International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 02 Issue: 03 March 2024
Page No: 612 - 615
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2024.0088

Agriculture Soil Nutrition Auto Sprayer

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Abstract

Modern agriculture demands precise management of soil nutrition to optimize crop yield and minimize resource wastage. This presents a smart agriculture solution that utilizes an NPK sensor to monitor and regulate the levels of essential nutrients - Nitrogen (N), Phosphorus (P), and Potassium (K) in soil. The system is designed to automatically adjust nutrient levels when they fall below optimal values. Integrating NPK sensors in agriculture soil nutrition management represents a significant advancement in precision farming. These sensors are designed to detect the levels of the essential nutrients in the soil accurately. When the nutrient levels fall below optimal thresholds, a signal is sent to open the corresponding solenoid valve, allowing for the precise application of Nitrogen, Phosphorus, and Potassium fertilizers. Solar panels are considered a clean energy source because they do not produce harmful emissions of greenhouse gases during electricity generation. They rely solely on sunlight, which is an abundant and renewable resource An LCD provides real-time information to farmers, offering insights into nutrient levels and helping them make informed decisions about fertilization.

Keywords: *Soil Nutrition, Crop Yield, Soil Analysis, Auto sprayer*

1. Introduction

In modern agriculture, optimizing soil nutrition is paramount to achieving higher crop yield sand ensuring sustainable farming practices. The advent of NPK (Nitrogen, Phosphorus, and Potassium) sensors has revolutionized the way farmers manage nutrient levels in their fields. [1] The sensors have the capability to detect the innovation involves a system where NPK sensors continuously monitor soil nutrient levels. When these levels are below optimal thresholds, the system triggers the release of the appropriate nutrients through solenoid valves, ensuring that the soil receives the necessary Nitrogen, Phosphorus, and Potassium fertilizers precisely when needed. Moreover, [2] Solar panels work on the principle of photovoltaics, where semiconductor materials, typically silicon, absorb sunlight and convert it into electricity through the photovoltaic effect. The entire setup operates sustainably with the use of solar panels, reducing both costs and environmental impact. [3] The LCD display provides real-time feedback to farmers, offering insights into nutrient levels and helping them make informed decisions about fertilization. This system is further bolstered by its integration with the Internet of Things (IoT), allowing farmers to remotely monitor and manage their fields' nutrition levels. In this era of precision agriculture, this technology is poised to transform farming

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practices, maximizing crop productivity, minimizing resource waste, and promoting environmentally responsible farming. In this article, we delve into the world of agriculture soil nutrition management using NPK sensors and IoT, exploring how it is reshaping the future of farming. [4]

2. Experimental Methods or Methodology

3.

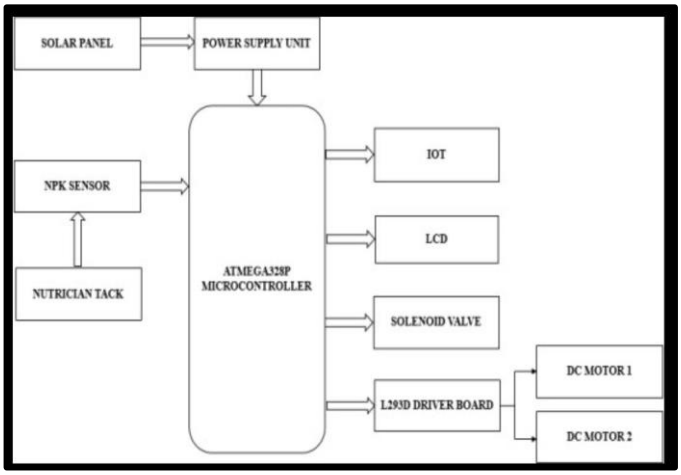

Figure 1 Methodology

This article addresses the identification of the DOS attack that is a denial of service invasion. The DOS threats are a prominent kind of cyber-threat that is designed to reduce the database access and restricting the client access to systems. This can be tackled with the utilization of the CPU load management and Wireshark monitoring tool within the framework for malware detection. [5] The cement particles have uneven outlines, according to the FESEM investigation. The GGBS particles, on the other hand, are angular at different magnifications, as illustrated in Figure 1. The composition of the elements contained in the material is shown in Figure 2 by the EDAX analysis. Figure 4 shows the elemental compositions of cement and GGBS. Higher component values are determined by high-intensity peaks. The cement particles have uneven outlines, according to the FESEM investigation. The GGBS particles, on the other hand, are angular at different magnifications, as illustrated in Figure 3. The composition of the elements contained in the material is shown in Figure 1 by the EDAX analysis. Table 4 shows the elemental compositions of cement and GGBS. Higher component values are determined by high-intensity peaks. The cement particles have uneven outlines, according to the FESEM investigation. The GGBS particles, on the other hand, are angular at different magnifications, as illustrated in Figure 3. The composition of the elements contained in the material is shown in Figure 2 by the EDAX analysis. Figure 4 shows the elemental compositions of cement and GGBS. Higher component values are determined by high-intensity peaks. [6]

