

SmartRain Cloth Saver

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Abstract—Our project SmartRain Cloth Saver is made to automatically protect clothes from getting wet during rain. Many times, people forget to take their clothes from the balcony or terrace when it suddenly starts raining, so we decided to make a system that can do this job automatically. This project mainly uses an Arduino Mini, a rain sensor, and a servo motor. The rain sensor detects water drops and sends a signal to the Arduino. The Arduino then controls the servo motor to pull a cover over the clothes so they don't get wet. When the rain stops, the cover moves back to its open position. It works on a simple idea but is very useful in daily life. The project is also low cost and easy to make.

Index Terms—Arduino Mini, Smart Home System, Automatic Clothes Protection Smart Rain cloth saver.

I. INTRODUCTION

In our daily life, drying clothes in open areas such as balconies, terraces, or backyards is a common practice. However, during the rainy season, sudden rainfall often causes clothes to get wet again, which leads to inconvenience and extra work. This problem is faced by almost

every household, especially in regions with unpredictable weather conditions. To overcome this issue, various automatic systems have been developed that detect rainfall and take immediate action to protect clothes from getting wet [1].

The SmartRain Cloth Saver is an automatic and smart system designed to solve this everyday problem using simple electronic components and automation. The system works by detecting rain using a rain sensor and controlling a servo motor through an Arduino Mini. When the rain sensor detects water, the Arduino sends a signal to the servo motor, which activates a cover or cloth hanger mechanism to protect the clothes. Once the rain stops, the cover automatically moves back to its open position.

The main aim of this project is to develop a low- cost,

energy-efficient, and easy-to-use device that helps people save time and effort while ensuring that their clothes remain dry and clean. This system can be further enhanced with IoT (Internet of Things) technology to send alerts or be controlled remotely [2]. Previous research has shown that using automation and sensor-based systems in household activities can improve convenience and reduce manual intervention [3].

The paper discusses the existing literature, the materials and methodology used for developing the SmartRain Cloth Saver, and reviews several related works that focus on rain detection and automatic cloth protection systems.

II. LITERATURE SURVEY

[1] M. N. A. Latif, N. A. A. Aziz, M. R. Ramdan, and N. H. Othman

This paper describes a Smart Automated Clothesline using Arduino and a rain sensor. The system detects rainfall and automatically retracts the clothesline to prevent clothes from getting wet. It is simple and efficient but can be improved for faster operation and waterproof housing of components.

[2] J. Gorakh, S. Khandezod, P. Tarwatkar, S. Gopewar, and R. Patle

This work presents a Rain Detection Based Automatic Clothes Collector system. It uses a rain sensor to detect water and a motor to pull the clothesline automatically. The system operates on Arduino control and is low cost, but its range and load capacity are limited.

[3] Janhavi V., Sahanashankar, Sanjana S., Vidya H. G., and Yuvarani S. R.

The authors developed an Automatic Protection of Clothes from Rain system using Arduino Uno, a rain sensor, and a servo motor. It automatically covers clothes when rain starts and uncovers them when it

stops. The design is easy to make and affordable, though it depends on proper sensor calibration.

[4] S. Nopika, I. L. Rimara, and A. A. Dahlan

This research focuses on an IoT-Based Automatic Clothing Tool. It uses Arduino and a rain sensor integrated with IoT technology to send notifications to users through a mobile app. The system improves convenience but requires stable internet connectivity.

[5] H. Lee, J. Kim, and D. Park

The study introduces a Smart Weather Detection System combining rain, humidity, and temperature sensor with an Arduino board for home automation. The idea can be extended to applications such as automatic cloth protection. It is reliable and efficient but more complex than basic designs.

Table 1: List Of Articles

Sr. No.	Authors / Year	Title of Paper	Method / Devices Used	Key Findings / Results	Remarks (Merits / Demerits)
[1]	M. N. A. Latif et al., 2021	Design and Development of Smart Automated Clothesline	Arduino UNO, Rain Sensor, DC Motor	Automatically retracts clothesline when rain is detected	Low cost and practical, needs faster response and waterproof design
[2]	J. Gorakh et al., 2025	Rain Detection Based Automatic Clothes Collector	Arduino Board, Rain Sensor, Motor Driver	Collects clothes automatically on rain detection	Simple and efficient, limited load capacity
[3]	Janhavi V. et al., 2023	Automatic Protection of Clothes from Rain	Arduino UNO, Rain Sensor, Servo Motor	Covers clothes automatically when it rains	Accurate operation, depends on proper sensor calibration
[4]	S. Nopika et al., 2024	IoT-Based Automatic Clothing Tool	Arduino Board, Rain Sensor, IoT Module	Sends rain alerts and controls clothesline remotely	Convenient IoT use, needs stable Internet
Sr. No.	Authors / Year	Title of Paper	Method / Devices Used	Key Findings / Results	Remarks (Merits / Demerits)
[1]	M. N. A. Latif et al., 2021	Design and Development of Smart Automated Clothesline	Arduino UNO, Rain Sensor, DC Motor	Automatically retracts clothesline when rain is detected	Low cost and practical, needs faster response and waterproof design

From the above articles [1]–[5], it is observed that most existing systems use Arduino as the controller because it is low-cost and easy to program. All designs focus on rain detection and automatic motion control, usually through a servo or DC motor.

