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Solar-Based Smart Agriculture With IoT Enabled For Climatic Change

Mrs. B. Kanaka Durga[1], A. Bhanu prakash[2], D. Manoj Sai[3], S. Yamini[4]

[1] Assistant professor of ECE, Department of Electronics and Communication Engineering, St . Peter's Engineering College. Hyderabad 50100

[2,3,4]Undergraduate Student, Department of Electronics and Communication Engineering, St . Peter's Engineering College. Hyderabad 50100

1. ABSTRACT

This paper presents to innovate the climatic change in agriculture through the integration of solar energy systems and Internet of Things (IoT) technologies. The proposed Using solar electricity for diverse agricultural applications the solar-based smart agriculture system operates and employs IoT devices to collect, analyze, and utilize real-time data for decision-making. In the Solar-based smart agriculture system with IoT provides a sustainable and resilient approach to addressing the challenges of climatic change in agriculture. By utilizing solar energy and leveraging IoT technologies for data-driven decision-making, this system has the potential to enhance agricultural efficiency, optimize resource utilization, and mitigate the adverse effects of climate change on crop production. agricultural field to collect data on crucial environmental like temperature, humidity & soil moisture sensors.

KEYWORDS: IoT Technologies, Sensors, Actuators, Temperature, Humidity, Soil moisture, Light intensity, Crop production.

2. INTRODUCTION

The challenges posed by climatic change in the agricultural sector. The increasing frequency and intensity of extreme weather events, coupled with changing climate patterns, have significant implications for crop production, resource management, and food security. Solar-based smart agriculture the solar power as a renewable energy source for powering various agricultural operations. Solar panels can capture the sunlight and convert it into electricity, providing a traditional energy source and farmers can reduce their fossil fuels, low cost, and changes in climatic conditions.

3. LITERATURE SURVEY

This article is written based on of protection of soil and crops through solar energy Shankar Deosarkar [1] created a technique for creating a sensor interface device for a Smart Farming Monitoring system using an IoT environment was put forth. Most of the environmental parameters like pH, humidity, water level, water temperature, and carbon dioxide (CO_2) on the water's surface.

Sughapriya et al. [2] created a system for evaluating The economy and existence of the Indian people depending on agriculture. The goal of this project is to develop an embedded irrigation and soil monitoring system that will decrease the need for human field monitoring and deliver data via a mobile app.

4. PROPOSED METHODOLOGY

The farmers can reduce their use of water and power-planned technology. Using sensors, it is monitoring the plant's parameters. The Arduino serves as the project's main node. It can be programmed using Arduino software, and Arduino is also where it operates. Some of the operations done in this system as

1. Solar Energy System Installation
2. IoT Sensor Deployment
3. Data Collection and Transmission
4. Remote Monitoring and Control
5. Sustainable Water Management
6. Monitoring and Evaluation.

5. BLOCK DIAGRAM

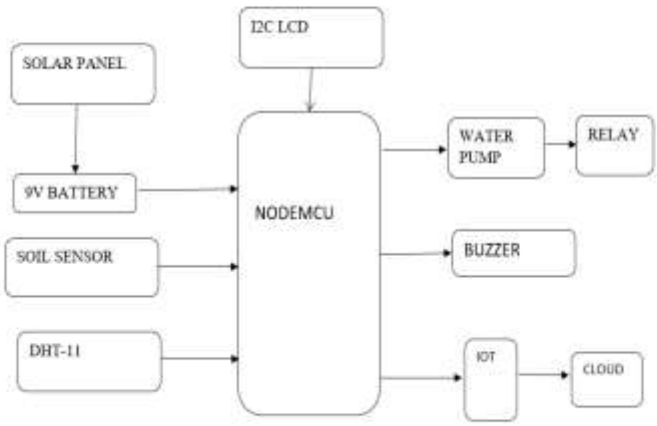


Fig 4: Block Diagram of smart agriculture with solar-based with IoT-enabled climatic changes

The block diagram for solar-based smart agriculture with IoT enabled for climatic change depicts the key components and their interactions within the system. At the center of the diagram is the solar energy system, which consists of solar panels or photovoltaic cells that capture sunlight and convert it into electricity. This renewable energy source powers various agricultural operations.

