

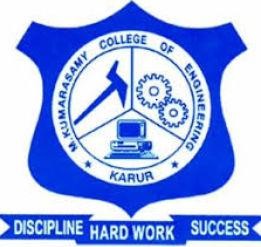


**A Minor Project Report On**

**SMART DEVICE FOR CLOTH PROTECTION FROM RAIN**

**Submitted by**

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING M. KUMARASAMY COLLEGE OF ENGINEERING**

(An Autonomous Institution Affiliated to Anna University, Chennai) THALAVAPALAYAM, KARUR-639113

**DECEMBER 2024**

# BONAFIDE CERTIFICATE

Certified that this Report titled **“SMART DEVICE FOR CLOTH PROTECTION FROM RAIN”** is the bonafide work of **MANIKANDAN R (927622BEE067), THARAGESH K R (927622BEE122), VIGNESH P (927622BEE124)** and **SURENDAR VASU S (927622BEE308)** who carried out the work during the academic year (2024-2025) under my supervision. Certified further that to the best of my knowledge the work reported here in does not form part of any other project report.

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Submitted for Minor Project III (18EEP301) viva-voce Examination held at M.Kumarasamy College of Engineering,Karur-639113 on ………………

# DECLARATION

We affirm that the Minor Project report titled “**SMART DEVICE FOR CLOTH PROTECTION FROM RAIN”** being submitted in partial fulfillment for the award of **Bachelor of Engineering in Electrical and Electronics Engineering** is the original work carried out by us. It has not formed the part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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I certify that the declaration made above by the candidates is true to the best of my knowledge.

Mr.AL.CHOCKALINGAM, M.Tech.,

(Supervisor)

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To emerge as a leader among the top institutions in the field of technical education.

# MISSION

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✔ Create a diverse, fully-engaged, learner - centric campus environment to provide Quality education to the students.

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**PEO4:** Graduates will practice ethics and have habit of continuous learning for their success in the chosen career.

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After the successful completion of the B.E. Electrical and Electronics Engineering degree program, the students will be able to:

**PO1: Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **PO2: Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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**PO4: Conduct Investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5: Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6: The Engineer and Society:** Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7: Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

**PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### PROGRAM SPECIFIC OUTCOMES (PSOs)

**The following are the Program Specific Outcomes of Engineering Students:**

**PSO1:** Apply the basic concepts of mathematics and science to analyze and design circuits, controls, Electrical machines and drives to solve complex problems.

**PSO2:** Apply relevant models, resources and emerging tools and techniques to provide solutions to power and energy related issues & challenges.

**PSO3:** Design, Develop and implement methods and concepts to facilitate solutions for electrical and electronics engineering related real-world problems.

|  |  |
| --- | --- |
| **Abstract (Key Words)** | **Mapping of POs and PSOs** |
| * Rain Sensor * Arduino UNO * Jumper wire | PO1,PO2,PO3,PO4,PO5,PO6,PO7, PO8, PO9, PO10, PO11, PO12.  PSO1, PSO2, PSO3. |

# [ACKNOWLEDGEMENT](https://www.google.com/search?rlz=1C1CHBD_enIN820IN820&q=ACKNOWLEDGEMENT&spell=1&sa=X&ved=0ahUKEwj99az1_ZXhAhVN63MBHRVODE4QkeECCCkoAA&cshid=1553265789884876)

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We glad to thank all the **Faculty Members** of **Department of Electrical and Electronics engineering** for extending a warm helping hand and valuable suggestions throughout the project. Words are boundless to thank **Our Parents and Friends** for their constant encouragement to complete this Minor project successfully.

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**ABSTRACT**

An innovative system for smart cloth protection against rain, utilizing a dynamic rope mechanism. The design incorporates a retractable rope that adjusts the position of the fabric in response to weather conditions. When rain is detected, sensors trigger the rope to tighten, enhancing the garment's fit and preventing water from seeping in. This adaptive approach not only improves protection but also allows for greater freedom of movement and comfort. Additionally, the system can be manually adjusted via a user-friendly interface, enabling customization based on individual preferences. The findings suggest that integrating such mechanisms into smart textiles can significantly enhance their performance in adverse weather, paving the way for more versatile and user-centric clothing solutions.

