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Utilizing The Internet Of Things For Intelligent Crops And Next-Generation Smart Forming

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ABSTRACT:

The agricultural sector plays a crucial role in our economy, contributing over 20% of GDP. The cultivation of plants and animals is known as agriculture. One of the most crucial natural resources for food production is soil, which is itself an important natural resource. The fundamental issue with maintaining agricultural resources is a lack of knowledge and instruments. Most farmers lack the skills necessary to accurately evaluate the state of their fields and crops. Water scarcity, climate change, and low production owing to inefficient farming methods, which waste time, money, and fertility, are among the problems that the agriculture sector faces. Giving farmers access to relevant information and solutions is research's primary contribution. Consequently, it is vital in improving the lives of farming communities and fostering positive change in the agriculture industry. A few sensors on a handheld device gather data about the soil in our suggested system. The situation is detected by sensors that measure soil moisture, humidity, temperature, and pH. Data analysis then gives a decision based on the data. The farmers will be notified of our decision through an alert system. Farmers will have an easier time achieving fertile soil conditions and using less water for irrigation with this device. In addition, Blynk, an IoT platform, is integrated with a web-based monitoring system in this system. Smart farming technology allows for the planting of more crops and increases modern agricultural output. We have built the proposed system and implemented our model using the Arduino UNO on the backend.

Keywords—Internet of Things (IoT), Monitoring Systems, ArduinoUNO, Blynk.

INTRODUCTION

In order to satisfy the current human need on Earth, new ideas and technology are constantly being invented and implemented. These innovations have had a direct impact on the IoT, or Internet of Things [1]. A wide range of items embedded in devices, sensors, machines, software, and people may communicate, share information, and interact with one another via the Internet of Things (IoT) [2]. Through this integration, the divide between the real and virtual worlds is diminished. Smart homes, smart cities, smart energy, autonomous vehicles, smart agriculture, campus management, healthcare, and logistics are just a few of the many areas that have employed IoT in recent years [3]. If we want better results, we need to modernize agriculture. Most of our farmers don't know how to use the land to their advantage [4]. Looking at it from this angle, our goal is to help them with IoT. We have discussed important issues in this study that will have a major impact on contemporary farming practices in terms of sustainability [5]. We have made use of a few IoT devices, which enable the gathering of data in real-time and the connection between systems, machines, and humans. By utilizing a portable device equipped with sensors and SMS warnings, our proposed system provides a sustainable approach to soil management. It also optimizes industrial operations, reduces water use, and improves resource utilization, productivity, and preventative maintenance. Additionally, it improves fertility for farmers. We have taken into account in this study a farmer who is ignorant of the agricultural resource and unable to use modern technologies. He will be helped by our system's modern technology. Fertility will also be easier to manage, and less water will be needed for irrigation[7]. The proposed system relies on a tiny handheld gadget to gather data, process it, and then send an SMS message to the user with any relevant instructions or information. Additionally, it enables the monitoring of websites from anywhere. The user then takes the required steps to finish the operation. Some sensors could allow us to collect data from the

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field in real-time. We need an Arduino controller board to make decisions using threshold values [8]. Our system will notify the user via SIM card once the choice is made. Our goal is to facilitate real-time decision-making in order to alleviate the difficulties encountered by farmers in their agricultural operations. We expect that by fixing these issues, farming will become more efficient, and that farmers' lives would be better in the long run. For the simple reason that a lot of farmers lose time, energy, and money because they fail to account for the soil's and crops' fertility. By giving the farmers actionable information and recommendations, our study closes the knowledge gap.

