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Solar Based Agriculture Smart Stick with Alert and Shoking System

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ABSTRACT:

Every aspect of a regular person's life has altered as a result of the Internet of Things (IoT) technology, which has made everything smart and intelligent. The Internet of Things is a network of autonomous gadgets (IoT). As more and more IoT-based, intelligent, and smart agricultural technologies are developed, agriculture is evolving every day. These technologies increase crop output while also improving efficiency, cost-effectiveness, and waste-free operations. This project aims to develop a smart IoT-based agriculture stick that will provide farmers with access to real-time data on temperature, soil moisture, turbidity, humidity, battery voltage, and other environmental parameters so they can practise smart farming and increase their overall yield and quality of products. The proposed farm stick for this project integrates Arduino technology, a breadboard, and many sensors. A mobile phone that supports GSM can get a live data feed online. The proposed approach has been tested in actual agricultural fields and delivers data feeds with exceptional accuracy in a range of soil conditions across many sites.

Keywords: Agriculture, agriculture IoT, soil moisture sensor, cloud computing, solar technology, ESP8266, Arduino Mega 2560, and smart farming are all terms used to describe the Internet of Things (IoT).

INTRODUCTION:

In order to meet the world's need for food and water through the year 2020, the productivity of the current land is anticipated to increase at a never-before-seen rate [1]. The anticipated 1990s food production deficit has been avoided because to open groundwater exploitation and the development of water-saving technologies, but the issue is currently becoming worse as a result of widespread aquifer exploitation and poor water quality in many developing countries. The importance of water management for the long-term survival of irrigated agriculture has increased as a result of the rising demand on existing water allocations.

The objectives of this approach are to maximise water distribution to crops while minimising manual intervention, and to make irrigation systems intelligent, autonomous, and efficient. It

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increases daily water volume and enhances reliability. When pumping water to the agriculturally-used land, crops may be damaged because water resources weren't used effectively. In order to control the opening and closing of the pump in accordance with the scenario, this study presents a methodology that analyses the water level in the tank and the soil moisture content and delivers a command signal to an Arduino-based microcontroller. Only the Internet of Things will make the future of smart computing viable (IoT). Through the Internet of Things, current "Traditional Technology" in homes and offices is being changed into "Next Generation Everywhere Computing" (IoT). In studies from throughout the world, notably in the area of modern wireless communications, the phrase "Internet of Things" (Weber, R.H., 2010) is gaining importance. Suo et al. (2012) claim that the term "Internet of Things" refers to objects with unique identifiers things and Internet-based smart sensors for farming with their appropriate virtual representations within the 1998 planned Internet-like structure An agriculture stick can continuously track temperature and moisture using Arduino, cloud computing, and solar technologies. In the department of computer applications at the KCL Institute of Management and Technology in Punjab, Anand Nayyar Er is an assistant professor. Attending the G.N.D.U. Regional Center in Ladewali, Jalandhar, Vikram Puri is an ECE major. The life of the average person has changed drastically as a result of the Internet of Things (IoT) technology, which has made everything smart and intelligent. The Internet of Things is a network of autonomous gadgets (IoT).

Agriculture production is evolving as intelligent smart farming IoT-based technology develops further by enhancing it, making it more effective and decreasing waste. The objective of this study is to suggest a brand-new, intelligent Internet of Things (IoT)-based agriculture stick that will help farmers get real-time data (temperature, soil moisture) for effective environment monitoring. They will be able to practise intelligent farming as a result, increasing their overall productivity and product quality. The agriculture stick that is suggested in this study uses Arduino technology. Thingsspeak.com offers a live data feed and has coupled a breadboard with a range of sensors. Testing of the recommended gadget was done on actual agricultural fields, and the data feeds it produced had a high accuracy of over 98%. Agriculture, Arduino Mega 2560, DS18B20 Temperature Sensor, Internet of Things (IoT), Agriculture Precision, In 1999, "Kevin Ashton" (Weber, R.H., 2010) discovered "Smart Farming, Soil Moisture Sensor, The strength and adaptability of IoT have changed recently, and even the average user now uses it. Examples include cloud computing, solar technology, the ESP8266, and thingspeak.com in relation to supply chain management. Smart living, e-health services, automation, and even smart education have all been made possible thanks to IoT (Ashton, 2009). IoT is now currently used in manufacturing, intelligent transportation, business management, and even agriculture from a corporate standpoint. Agriculture is one of the key industries where IoT research is taking place and new products are being released every day to make operations smarter and more efficient in the direction of better production. The agricultural sector is viewed as being more essential to ensuring global food security.