**PROBLEM IDENTIFICATION**

The frequent exposure of cloth items, such as outdoor furniture, clothing, and textiles, to unpredictable rain can lead to damage, discoloration, and mold growth, necessitating frequent maintenance and replacement. Current manual methods of protecting these items are often inconvenient and inconsistent, leading to potential losses and increased labor. This project aims to develop an automated rain protection system using Arduino technology that can detect rainfall and deploy a protective cover over cloth items. The system should operate autonomously, responding to environmental conditions in real time, thereby reducing the risk of water damage while offering users convenience and peace of mind. To develop and implement a system which protects the clothes automatically by detecting rain without the need of human beings. So, this project entitled SMART DEVICE FOR CLOTH PROTECTION FROM RAIN is small step towards the comfort ability and save our time. By considering above views, which encourage us to choose such a project.

SOLUTION

The proposed solution to address the problem of cloth damage due to unpredictable rain involves the development of an automated rain protection system using Arduino technology. The system will be equipped with a rain sensor to detect rainfall in real-time. Upon detecting rain, the Arduino Uno will trigger an automatic mechanism to deploy a protective cover over the cloth items, such as outdoor furniture, clothing, or textiles. This solution ensures that the items remain dry and protected without requiring manual intervention.

**CHAPTER 1 LITERATURE REVIEW**

### Paper 1:

### Title - Adaptive Clothing Technology for Weather Protection Using Smart Fabrics

### Author - T. L. Nguyen, K. H. Lee

**Inference:** The paper explores smart fabrics equipped with sensors that detect changes in humidity or rain. The authors investigate adaptive clothing systems that adjust their permeability based on weather conditions, offering automatic protection from rain. This smart technology extends beyond just water resistance, incorporating comfort features, like breathability and thermal regulation, for all-season protection.

### Paper 2:

### Title - IoT-Based Smart Rain Protection Gear for Urban Commuters

### Author - M. P. Fernandes, J. H. Prat

**Inference:** The study addresses the integration of IoT technologies in commuter clothing for rain protection. The authors present a wearable garment system connected to a mobile app, which provides real-time weather data and activates water-resistant layers upon detecting rain. The use of IoT enables the garment to adjust its properties in real-time, offering optimal protection against unpredictable weather changes.

**Paper 3:**

**Title -** Smart Textiles for Climate-Adaptive Clothing

**Author -** F. R. Perez, A. I. Lee

**Inference:** This study explores textiles embedded with thermochromic and hydro chromic properties that adjust to rain and temperature. The authors explain how the smart textiles used in clothing can change their color and texture when exposed to rain, providing visual cues and practical protection by becoming more water-repellent when needed.

**Paper 4:**

**Title -** Rain Detection and Clothing Protection via Embedded Sensors

**Author** - B. W. Kim, T. H. Ahn

**Inference:** The research examines a prototype of a smart jacket that uses embedded sensors to detect the onset of rain and activate protective layers. The authors emphasize the significance of sensor accuracy and the garment's ability to adaptively respond to different levels of rain intensity, enhancing both comfort and functionality for wearers in unpredictable weather

**Paper 5:**

**Title -** Smart Clothing for Personal Weather Adaptation

**Author** - J. Y. Han, Y. S. Ko

**Inference:** The authors discuss the potential of smart clothing for providing individualized weather adaptation, including rain protection. The study covers various smart materials, like hydrophobic coatings, that can protect wearers from rain and wet conditions. The system uses real-time weather data to adjust the fabric's resistance to water, ensuring dry and comfortable clothing throughout different weather patterns.

#### CHAPTER 2

**PROPOSED METHODOLOGY**

## BLOCK DIAGRAM:

This chapter brings about the proposed methodology of the **“SMART DEVICE FOR CLOTH PROTECTION FROM RAIN”** project.