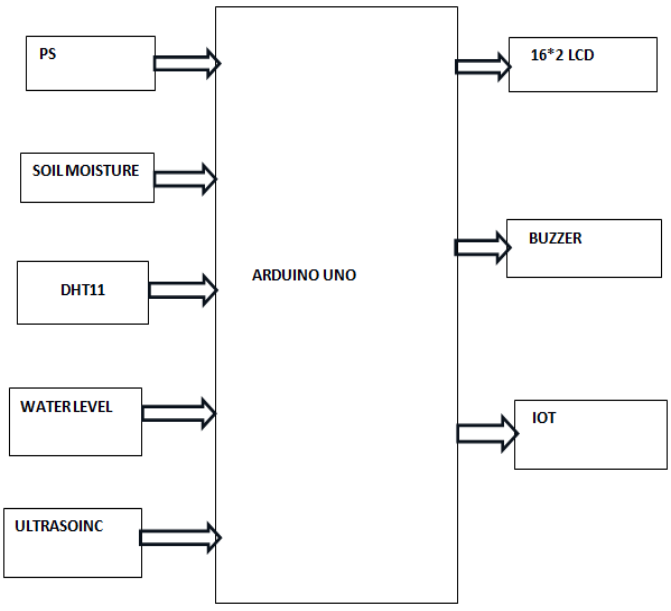
LITERATURE REVIEW

In order to identify the best answers, researchers have employed a wide range of approaches. Here we will go over a few pieces of literature that have been written on research. The researchers in [9] optimized agricultural operations, improved resource management, increased production, and addressed issues like climate change and food security by using the Internet of Things (IoT), artificial intelligence (AI), robots, and data analytics. To improve weather forecasts, optimize irrigation and fertilization, and aid farmers in making better-informed decisions, the study mentioned the use of technologies like GPS (Global Positioning System), UAVs (Unmanned Aerial Vehicles), and remote drone operations in predictive data analytics. Connectivity and infrastructure problems, high starting expenditures, data management, and privacy concerns are some of the obstacles that the writers can take into account in their work. The writers of [10] mostly discussed smart agricultural methods and all of its parts. Among the many topics discussed were the use of mobile internet and the Internet of Things (IoT) for data collection, transmission, and storage. Smart technology applications, such as unmanned aerial vehicles (UAVs), robotics, and the integration of the internet of things (IoT) with wireless communications were also investigated. Sustainable development, enhanced efficiency, real-time monitoring, and automation in agricultural techniques were other goals of the study, which also addressed the deployment of a 5G network within the framework of smart farming. Problems in underdeveloped nations, lack of scalability, gaps in knowledge and expertise, and possible negative effects on the environment are only some of the constraints that the authors have noted.

Methodology

Working

We want to enhance farming methods by resolving these issues, which will benefit our farmers. By providing farmers with useful information and guidance, we have attempted to fill this knowledge gap. Continuous real-time data analysis made possible by sensor data allows for better environment management and more educated decision-making. In addition to the bylnk IoT platform and a GSM module, our proposed solution will allow for rapid upgrades and improve user involvement. This module enables the system to send users visual monitoring and SMS warnings, ensuring that essential information will be delivered to them on time. Skilled farmers may see the value of circumstances in real-time with the bybylnk IoT platform. Our suggested approach may therefore be useful in certain contexts. Minimizing irrigation water use is achieved in this scenario by measuring soil pH as the device functions.



Block diagram.

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Arduino uno

A microcontroller board based on the Atmega328, the Arduino Uno is described in the datasheet. A 16 MHz crystal oscillator, 6 analogue inputs, 14 digital input/output pins (including 6 PWM outputs), 1 USB port, 1 power connector, 1 ICSP header, and 1 reset button are all part of it. All you need is a USB cable, an AC-to-DC converter, or a battery to get it going; it comes with everything you need to support the microcontroller. Because it forgoes the FTDI USB-to-serial driver chip, the Uno stands apart from all previous boards. In its place, you'll find the Atmega8U2 configured to convert USB to serial. "Uno" signifies "One" in Italian and is chosen to commemorate the impending release of Arduino 1.0. Going forward, the Uno and version 1.0 will serve as the reference versions of Arduino. See the index of Arduino boards for a comparison with earlier generations; the Uno is the newest in a series of USB Arduino boards and the platform's standard model.

LIQUID CRYSTAL DISPLAY

In front of a light source or reflector, a thin, flat display device called a liquid crystal display (LCD) arrays a large number of color or monochrome pixels. Pile of liquid crystal molecules held aloft by two transparent electrodes and two polarizing filters, whose polarity axes orthogonal to one another, make up each pixel. If there weren't liquid crystals interposed, one would block the other from light. Light that enters one filter is able to pass through the other because the liquid crystal bends its polarity. A program's ability to communicate with the outside world depends on its input and output devices, which in turn rely on human communication. An LCD display is a typical accessory for controllers. The 16x1, 16x2, and 20x2 LCDs are among the most popular types of displays that are attached to the controllers. This equates to sixteen characters on a single line. The first set has 16 characters on each line while the second set has 20 characters on each line.

ESP8266 Wi-Fi Module

This project revolves on this. Given that the project relies on WIFI control of appliances, the module is a crucial part of it.For those looking for an affordable Wi-Fi chip with complete The most remarkable feature about this little board is its TCP/IP capacity. It also contains an embedded MCU, or microcontroller unit, which allows for the control of I/O digital pins using a simple programming language that is almost pseudo-code-like. The Chinese company Es press if Systems is situated in Shanghai and makes this gadget.

