International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Strategy to Farming Activities Using Dual Centre Configurations Chip

Dr. P. Senthil Pandian

Associate Professor, Department of CSE, Solamalai College of Engineering, Madurai, Tamilnadu.
E-Mail : psenthilpandian@gmail.com.

ABSTRACT—

The farming sector clearly needs human work for a variety of reasons. Farmers face numerous challenges every day in order to provide the demand for fruits and vegetables for everyone. This is because it is almost impossible to ascertain the properties of the soil, including humidity, soil wetness, along with a wide range of other parameters, without farmers physically present at the farm. Farmers find it very difficult to perform farming tasks during a specific period of time in April and May because the land is dry. So, we are implementing a strategy to provide all the information about intensive farming. These changes considerably improve farmers' agricultural management, and they won't have an impact on the development of harvests in any way. The proposed system can manage all limits as the primary criterion in order to develop a comprehensive solution for a better agricultural surveillance system. In this, a microcontroller-embedded precision agriculture surveillance system is built.

***Keywords:* Agricultural Cultivation, Water level sensor, Low-Cost System Chip, Soil moisture sensor.**

I. CONTRIBUTION OF AGRICULTURE

Agriculture has a huge economic impact on the country. A whopping 60 to 70 percent of people in India are involved in agriculture. The Internet of Things (IoT) was used by farmers to manage the challenges in agriculture. India is one of the developing countries with the second-fastest growing populations, hence it is critical to increase agricultural production. Since irrigation uses more water annually than precipitation does, water supplies are at a critical point for better futures. In order to protect water resources for future generations and maintain better water management, it is crucial to employ methods that use the least amount of water feasible to meet the requirements.

It should be possible to employ certain techniques to lower water usage. IoT technology enables us to develop strategies for detecting water consumption by connecting an Android app. Because a soil moisture and humidity sensor is buried in the soil next to crop varieties, we can determine the amount of moisture in the soil. The Internet of Things, or IoT, is a network of everyday objects that have interconnectivity, sensors, operating systems, and circuitry built-in to them to help transmit data. In essence, an object has a networked system connected to it that allows data to flow in both directions.

Any object that can receive inputs (particularly object management) or collect and produce an informative response (typically object state or some other sensory information) may be equipped with a small connected system, including incandescent bulbs, toaster ovens, refrigerators, potted plants, smart watches, fans, rail lines, aeroplanes, and automobiles. Computers will become ubiquitous, individually recognised, and globally networked pervasive computing systems as a result, and we will see them everywhere we turn[1]. Because of low-cost, wirelessly connected microprocessor processors, the Internet of Things is quickly losing ground. Combining numerous sensors and connecting sensor data to insights that enable automation and reaction operations is one of the challenges faced by modern farming systems [9]. Big data analysis will help to precisely control water, fertilisers, and sunlight in order to lower overall farming costs and boost output while utilising the same amount of land. A crucial element of advanced systems that permit cultivation on shorter and possibly more dispersed regions is remote administration, whether inside or outside. A precision agricultural infrastructure type is choosing sensor types and brands are frequently the easiest step. It could be challenging for some agricultural experts to configure tracking and machine intelligence technologies to carry out tasks like watering prompts, alerts, and cautions. The agriculture sector depends heavily on the usage of machinery.

Management systems require time and money even when they are regularly scheduled, but they cannot completely eliminate the unexpected. When a piece of equipment unexpectedly breaks down, accidents often slow down. The amount of water used for farming depends on how moist the terrain is. Instead of going to the field and completing routine physical checks, farmers might use smart sensing equipment [10], which is much more accurate, simple, and time-saving. Lack of accurate information on ground moisture may cause plants to be under- or over-watered. Overwatering wastes water and results in higher water bills, but under hydrated plants are brittle and fragile.

Effective pest management, which involves identifying pests and learning about their habitat, range of movement, and behavioural characteristics, is another issue that farmers must deal with. Obviously, it would be quite challenging to complete this work without IoT-based pest management technology. A thorough assessment of the literature is included in Section II of the essay. System designs for the suggested system are discussed in Section III. The suggested methodology has been expanded upon in Part IV. Results have been discussed in section V, and section VI concludes.

II. RELATED ANAYSIS

S. Karim et al. (2022)[2] For reliable and effective farming, smart sensors are integrated with the required information and communication technologies. A wide range of cutting-edge software is used in smart agriculture, including wireless sensor networks, the Internet of Things, robotic systems, farming bots, drones, machine intelligence, and cloud services[3]. By using these methods in sustainable farming, all farming stakeholders may make excellent management decisions to maximise crop yields. We differentiate between conventional farming and smart agriculture based on implementation methodologies and a focus on the several processing processes in smart farming.