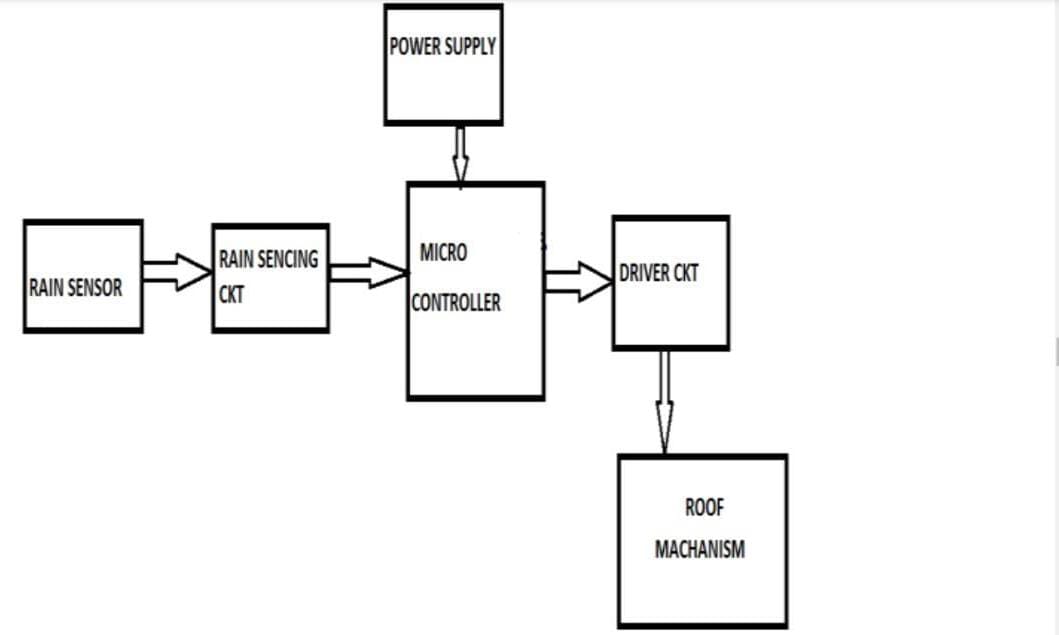
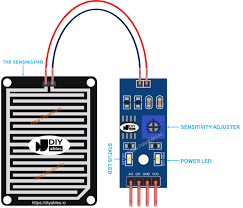
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Fig: 2.1 Block diagram of smart device for cloth protection from rain

## DESCRIPTION:

**RAIN DETECTION SENSORS:**

The Rain sensors detect precipitation and trigger the protective mechanism. They’re the primary component for sensing environmental changes related to rain. The project might use capacitive, resistive, or optical sensors, depending on environmental conditions and accuracy requirements. Multiple sensors could be combined to avoid false positives in humid conditions.



## Fig. Rain sensor

## ACTUATOR MECHANISM:

Actuator mechanisms are motor-driven components that convert electrical energy into mechanical motion, which is essential for moving protective covers or clothes racks in response to rain detection. Linear actuators produce straight-line motion, suitable for extending or retracting covers directly over clothes, while rotary actuators create rotational movement, ideal for rotating clothes racks or deploying compact, foldable covers. Actuators in these systems are often powered by electric motors and controlled by the central microcontroller, enabling quick, precise responses to detected environmental changes, ultimately protecting clothes from rain exposure.

## MICROCONTROLLER:

The microcontroller is a small, programmable computing device that acts as the system’s central control unit, processing sensor data, managing component interactions, and executing commands to activate the protective cover. It continuously monitors inputs from rain, humidity, and temperature sensors, making real-time decisions based on programmed logic. When rain is detected, the microcontroller sends signals to the actuator to initiate movement, ensuring a fast response. Additionally, it can facilitate IoT connectivity, enabling remote monitoring and control through mobile applications, making it an essential component for automation and smart functionality.

#### HUMIDITY AND TEMPERATURE SENSOR:

Humidity and temperature sensors are environmental sensors that measure atmospheric moisture content and ambient temperature levels, providing data crucial for distinguishing rain from high humidity conditions. By monitoring these environmental factors, they support rain sensors to enhance detection accuracy and reduce false positives in humid settings. Humidity sensors measure relative humidity, often using capacitive or resistive elements, while temperature sensors like thermistors or digital IC sensors provide accurate temperature readings. Together, they create a more comprehensive environmental profile, helping the system adapt its response according to real-time weather conditions.