In August 2014, this chip made its debut in the ESP-01 version module manufactured by the third-party company AIThinker. This little module enables the MCU to establish basic TCP/IP connections and connect to a WiFi network. In his His tiny size and cheap pricing (1.7–3.5$) enticed a lot of hackers and geeks to look into it and utilize it for all sorts of projects. Because of its enormous success, Espressif now offers a wide variety of models with varying size and technological specs. Among the following is the ESP32. Countless projects and implementations, such as home automation, may be found online.

RELAYS:

A relay is a programmable electrical switch that finds extensive use in machinery, vehicles, and home appliances. By using a relay, two independent voltage sources may be isolated from one another; in other words, a little quantity of voltage or current on one side can manage a big amount of current or voltage on the other side, and vice versa.

BLUETOOTH MODULE

Wireless headsets, gaming controllers, mice, keyboards, and a plethora of other consumer electronics make use of it. Depending on the transmitter and receiver, the environment, geographic and urban circumstances, and other factors, its range may be up to less than 100 meters. It is the established protocol for wireless Personal Area Networks (PANs) developed by IEEE 802.15.1. It transmits data wirelessly using frequency-hopping spread spectrum (FHSS) technology. It communicates with devices using serial communication. The USART is the means by which it exchanges data with the microcontroller.

RESULTS

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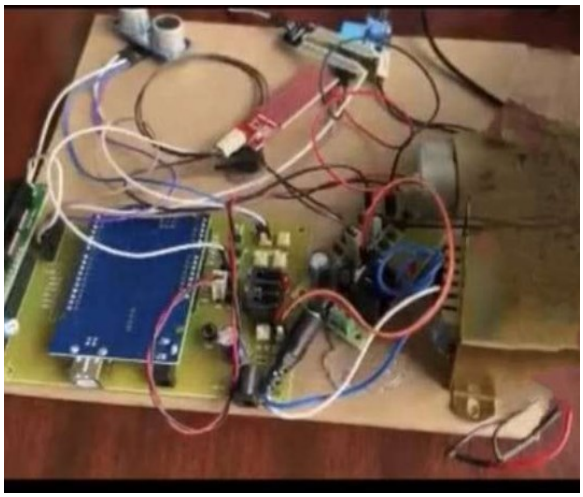
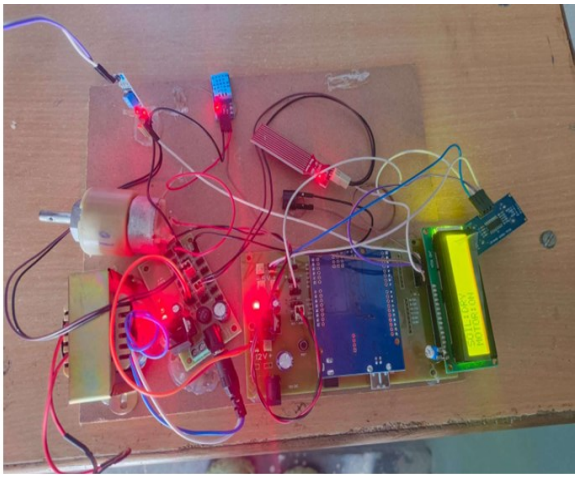


Ouput1



Output 2

CONCLUSION

In order to boost agricultural productivity and alleviate some of the difficulties farmers have, this study suggests a handheld gadget equipped with sensors. We want to alleviate the difficulties farmers have in order to make farming more palatable for them. We want to improve agricultural practices by addressing these concerns, which will lead to improved results for our farmers. We have done our best to address this information vacuum by offering practical advice and data to farmers. With the use of sensor data, we can effectively manage our environments and make well-informed judgments by continually analyzing data in real-time. To enhance user engagement and enable speedy updates, our suggested system will also include a GSM module and the bylnk IoT platform. This module ensures that users will get important information on time by allowing the system to deliver SMS alerts and visual monitoring straight to them. The bybylnk IoT platform allows capable farmers to see the value of conditions in real-time. Consequently, our proposed method may find practical use. Soil pH is measured while the device operates, which in this case minimizes irrigation water consumption. It is our sincere wish that the contemporary agriculture sector would find great success with the method we have proposed. Farming on the cloud and artificial intelligence will be part of future projects.

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