AUTOMATIC AGRICULTURAL MONITORING AND PROTECTION SYSTEM FROM HEAVY RAINS

[1] Dr.B.Malakonda Reddy, [2] K.Annapoorna,[3] Sk.Jareena,[4] K.Lakshmi Bhargavi,[5] B.Sai Meghana

[1] Dr.B.Malakonda Reddy Professor of ECE Department, NECG

Narayana Engineering College, Gudur, India

[2,3,4,5]Students, Department of Electronics and Communication Engineering,

Narayana Engineering College, Gudur, India

Abstract: **Agriculture is the basic source of food supply for all countries in the world. Water is the Essential resources for agriculture. The automated irrigation and crop field monitoring system is used to optimize the use of water resource for agriculture. This paper is mainly focused on improving the agricultural fields yield by providing a monitoring system with effective and efficient usage of water resource. If moisture sensor detects dryness in the field, the water motor will be on. If rain sensor detects the rain the automatic roof will open.**

Keywords: **Automatic Crop Protection, Heavy Rain, Agriculture, Sensor Deployment, Data Analysis, Automation, Environmental Monitoring, Crop Yield Enhancement and Sustainable Farming.**

I. INTRODUCTION

Agriculture is the important sector and backbone of our country. Many of our Indian people depends on agriculture. About 58%people depends only on agriculture.38%of GDP of Indian economy contributed by agriculture. It depends on monsoon and rainfall, so it is still under development. Adoption of irrigation and scientific methods helps in improvement of agriculture. Greenhouse, polyhouse kind of improved and protected method helps to yield more. Government is also encouraging these types of modern technologies to increase the yield and provide funds through different schemes. Central government provide subsidy, loan for greenhouse, cent polyhouse, shade net house scheme to encourage modern method of agriculture. These structures may vary in different structures and sizes including small sheds to large size like industrial buildings. The greenhouse which is miniaturized is called as a cold frame. The modern greenhouses are made up with screening installations, heating, cooling, lighting, computer to provide required favourable conditions for plant growth and it also manages the micro-climate conditions by controlling parameters like air, temperature, relative humidity, and vapour pressure deficit etc. It consists of roof which can close during heavy rainfall and open during the conditions specified by the user. Roof can be controlled automatically and manually. This system can monitor different physical conditions like humidity, moisture and temperature suitable for a growth of plant specified by the user.

II. LITERATURE SURVEY

To monitor temperature, humidity and moisture in the soil of agricultural land done by using Embedded Systems. Large number of crops have been destroyed due to difference in weather condition. Sensors collect the field information i.e., more accurate and measure the various parameters like temperature, moisture, humidity content in soil which helps to reduces the problems in agricultural field [1]. The internal parameters of Greenhouse can be controlled by modifying temperature, humidity, concentration CO2, micro/macro nutrients. Greenhouse is the climatic model has nonlinearity, strong coupling, feedback feed forward linearization and decoupling [2].

Automatic control of temperature in green house is done by using a technology called commercial embedded system. The system is designed in such a way that it can provide the appropriate air temperature in the region where the crops are grown [3]. The system to monitor agricultural land is developed by using WSN. From the level of production and quality of crops increases. The main advantage of this is no manual interface. The factors on which production, Quality and growing level depends are temperature, humidity and water level [4]. The parameters such as air humidity, temperature, ground moisture and environment lightness can be controlled under greenhouse environment. The data collection of these parameters can be done by using hierarchical WSN technology [5].

III. METHODOLOGY

PROPOSED SYSTEM

The automated irrigation system based on low power microcontroller was developed and deployed. Introduce a new system which will have wireless connection between server and nodes. The automated irrigation system consists of distributed sensor network built using soil moisture sensor, temperature sensor, rain sensor and humidity sensor. If moisture sensor detects dryness in the field, the water motor will be on, if rain sensor detects the rain the automatic roof will open.