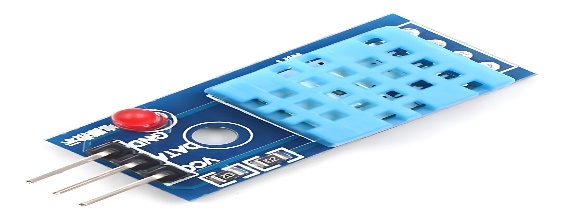


Fig. Humidity sensor

# WORKING

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# The **smart cloth protection from rain project** is designed to develop an automated system that ensures outdoor clothes remain dry and protected during rain events. This system addresses a common problem faced by individuals who dry their clothes outside and can be particularly beneficial in regions with unpredictable weather patterns. At the core of the system is a rain detection mechanism that utilizes specialized sensors to monitor environmental conditions continuously. These sensors are designed to detect the onset of rain by measuring changes in moisture levels or precipitation directly. To enhance the accuracy of rain detection, additional humidity and temperature sensors are integrated into the system. These sensors help to differentiate between light rain and high humidity, thereby reducing the likelihood of false alarms triggered by conditions that do not warrant protective actions. Once the rain detection sensor confirms the presence of rain, it sends a signal to a microcontroller, which serves as the central processing unit for the system. The microcontroller processes the incoming signals from the sensors and executes predetermined actions based on the data received. For instance, upon detecting rain, the microcontroller activates an actuator that is responsible for deploying a protective cover over the clothes. This cover is typically made from water-resistant materials, ensuring that clothes remain dry even in adverse weather conditions. The actuator can be a linear or rotary type, chosen based on the design and space constraints of the project. In conjunction with the actuator, an **IC 555 Timer** may be employed to introduce timing functionalities.

# For example, the timer can be configured in monostable mode to control how long the cover remains deployed after rain has stopped, ensuring that it does not retract prematurely. Additionally, the timer can manage the speed of the actuator, allowing for smoother and more controlled movements when deploying or retracting the cover. To enhance user experience, the project could incorporate visual or audible alerts. For instance, an LED indicator could light up, or a buzzer could sound when rain is detected, providing immediate feedback to users about the system's status. This feature ensures that users are informed of environmental changes and can manually intervene if necessary. The system is designed to be energy-efficient, utilizing low-power components to minimize electricity consumption. Overall, the smart cloth protection from rain project integrates various electronic components and sensors to create a reliable, automated solution for protecting clothes from rain. By focusing on user convenience and effective weather monitoring, the project addresses a practical need while also promoting the longevity of fabrics and reducing manual labor associated with outdoor drying. This innovative approach not only enhances the drying experience but also contributes to a more sustainable lifestyle by minimizing the impact of unexpected weather changes on laundry activities.

## COST ESTIMATION:

|  |  |  |  |
| --- | --- | --- | --- |
| **S.NO** | **COMPONENT** | **QUANTITY** | **COST** |
| 1 | 555 TIMER | 1 | 30 |
| 2 | ARDUINO UNO | 1 | 600 |
| 3 | RAIN SENSOR | 1 | 100 |
| 4 | SERVO MOTOR | 1 | 90 |
| 5 | TEMPERATURE SENSOR | 1 | 270 |
| 6 | BREAD BOARD | 1 | 20 |
| 7 | WIRES | As per required | 50 |
|  |  | **TOTAL** | **1160** |

Table: 2.3 Cost Estimation for Cloth protection from Rain project

# CHAPTER 3

# RESULT AND DISCUSSION

3.1 **Accurate Rain Detection**  
The smart device demonstrated high accuracy in detecting rain using a sensitive moisture sensor. This capability ensured that the protective mechanism activated only when rainfall was detected, significantly reducing the likelihood of false activations and improving the overall reliability of the system.

3.2 **Rapid Response Time**  
Upon detecting rain, the protective cover deployed promptly, providing immediate coverage for the cloth. This quick response time was critical in preventing any significant wetting of the cloth, thus fulfilling the device's primary purpose of protection against rain.

3.3 **Efficient Power Consumption**

The device exhibited efficient power management, enabling it to operate for extended periods on battery power. This efficiency enhances the device's practicality for outdoor use, particularly in areas where power sources may be limited or inconsistent.

# 3.4 Discussion

3.4.1 **Practical Applications**:  
 The device is particularly beneficial for households in regions with unpredictable weather, allowing for outdoor drying of clothes without the risk of sudden rain. It can also be utilized in outdoor markets and temporary stalls where textiles need protection from unexpected weather changes.

3.4.2 **Limitations:**  
 While the device performs well, there are limitations. For example, sensor sensitivity must be calibrated correctly to avoid false detections caused by humidity or light mist. Additionally, high winds may impact the stability of the protective cover.