The IoT devices, represented in the diagram, are deployed across the agricultural field and equipped with sensors and actuators. These configuration devices collect the data application's environmental parameters such as temperature, humidity, and soil moisture. It is connected through a wireless network, facilitating seamless data transmission to the central system.

FLOW CHART

The workflow of solar smart agriculture is to start the power supply. The readings from the soil moisture and temperature sensors are analyzed. The motor is switched on if the value exceeds the threshold value while it is off. The motor is turned off if the value is below the threshold value when it is on. The reading and analysis of the gas sensor value The farmer is informed and the buzzer is turned on if smoke or gas is found. On the LCD, the sensor values are shown. The cloud receives the values. It displays the reading and sends it to the cloud and shows the analysis.

6. DISCUSSION

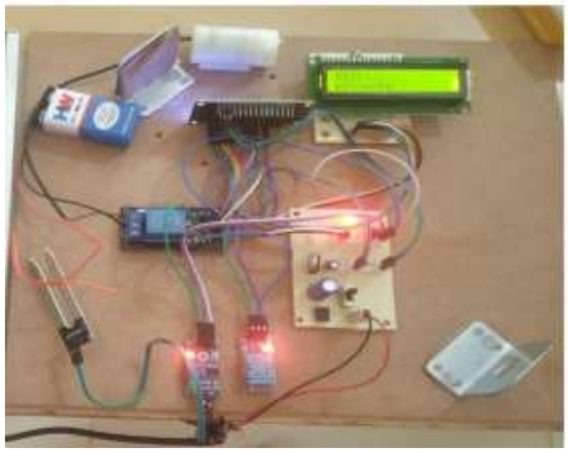


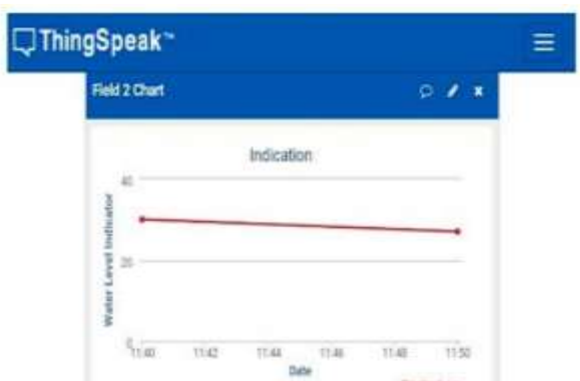
Fig 5: Developed Model of smart agriculture with solar-based with IoT-enabled climatic changes

In this kit, the integration of solar energy, IoT devices, data collection and analysis, automation, and remote monitoring in smart agriculture with IoT-enabled for climatic change. It illustrates how these components work together to optimize agricultural operations, adapt to climatic variations, and mitigate the adverse effects of climate change on crop production.

Benefits and Applications:

In this section the advantages of smart agriculture of solar energy with IoT integration and it discusses how this approach enables agriculture, optimizing water management, fertilizer application, and pest control. The section also explores the potential for remote monitoring and control of farming operations through mobile applications and web-based platforms. Furthermore, it emphasizes the importance of sustainable water management practices enabled by solar-powered irrigation systems and IoT sensors.

The developed model is tested with soil and water for samples and the results are shown



7. CONCLUSION

In this conclusion, in solar-based smart agriculture, Solar panels can be installed on agricultural lands or implemented in the form of solar-powered irrigation systems, helping to power farm operations and reduce electricity costs. The use of IoT in solar-based smart agriculture enables remote monitoring and control of farming operations. Farmers can access the data and manage their farms from anywhere, using mobile applications or web-based platforms. Farmers can optimize their production processes, and reduce resource wastage.

8. DECLARATION

We would like to thank all the authors of different research papers referred to during writing this paper. It was very knowledge-gaining and helpful for further research to be done in the future.

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