N. K. Chaubey et al (2022)[6] The essay discussed agricultural mobile crowd sensing (AMCS) in great detail and offered suggestions for agricultural data collection techniques. In addition, we contrast AMCS with other farm data collection techniques and find that AMCS has a number of advantages over them, including adaptability, the capacity to obtain latent information, and low-cost requirements. A basic analysis of farming aspects should be presented, and a specific illustration highlighting the upkeep problem with solar pesticide lights should be discussed.

Q. Zhong et al. (2021)[7] Because they don't know how to use them properly, humans waste key resources, which leads to a higher resource consumption for a given level of agricultural yield. One approach to addressing this issue is the creation and implementation of an intelligent farming structure that makes use of the Internet of Things (IoT). In this research, a framework for intelligent farming is presented that will handle a variety of less expensive IoT sensor kinds. This framework will collect data from the land, the air, the water, and the bugs, then analyse that data to decide the best line of action. The special feature of our suggested approach is its capacity to scientifically automate tasks like fertilisation, irrigation, insect identification, and pesticide application with little to no farmer involvement.

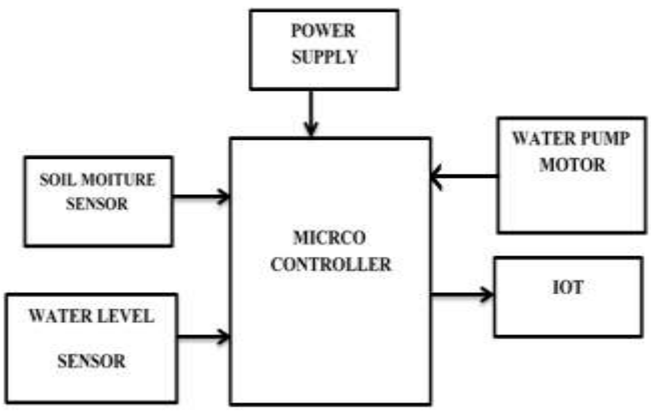
Jun-feng Zhang et al. (2020)[9] The development of the Internet of Things (IoT) and the fifth generation wireless network (5G) is anticipated to advance agricultural practises since vast amounts of real-time data can be obtained to monitor the health of crops and animals, warehouse management, as well as other crucial data. In order to strike a balance between data broadcasting and data protection, this study proposes a privacy-preserving data collection method using the ElGamal Cryptosystem. Its safety, discretion, and adaptability are demonstrated by the evaluation and efficacy modelling.

III. PROPOSED SMART AGRI-MONITORING SYSTEM

During the warmer months, it is essential to maintain a sufficient level of earth moisture. Farmers incur significant costs since many unhealthy plants produce less than healthy ones. Its limitations include its extreme complexity and inability to communicate at greater distances.

To address these shortcomings, a smart agriculture monitoring system has been proposed, and it is shown in in Figure-1.

Figure 1 Architecture of Proposed Smart agriculture monitoring system



An integrated remote communication unit with dual centre configurations is used in the ESP32 low-cost system on chip (LCSC) package is shown in Figure-2. Just a few examples of the airless devices that the gadget can interact with include Bluetooth and ESP8266. The Node MCU unit is another name for the ESP component. The network has been configured such that ports can connect with SSIDs or stronger customer ids that have important credentials.

Figure 2 Wifi module

In order for the sensor to function, a number of accessible wires that are attached to the ground must be intertwined with the detecting threads. The 1 MΩ pull-up resistor on the sensing lines is poor. When a droplet of water crosses the sensing trace to the grounded trace, the resistor will raise the sensing trace level. The Soil moisture sensor is shown in Figure-3.

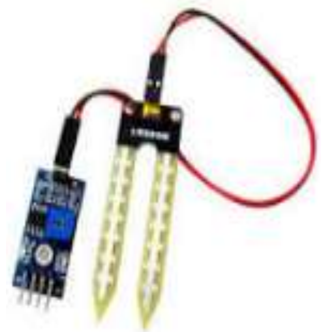


Figure 3. Soil moisture sensor

A soil moisture sensor measures a soil's water content and can also be used to determine how much water has been held in the soil's surface. Soil moisture sensors do not immediately measure the water content of the soil. Instead, they concentrate on differences in a different soil property that is consistently correlated with water potential. Direct current pumps can transport liquid in a variety of manners by using electricity from an engine, batteries, or solar panel. The most common DC voltages used by powered pumps are 6, 12, 24, or 32 volts. Photovoltaic (PV) panels containing solar panels are used in photovoltaic DC pumps to generate direct current as soon as they're in contact with sunlight is shown is Figure-4.