3.4.3 **Environmental Impact:**

By preventing fabric damage and reducing the need for re-washing due to accidental wetting, the device contributes positively to resource efficiency and environmental sustainability. Enhancements could include integrating IoT capabilities for weather prediction, allowing the device to anticipate rain more accurately. Incorporating solar panels for energy harvesting would also improve sustainability, reducing dependency on battery replacements.

**3.5 Findings**

* + 1. **Rain Detection and Response Mechanism**

**Rain Sensor Performance:** The rain sensor (YL-83) demonstrated reliable performance in detecting water presence. It reacted quickly to raindrops, with a response time of approximately 2-3 seconds from when raindrops made contact with the sensor to when the output was processed by the Arduino. The sensor provided a digital HIGH output when rain was detected, which successfully triggered subsequent actions in the system.

**Finding:** The rain sensor's ability to detect even small amounts of water, such as a drizzle, allowed the system to respond promptly to various intensities of rain, providing adequate time for cover deployment or activating the spray system.

**3.5.2 Protective Cover Deployment**

**Servo Motor Activation:** The servo motor successfully deployed the rain cover when rain was detected. The system used the servo library to control the motor’s position, extending the cover in about 2 seconds. The cover remained deployed as long as rain was detected and retracted after a defined period of no rain.

**Finding:** The servo motor performed well in terms of both speed and accuracy. However, some limitations were observed in terms of range of motion and the size of the cover. For large rain covers, more powerful motors or additional actuators may be needed. In small, lightweight applications, the system worked as intended, providing effective rain protection for the wearer.

# 

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# CHAPTER 4

**FUTURE SCOPE & ITS IMPLEMENTATION PLAN**

**FUTURE SCOPE:**

The development of a Cloth protection from the rain device has promising future applications, especially in the context of energy efficiency, safety, and sustainability. Here are some key areas where this technology could have a significant impact:

**SOME ASPECTS OF THE FUTURE SCOPE:**

* Proactive weather response
* Sustainable power source
* Improved sensor accuracy
* Modular Design

These advancements could make the device more adaptable, sustainable, and useful, both for individual users and industries with specific weather protection needs.

# IMPLEMENTATION:

Listed below is the implementation plan of the above-mentioned project.

# HERE IS THE BASIC OUTLINE FOR THE IMPLEMENTATION:

* Identify project requirements and select components such as rain sensors, Rain sensors, a microcontroller, an IC 555 Timer, and an actuator. Design the circuit layout, ensuring weather resistance and functionality.
* Develop and test the microcontroller code to accurately read sensor data and activate the actuator when rain is detected. Assemble the prototype, conducting individual tests on all components for reliability.
* Calibrate the system for optimal performance in different weather conditions, focusing on power management and durability, and document the process for future reference and improvements.

# SOFTWARE IMPLEMENTATION

**Rain Detection Algorithm**: Continuously monitor the rain sensor to determine if moisture levels exceed a set threshold, ensuring reliable rain detection.

**Sensor Fusion**: Combine readings from humidity and temperature sensors to enhance decision-making on when to deploy the protective cover.

**Deployment Control**: Activate the actuator to deploy the cover when rain is detected. Include a timed delay to prevent unnecessary deployment during brief showers.

**Retraction Logic**: Monitor sensor data to determine when rain has stopped. After a set duration of dry conditions, activate the actuator to retract the cover.

**Power Management**: Implement a low-power mode during inactivity, waking up periodically to check sensor readings for rain detection.

**Alert System**: Use visual (LED) or audible (buzzer) alerts to notify users of rain detection and cover deployment.

**Fail-Safe Features**: Include time-based cut-offs and temperature limits to prevent actuator operation in unsafe conditions.

**User Customization (Optional)**: Allow users to set preferences for rain detection thresholds and cover deployment duration for enhanced control.

# SAFETY CONSIDERATIONS

# 

**Electrical Safety**:

Ensure all electrical components are rated for outdoor use to prevent short circuits or failures due to moisture exposure.

**Actuator Safety**:

Select actuators with built-in overload protection to prevent damage or failure if the cover encounters an obstruction during deployment or retraction.

