPONENTS

BLOCK DIAGRAM



The system consists of the following main components:
Arduino UNO: Microcontroller that processes signals from the rain sensor.
Rain Sensor Module: Detects precipitation and sends signals to the Arduino.
Servo Motor: Controls the movement of the clothes-holding mechanism.
Mechanical Arm: Moves the clothes to a sheltered area when rain is detected.
Power Supply: Provides necessary electrical power to the system components.

WORKING PRINCIPLE

- The rain sensor continuously monitors the environment for rainfall.
- Upon detecting rain, the sensor sends a signal to the Arduino.

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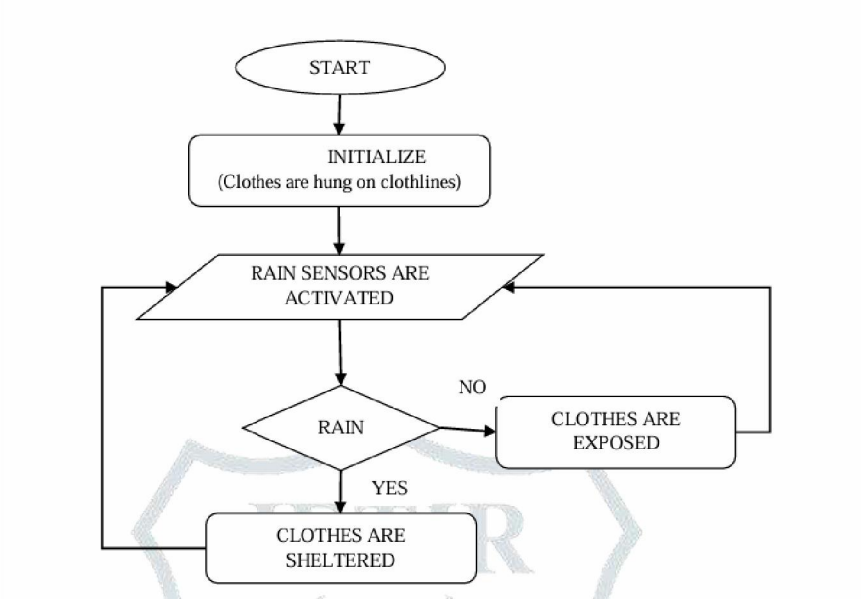
- The Arduino activates the servo motor, which moves the mechanical arm to shelter the clothes.
- When the rain stops, the sensor detects dry conditions and signals the Arduino.
- The Arduino commands the servo motor to return the clothes to their original drying position.
- The system operates autonomously with real-time monitoring.

FLOWCHART



III. IMPLEMENTATION AND CODE

```
#include <Servo.h>
// Define the pin for the rain sensor
constintrainSensorPin = A0; // You can change this pin as per your wiring
// Define the pin for the servo motor
constintservoPin = 8; // You can change this pin as per your wiring

Servo myServo;

void setup() {
  // Set up the rain sensor pin as an input
pinMode(rainSensorPin, INPUT);

  // Set up the servo motor
myServo.attach(servoPin);
}

void loop() {
  // Read the state of the rain sensor
intrainState = digitalRead(rainSensorPin);

  // If the rain sensor detects rain (LOW), rotate the servo motor continuously
  if (rainState == LOW) {
```

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```
myServo.write(180); // Rotate the servo motor to 90 degrees
  } else {
    // If no rain is detected, stop the servo motor
myServo.write(0); // Rotate the servo motor to 0 degrees
  }