Figure 3 Powered Pumps

IV. PRODUCTION STATISTICS

For a number of reasons, the agriculture sector genuinely requires physical labour. Farmers currently face a number of challenges in order to grow fresh crops of fruits and vegetables. The reason is that without farmers on the current field, it is difficult to assess the moisture content, humidity, and many other characteristics of the soil.

Since the earth starts to dry out over a set length of time, they find it incredibly difficult to carry out farming operations in May and April, respectively. We are beginning a programme that will provide comprehensive statistics on agricultural production as a result.

These measures won't affect the development of harvests; instead, they will make it easier for farmers to cultivate their land. The suggested strategy enables an exclusive approach that includes a smart farm tracking system by treating all limits as the primary need. This article creates a microcontroller-based smart farm surveillance system. The new strategy does away with the need for soil testing. When deciding when to plant seeds and harvest crops, farmers use the properties of the soil as a powerful metric. Through IoT devices monitoring ground conditions, farmers are promptly informed of relative humidity and saltiness.

Accurate measurements of the ground climate and air humidity, among other factors, allow a farmer to plan irrigation schedules and predict insect activity. Soil quality management uses a combination of hardware and software to operate in real-time and notify the user of any significant changes.

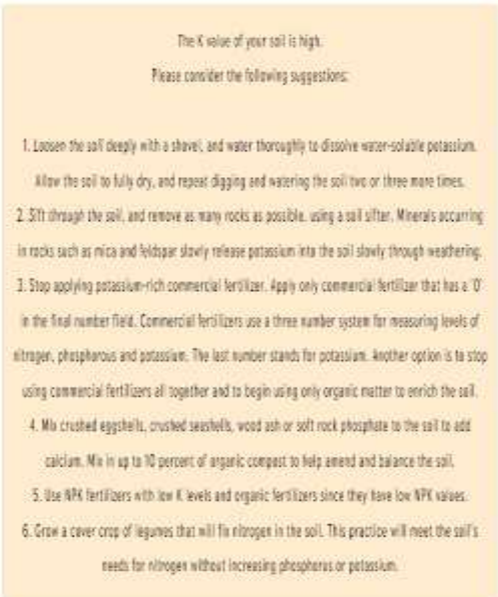
Only when the soil's water level falls below 50 will the water pump motor automatically start irrigation; once the level rises above 50, the pump will stop. Here, the comprehensive solution has been found as a component of the smart farm system.

Embedded sensors are used to monitor and analyse the environment. On the other hand, crop disease is regarded as one of the most significant limitations. Using image processing, the crop disease is found. Here, image segmentation and colour classification based on colour spaces are carried out to identify diseases. The colour space values are distinguished and divided into healthy plant and unhealthy plant categories. Fertilisers are taken into consideration when a plant is diseased.

V. RESULTS AND DISCUSSIONS

Images of the Python Web application are shown in Figure-4,5,6,7,8.

Figure 4 Home Page


The K value of your soil is high.

Please consider the following suggestions:

1. Loosen the soil deeply with a shovel, and water thoroughly to dissolve water-soluble potassium. Allow the soil to fully dry, and repeat digging and watering the soil two or three more times.
2. Sift through the soil, and remove as many rocks as possible, using a soil sifter. Minerals occurring in rocks such as mica and feldspar slowly release potassium into the soil slowly through weathering.
3. Stop applying potassium-rich commercial fertilizer. Apply only commercial fertilizer that has a '0' in the final number field. Commercial fertilizers use a three number system for measuring levels of nitrogen, phospharous and potassium. The last number stands for potassium. Another option is to stop using commercial fertilizers all together and to begin using only organic matter to enrich the soil.
4. Mix crushed eggshells, crushed seashells, wood ash or soft rock phosphate to the soil to add calcium. Mix in up to 10 percent of organic compost to help amend and balance the soil.
5. Use NPK fertilizers with low K levels and organic fertilizers since they have low NPK values.
6. Grow a cover crop of legumes that will fix nitrogen in the soil. This practice will meet the soil's needs for nitrogen without increasing phospharus or potassium.