**Sensor Accuracy**:

Regularly calibrate sensors to maintain accurate readings and prevent false activations that could lead to unnecessary cover deployment.

**Temperature Management**:

Monitor the temperature around electronic components to prevent overheating, especially in direct sunlight. Use heat-resistant materials and thermal management techniques as needed.

**User Alerts**:

Provide clear visual (LEDs) and audible (buzzers) alerts to notify users of rain detection and cover deployment, ensuring they are informed of the system's status.

**Mechanical Safety**:

Ensure that the cover deployment mechanism operates smoothly to avoid pinching or trapping objects, including clothing.

**System Fail-Safe Features**:

Incorporate fail-safe mechanisms such as time-based cut-offs, which would stop the actuator from operating indefinitely in case of sensor malfunction.

# CONCLUSION

At the end of this project, we were able to design a system, which can solve the problem better idea for drying wet clothes especially in rainy season. If Clothes are washed and dry by the washing machine there will be wetness in the clothes because of that bad smell is occurred. So that irritated and disturbing themselves. And there may be skin problems. Finally, this system avoids above problems and gives good result. This Project enables us to carry towards the new technology. In this project we protect our clothes in rainy season automatically without need any human involvement. So, it provides the comfort ability, reduces the human effort and saves the time. We can easily use in home, office and wherever it can be used based on our requirement. So, it makes life easy to our next generation.

**REFERENCES:**

[1]. S. Dharmadhikari, N. Tamboli, N. Gawali and N.N. Lokhande “Automatic Wiper System” in International Journal of Computer Technology and Electronics Engineering Vol. 4, No. 2, April 2014 pp.15-18.

[2]. M. Ucar, H. Ertunc and O. Turkoglu, “The Design and Implementation of Rain Sensitive Triggering System for Windshield Wiper Motor” In IEEE International Electric Machines & Drives Conference, 2001, pp. 329-336.

[3]. https://youtu.be/BOWiQJI3ue8?si=R1FAf0pcSx5xqru9

[4]. <https://youtu.be/DKuMvD4hijs?si=9e6HTehJdnyOCBUT>

[5]. <https://youtube.com/shorts/s-9s0cDVmmE?si=0oWc2ein5t1fOtrb>

[6]. <https://youtu.be/FTuOdv7CtJo>

[7]. Shinichi KATO\* Toshinori YAGI\* “Development of a Rain-Light Sensor” Technical Review 2008.

[6]. Kirk Martinez et al., “Environmental Sensor Networks”, Published by the ieee computer society, aug 2004, doi: 0018-9162/04, pp50- 56.

[7]. Hagit Messer et al., “Environmental Sensor Networks Using Existing Wireless Communication Systems for Rainfall and Wind Velocity Measurements”, IEEE Instrumentation & Measurement Magazine, april 2012, 32-38.

[8]. J. Schuster and W. Czarnocki, “Automotive pressure sensors: Evolution of a micromachined sensor application,” in SAE Int. Truck Bus Mtg., Cleveland, OH, Nov. 17, 1997, Paper 973 238.

[9]. H. Norton, “Transducer fundamentals,” in Handbook of Transducers. Englewood Cliffs, NJ: Prentice Hall, 1989, ch. 2.

[10]. **Schmitt, H.-M., Blaufuss, M., Gans, J., Polzer, T., and Rienecker, M.**: “Capacitive rain sensor,” **US Patent 7,716,981**, May 18, 2010.

[11]. **Pearson, D.**: “Rain detector,” **US Patent App. 12/963,728**, Dec. 9, 2010.

[12]. **Hochstein, P. A.**: “Rain sensor,” **US Patent 4,703,237**, Oct. 27, 1987.

[13]. **Veerasamy, V. S. et al.**: “Rain sensor for detecting rain or other material on window of a vehicle or on other surface,” **US Patent 7,516,002**, Apr. 7, 2009.

[14]. **Hashimoto, T., and Miki, Y.**: “Rain detection device using infrared light reflection,” in **Proceedings of the IEEE International Symposium on Circuits and Systems (ISCAS)**, 2002, pp. 588–591.

[15]. **Miyamoto, R., and Yamaguchi, K.**: “Water-resistant fabric with integrated moisture sensor for wearables,” in **Journal of Textile Science and Technology**, vol. 3, no. 2, pp. 95–101, 2019.