  // Add a small delay for stability
  delay(100);
}
```

This code ensures continuous monitoring of rainfall and appropriate response by the servo motor.

IV. RESULTS AND DISCUSSION

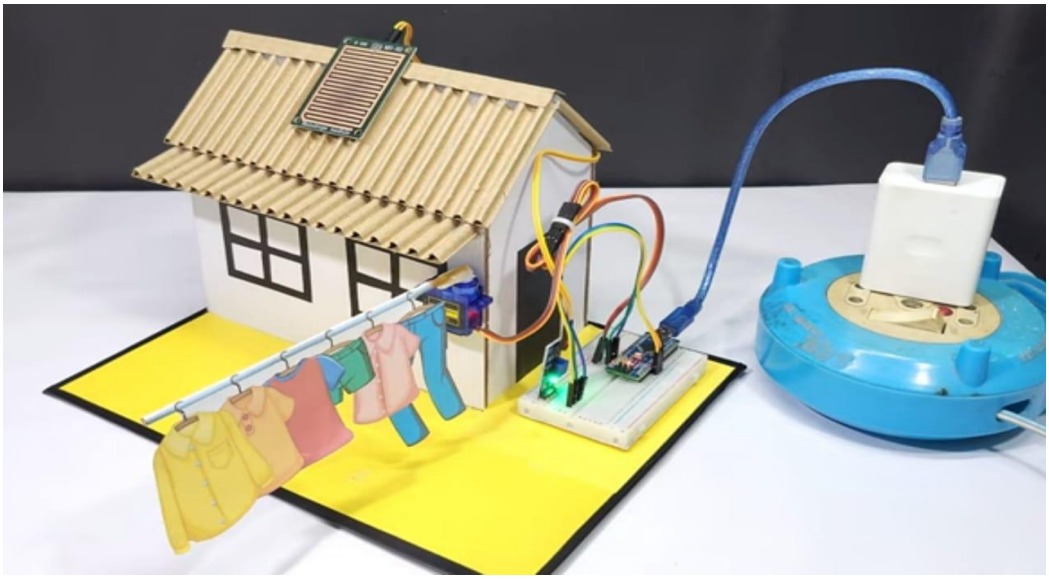

Fig 1: When rain is not detected, cloths are exposed to the outer space.

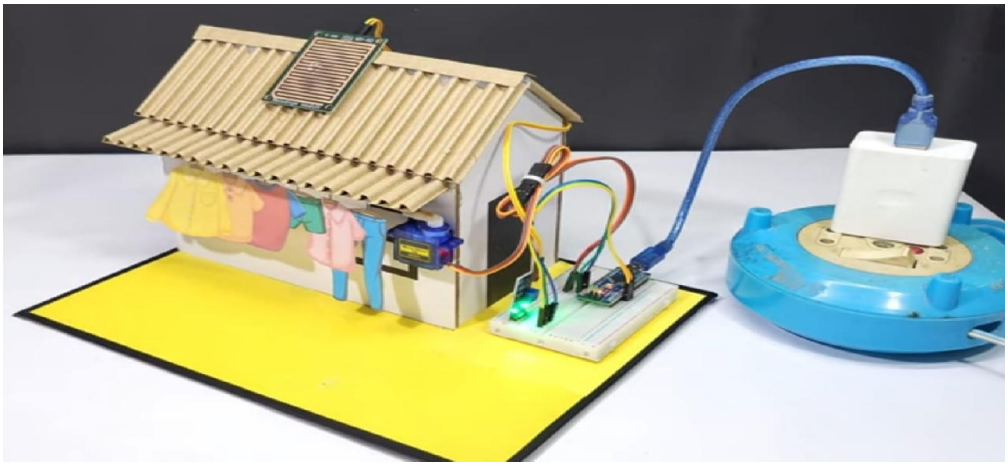

Fig 2: When the rain is detected , clothes are moved towards the sheltered area.

The prototype system was tested under various conditions. The rain sensor successfully detected precipitation and activated the servo motor, moving the clothes to a sheltered location within seconds. Once the rain stopped, the system automatically restored the clothes to their drying position. The system proved to be energy-efficient, reliable, and effective in minimizing human intervention.

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Advantages:

- Fully automated operation requiring minimal human effort.
- Cost-effective and easy to integrate with smart home systems.
- Reduces the risk of clothes getting wet during unexpected rain.

Limitation:

- Requires an appropriate installation space for mechanical movement.
- May require calibration based on varying weather conditions.

V. APPLICATION

- Residential balconies and terraces
- Shared drying spaces in apartment complexes
- Outdoor laundry facilities
- Commercial laundries and drying areas

VI. CONCLUSION

This project demonstrates the practical application of automation in daily life by developing an efficient rain detection and clothes protection system using an Arduino, rain sensor, and servo motor. The system successfully reduces manual intervention, ensuring convenience and efficiency. Future improvements may include IoT-based monitoring and remote control through mobile applications.

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