BLOCK DIAGRAM

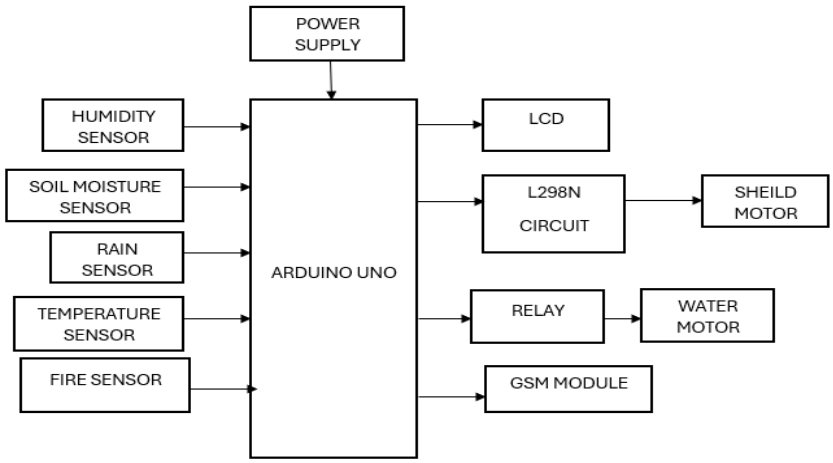
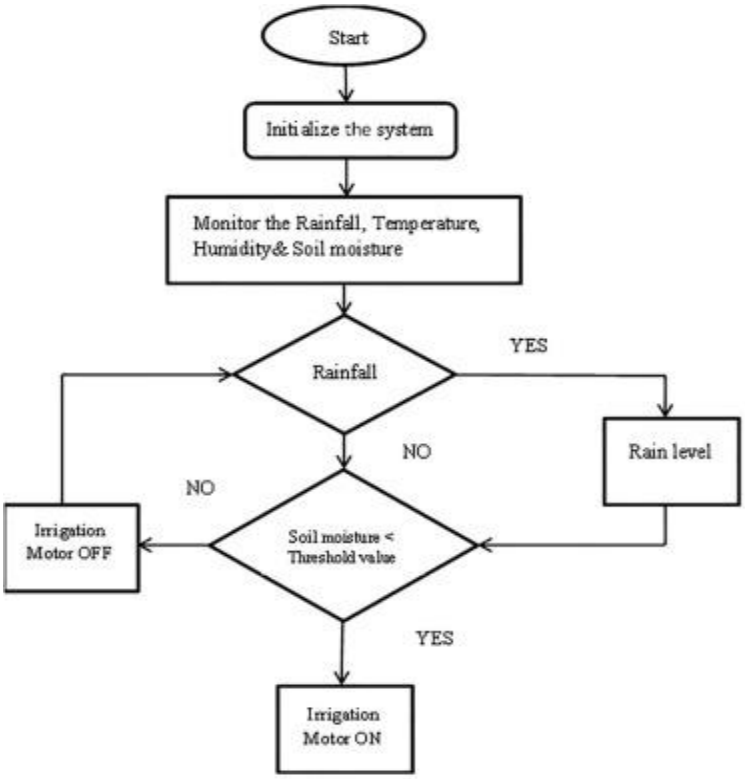


Fig 1: Block diagram

Arduino Uno is a micro controller board based on 8-bit ATmega328P micro controller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the micro controller. A humidity sensor is

a device that measures the amount of moisture or water vapor in the air. A soil moisture sensor is a device that measures the water content in the soil. It's commonly used in agriculture to help farmers determine the optimal time for watering their crops. A rain sensor is a device that detects the presence of rainfall. Temperature sensors are devices that measure the temperature of their surroundings. A fire sensor is a device designed to detect the presence of fire or excessive heat in an area. It works by monitoring for specific changes in the environment that indicate the presence of a fire, such as smoke, heat, or flames. The L2987 circuit is not a commonly known circuit component or IC. A power supply is a device that provides electrical energy to an electrical load. It converts electrical power from one form to another, typically from alternating current (AC) to direct current (DC) or vice versa, depending on the requirements of the electronic devices being powered. Power supplies are essential components in various electronic devices such as computers, smartphones, televisions, and many other appliances, ensuring that they receive the correct voltage and current to operate efficiently and safely. A relay is like a switch that is controlled by electricity. It uses a small current to control a larger current, allowing to control high-power devices with a low-power signal. Relays are commonly used in circuits to control lights, motors, heaters, and other electrical components. A GSM module is a component that allows devices to communicate over the Global System for Mobile Communications (GSM) network. It enables devices to send and receive data, make calls, and send messages using cellular networks. An LCD, or Liquid Crystal Display, is a type of flat-panel display commonly used in electronic devices such as TVs, computer monitors, smartphones, and digital clocks. It works by using liquid crystals that can change their orientation when an electric current is applied. A shield motor is a term that is not commonly used in electronics. A water motor is a device that uses the flow of water to generate mechanical energy. It typically consists of a turbine or impeller that rotates when water flows through it, converting the energy of moving water into rotational motion.