While these systems perform well, they can still be improved by making them more energy- efficient, portable, and IoT-enabled for remote operation.

The proposed SmartRain Cloth Saver builds on these ideas to provide a simple, compact, and fully automatic solution for daily household use.

III. MATERIALS & METHODOLOGY

1.1 Materials

The SmartRain Cloth Saver project uses simple and low-cost electronic components that are easily available in the market. These components are selected based on their compatibility with the Arduino Mini and their ability to perform efficient rain detection and automatic control of the servo motor.

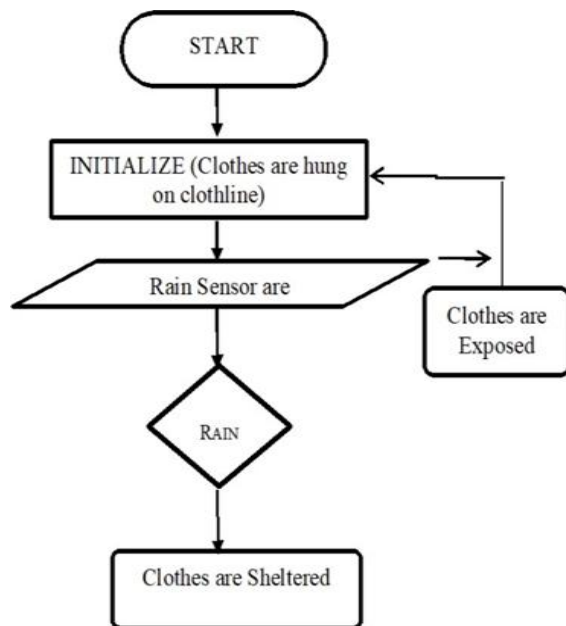
Table 2:List Of Materials

Sr.No	Component	Specification / Model	Quantity	Purpose / Function
1	Arduino Mini	ATmega328P, 5V	1	Main controller to process sensor data and control the servo motor
2	Rain Sensor Module	Analog output type	1	Detects presence of rain or water droplets
3	Servo Motor	SG90 / 9g micro servo	1	Moves the cover or cloth hanger to protect clothes
4	Battery / 5V Adapter	3.7V–5V supply	1	Provides power to the Arduino and other components
5	Connecting Wires	Male-Female jumper wires	As required	For electrical connections between components
6	Plastic/Metal Frame	Custom built	1	To support and mount all components safely

1.2 Methodology

The Arduino Mini reads input from the rain sensor module and controls the servo motor based on the presence or absence of rain. The rain sensor detects water drops and sends an analog signal to the Arduino. When rain is detected, the Arduino rotates the servo motor to move the protective cover over the clothes. Once the rain stops, the servo returns to the open position for drying. The system is powered using a 5V adapter or a small battery, making it simple and portable.

A FLOWCHART



The flowchart represents the working process of the SmartRain Cloth Saver.

At first, the system initializes when the clothes are hung on the clothesline. The rain sensor continuously monitors the environment. If no rain is detected, the clothes remain exposed for drying. When the sensor detects rain, the Arduino Mini sends a signal to the servo motor, which moves the cover or pulls the clothes under shelter. Once the clothes are protected, the system keeps checking the sensor reading to know when to reopen.

This makes the process fully automatic and reduces the need for human effort. [3]

IV. FUTURE ENHANCEMENT

V.

The SmartRain Cloth Saver system can be further improved based on the ideas and gaps observed in previous research works [1]–[5]. While the current setup provides automatic rain detection and protection, modern studies show that integrating IoT, weather prediction, and solar energy systems can make it more efficient and reliable [4], [5].

a. Merits

- Fully automatic operation reduces manual effort [1], [2].
- Low-cost design using Arduino and simple electronic components [3].
- Quick response to rainfall detected by the sensor [2].

• Portable and easy-to-use design suitable for domestic applications [1], [3].

• Can operate using a battery or small solar panel, making it energy-efficient [5].

b. Demerits

• The rain sensor may give false readings due to moisture or humidity [3].

• The servo motor has limited torque and may not handle heavy covers [2].

• The system only works after rain starts, not based on prediction [4].

• No wireless monitoring or remote alert in the current setup [4].

• Outdoor components may need waterproof protection for long-term stability [1].

Future improvements can include IoT-based mobile alerts to notify users about rainfall [4], solar-powered systems for better energy management [5], and machine learning algorithms to predict rainfall before it begins. These enhancements would make the SmartRain Cloth Saver a more advanced, reliable, and user-friendly solution for everyday life [2], [5].

VI. CONCLUSION

The SmartRain Cloth Saver is a simple, low-cost, and effective system designed to automatically protect clothes from unexpected rainfall. By using an Arduino Mini, rain sensor, and servo motor, the system can detect rain and immediately cover or collect the clothes without human involvement. It aims to make daily life easier, especially in regions where sudden rain is common [1], [2].

From the review of various research papers [1]–[5], it is observed that most existing systems use Arduino-based automation with sensors to achieve similar results. However, many of them face challenges such as limited range, lack of remote control, and sensitivity issues in sensors. The proposed SmartRain Cloth Saver overcomes some of these drawbacks by focusing on compact design, portability, and faster response to rain detection [2], [3].

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