4. Hardware Description

3.1 Solar Panel

Solar panels, also known as photovoltaic (PV) panels, work by converting sunlight into electricity through a process called the photovoltaic effect. Absorption of Sunlight: Solar panels are composed of individual solar cells, typically made of silicon. When sunlight hits consists of tiny particles of energy called photons. These photons carry energy from the sun. Flow of Electric Current: The movement of these excited electrons creates an electric current. This flow of electrons is what we commonly refer to as electricity. [7]

Figure 2 Solar Panel

3.2 Arduino Uno

The Arduino Uno serves as the brain of the system, processing data from the NPK sensors, controlling the solenoid valves, and managing the LCD display. It runs a program designed to interpret sensor data, make decisions based on predefined thresholds, and activate the solenoid valves as needed. [8]

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3.3 NPK Sensor

An NPK sensor is a specialized device used in agriculture to measure and monitor the levels of essential nutrients in the soil, specifically Nitrogen (N), Phosphorus (P), and Potassium (K). These nutrients are fundamental for plant growth and crop development, and their availability in the soil directly impacts agricultural productivity. NPK sensors typically employ various technologies, including electromagnetic or optical sensors, to analyses the soil's chemical composition. [9]

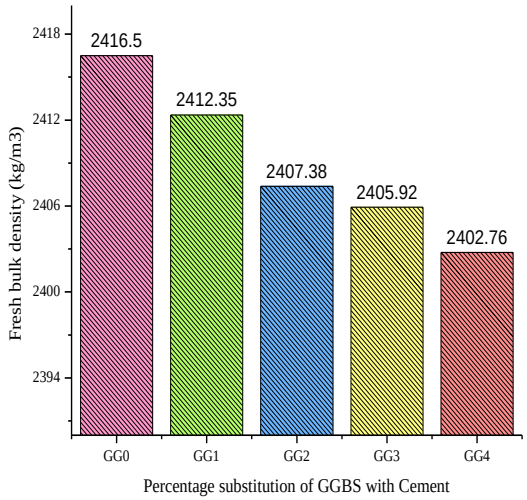

Figure 3 NPK Sensor

3.4 Node MCU

In the Agriculture Soil Nutrition Sprayer project, IoT (Internet of Things) plays a pivotal role in modernizing and optimizing agriculture practices. By incorporating IoT technology, this system becomes a part of the growing trend of smart farming. IoT connectivity allows for real-time data collection, analysis, and remote control, offering farmers a host of benefits. The IoT components enable the Agriculture Soil Nutrition Sprayer. Predictive modelling. By aggregating historical data from multiple farms and analyzing it, the system can provide valuable insights into soil health and crop performance. [10]

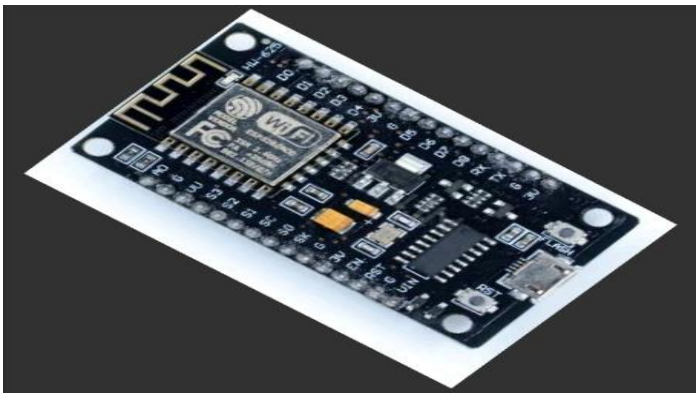

Figure 4 Node MCU

Conclusion

In conclusion, the Agriculture Soil Nutrition Sprayer system, enhanced by the integration of NPK sensors, a solar panel power source, solenoid valves, an LCD display, and IoT connectivity, represents a significant leap forward in precision farming. This innovative technology effectively addresses the critical task of soil nutrition management by providing real-time insights into nutrient levels. By automatically responding to nutrient deficiencies, this system optimizes the delivery of Nitrogen, Phosphorus, and Potassium to crops, resulting in healthier and more productive yields. Moreover, the incorporation of IoT connectivity allows farmers to remotely monitor and control the system, making informed decisions for sustainable and efficient farming practices. With a focus on resource conservation and improved crop production, this Agriculture Soil Nutrition Sprayer system stands as a testament to the ever-evolving landscape of modern agriculture, fostering both environmental stewardship and increased agricultural efficiency.

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