IV. IMPLEMENTATION



V. HARDWARE RESULTS

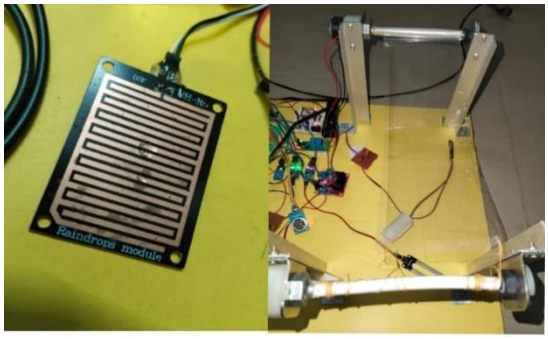


Fig: 2: Rain detected

Fig 3: High Humidity Alert

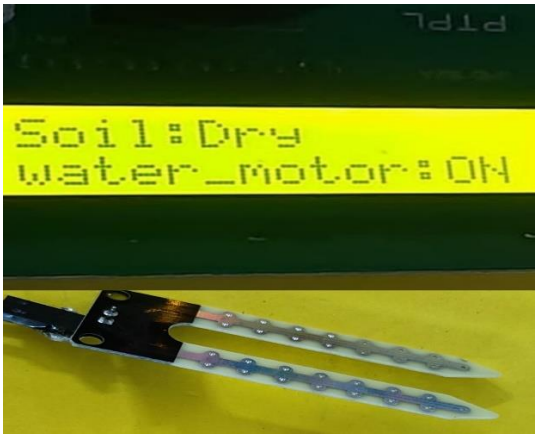


Fig 4: Low Moisture Detected

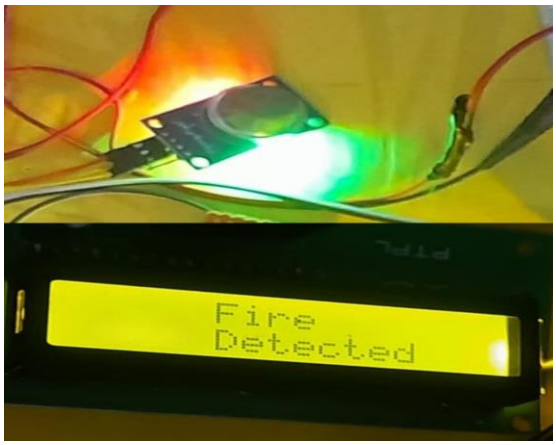


Fig 5: Fire Detected

Fig 6: Temperature & Humidity Sensing

VI.RESULT

The rain sensor are used to detect the rain, Fire sensor is used to detect the smoke and fire, Temperature sensoris used to detect the temperature which is present in the surroundings and displayed on the LCD. Humidity, Fire, Temperature, Soil and Rain values are display on LCD. The GSM Module is send the message after detecting the fire. Rain sensor senses the rain and automatically DC

Motors open the rain shield. And remaining sensor values are displayed on LCD.