Figure 5 Suggested Fertilizers

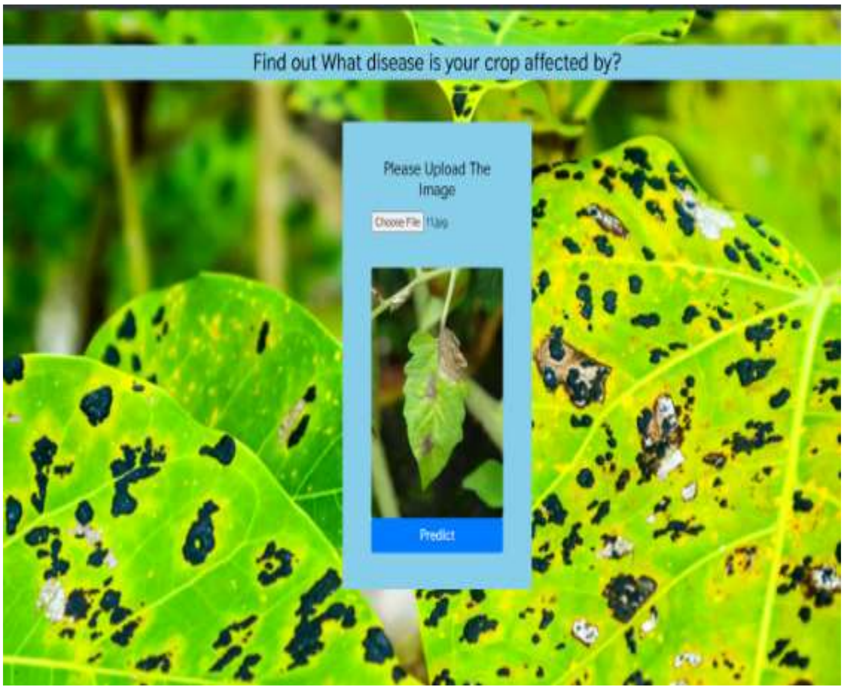


Figure 6. Disease Detection

Figure 6 shows the disease page detecting the image of plant disease through the web application

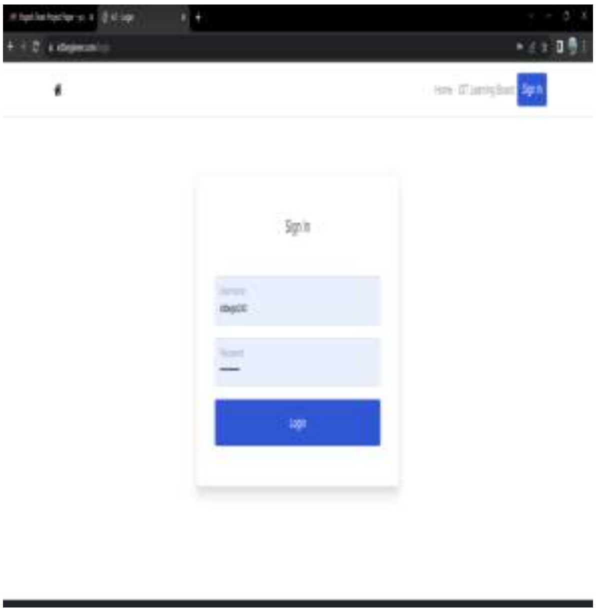


Figure 7 Login Page

Figure 7 and Figure 8 shows the login page and monitoring page of smart monitoring system in cloud platform.

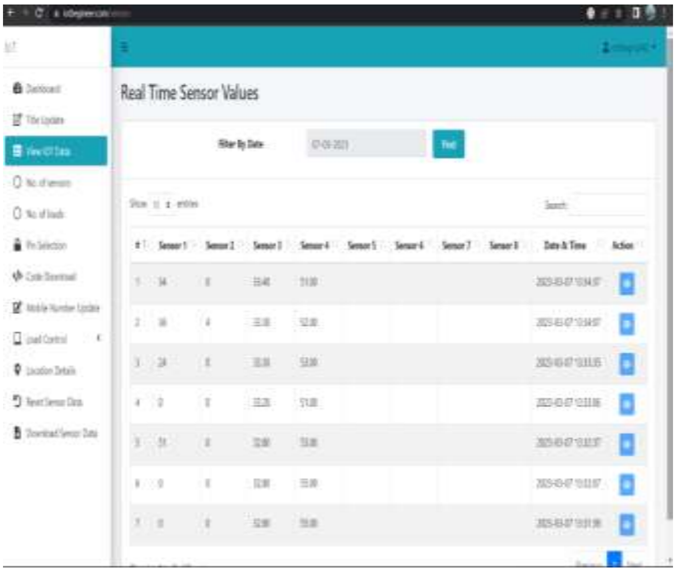


Figure 8 Monitoring Page

VI. CONCLUSION

IoT is used in "smart farming" to make it easy for farmers to obtain crop-related data and make appropriate adjustments wherever they are required. Block chain technology would benefit everyone involved, and IoT would significantly improve the farming process. Automatic identification techniques are being developed thanks to advancements in computer technology to help farmers recognize production estimations and provide useful information for crop management. The system can be improved further by integrating an android application that predicts weather data and rainfall with more accuracy and connects to a few commercial frameworks that benefit farmers.

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