Table 1 Temperature variation

c	Temperature	Test Case 1	Test Case 2	Test Case 3
1	Room Temperature (Inside)	22	22	21
2	Room Temperature (Outside)	35	35	35
3	During Rainfall	20	21	21
4	Mild Temperature	25	23	24

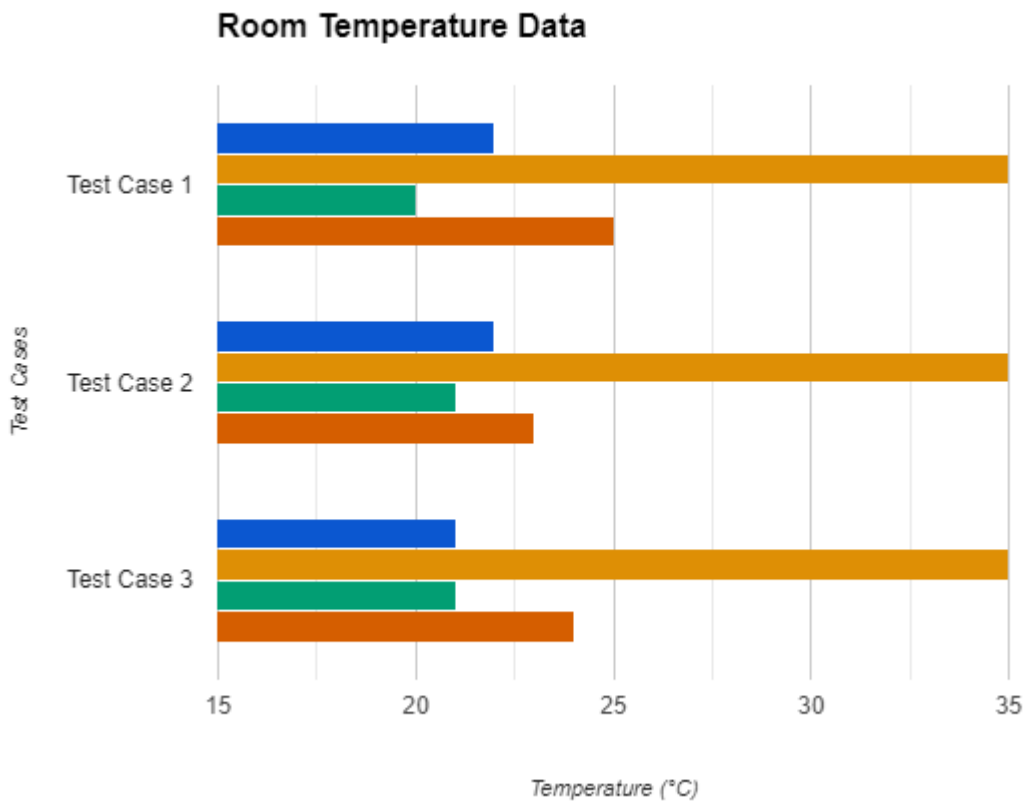


Fig 7: Temperature Variation

Table 2 Humidity variation

S.no	Humidity	Test Case 1	Test Case 2	Test Case 3
1	Morning	69.8%	70%	70%
2	Afternoon	48.7%	50%	50%
3	Evening	60%	60%	59.8%
4	Night	80%	79.6%	80%

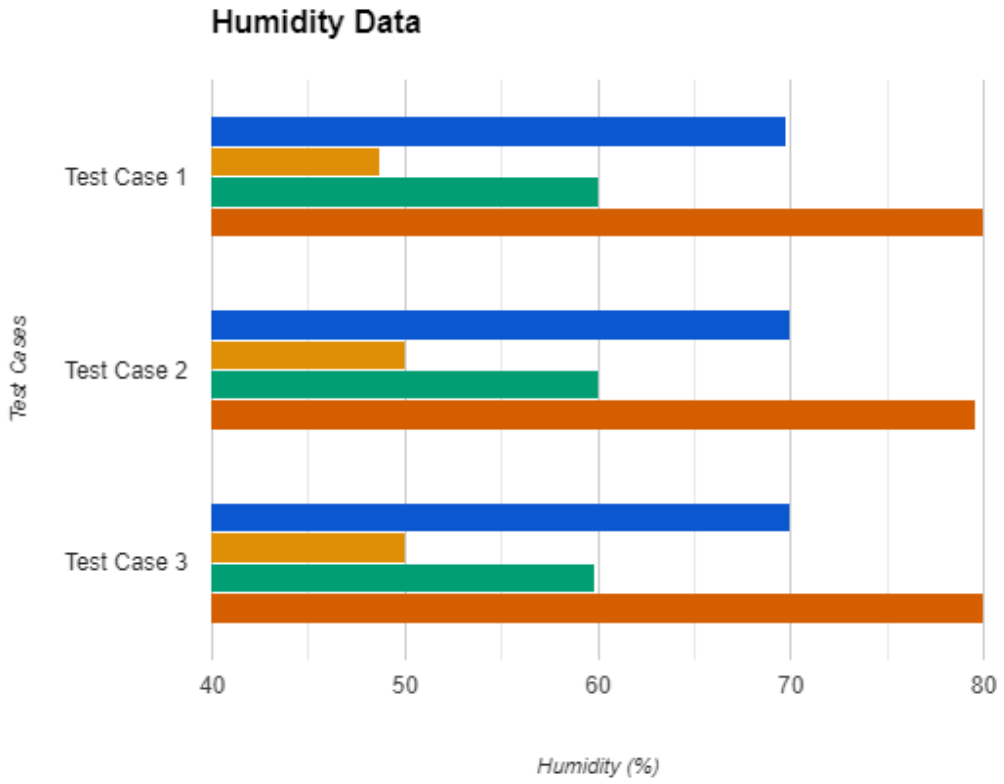


Fig 8: Humidity Data

Feature	Existing System	Proposed System
Water Consumption Efficiency	~60% efficient	~90% efficient
Manual Labor Requirement	High (100% manual)	Low (10-20% manual)
Cost of Operation	High (100 units)	Lower (70 units)
System Scalability	Low (limited to small areas)	High (scalable to large areas)
Real-time Monitoring	Limited (10%)	Comprehensive (100%)
Response Time to Environmental Changes	Slow (hours)	Fast (seconds to minutes)
Energy Consumption	High (100 units)	Lower (70 units, with solar)
Data Accuracy	Moderate (70%)	High (95%)
System Uptime and Reliability	80%	99%
Environmental Control Precision	Low (manual adjustments)	High (automated adjustments)
Alert and Notification Speed	Delayed (manual)	Instant (automated via GSM)
User Interface Complexity	High (manual operation)	Low (automated, user-friendly interface)

VII. CONCLUSION

As our main intention to protect the crops and along with the generation of power using solar panel is established and the parameters to grow the crop according the suitable environment is created using greenhouse structure. Actuating roof of the greenhouse helps to protect the crop in any climatic conditions. Using IOT technology it helps the farmers to control their filed anywhere is simple and now it is cost effective.

VIII. FUTURE SCOPE

The future scope for the automated agricultural monitoring and protection system project can be vast and impactful, addressing various aspects of agriculture technology, scalability, and sustainability.

Implement AI algorithms to predict weather patterns, optimize irrigation schedules, and identify potential crop diseases early.

Use machine learning models to analyze collected data for better decision-making and improving crop yield predictions.

Expand the range and types of sensors to include soil nutrient sensors, pest detection sensors, and more precise environmental sensors.

Implement more advanced and energy-efficient wireless sensor networks (WSN) for better data transmission and coverage.

IX. REFERENCES

[1] Mateos, L., & Araus, J. L. (2016). Hydrological, engineering agronomical, breeding and physiological pathways for the effective and efficient use of water in agriculture. Agricultural Water Management, 164, 190–196. doi:10.1016/ j.agwat.2015.10.017

[2] Wasson, T., Choudhury, T., Sharma, S., & Kumar, P. (2017). Integration of RFID and sensor in agriculture using IOT. 2017 Internationl Conference on Smart Technologies for SmartNation (SmartTechCon). doi:10.1109/smarttechcon.2017.835837 2

[3] Gouadria, F., Sbita, L., & Sigrimis, N. (2017). A greenhouse system control based on a PSO tuned PI regulator. 2017 International Conference on Green Energy Conversion Systems (GECS). doi:10.1109/gecs.2017.8066235

[4] Alsharakhat, A., Almoalem, M., AlHawaj, N., Papageorgiou, C., Sadriwala, A. (2017). Temperature Control of a Greenhouse System Using Embedded Systems Technology. 2017 9th IEEE-GCC Conference and Exhibition (GCCCE). doi:10.1109/ieeegcc.2017.8447937

[5] Infantian Rubala,D. Anitha., "Agriculture Field Monitoring using Wireless Sensor Networks to Improving Crop Production" 2017 IEEE International(2017).