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I'm referring to Indian farmers, who are currently dealing with significant challenges and are in a difficult position due to issues such as farm size, technology, trade, governmental rules, environmental concerns, etc. ICT-based approaches have obviously offered some solutions, but they fall short of guaranteeing productive efficiency and dependability. In recent years, IoT, often known as "Ubiquitous computing," has developed from ICT (Patil et al, 2012). The monitoring of soil and plants, the environment (such as temperature and moisture levels), transportation, supply chain management, infrastructure management, control system management, animal monitoring, and pest control are just a few of the many duties required for agricultural production.

In India, the field of agriculture is facing a lot of problems due to water scarcity and interrupted power supply. This condition leads to poor irrigation systems and hence the soil losses its moisture content. Thus, making the land unfit for agricultural losses. To avoid this condition, proper irrigation system must be developed, which will help to keep the soil moist in nature.

1. As opposed to other alternative energy sources, solar-powered systems are recommended for usage in developing nations because of their extraordinary durability and potential for long-term economic benefits. Solar powered water pumping systems can be the most appropriate solution for grid isolated rural locations in poor countries where the levels of solar radiation are extremely high.
2. We suggested an automatic irrigation system powered by solar energy. Sensors gather data on field water levels and provide updates to the farmer and microcontroller. Using a cell phone, the farmer may turn the motor ON and OFF based on the water level even from a distance. To ensure the proper water level in the field, the motor will, however, automatically start if the water level reaches the danger threshold.

LITERATURE REVIEW:

[1] K. Lakshmisudha et. al, Smart Precision Based Agriculture Using Sensors is a project that focuses on creating gadgets and solutions that make use of wireless sensor network advantages to manage, show, and alert users.

In [2] Sushanth & G. Sujatha, The article intends to harness developing technology, namely IoT, to implement smart agriculture. IOT and automated smart agriculture. Monitoring environmental conditions is the major factor to improve yield of efficient crops. The purpose of this work is to design a system that uses sensors and an Arduino board to track temperature, humidity, moisture, and even the movement of animals that can damage crops in agricultural fields.

In [3] M.K.Gayatri & J.Jayasakthi, Providing Internet of Things (IoT)-based smart agriculture solutions to farmers for increased yield; The cloud computing tools that can build an entire computing system from sensors to tools that observe data from agricultural field

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images and from human observers on the ground and accurately feed the data into the repositories along with the location as GPS coordinates. Chetan Dwarkani M et al[4] .'s study. Design and Development of Precision Agriculture System Using Wireless Sensor Network; This concept suggests a new approach to smart farming by tying a smart sensing system and a smart irrigation system together using wireless communication technologies.

In [5] Dr. V.Vidya Devi & G. Meena Kumari, Real-Time Automation and Surveillance System for Streamlined Agriculture; It puts forth a theory on the creation of an automated irrigation system to maximise the usage of water for agricultural crops. A gateway device additionally manages sensor data.

In [6] S. R. Nandurkar et. al, Agricultural Failsafe Mechanism based on IoT; It is intended for an IoT based monitoring system to study agricultural environments and the way to increase the effectiveness of decision making by analysing harvest statistics.

In [7] Monika Jhuria et. al, In this study, image processing is utilised as a tool to monitor the diseases on fruits during farming, from plantation to harvest. Image processing for smart farming: Detection of disease and fruit grading. The variances can be apparent in morphology, colour, and texture.

In [8] Ms. Shraddha & Ashok Ku. Maurya, IOT Based Agriculture; E-system outlines specifics of the design and implementation of wireless sensor networks, variable rate irrigation, and on-field real-time sensing. The design and implementation are controlled by utilising the necessary software. Five in-field sensor stations were used to build the entire system. These sensor stations gather data and transfer it to the base station via a global positioning system (GPS), where the appropriate steps were taken to manage irrigation based on the system's database.

In Lee, M., Hwang, J., & Yoe, H. (December 2013) There have been many analyzes and many attempts to deploy new IoT technologies in the agricultural sector. However, his IoT in agriculture needs to be thought differently from common areas such as industry and logistics. This paper introduces an agricultural production system that uses IoT to support the supply and demand of agricultural products, and develops a system that collects atmospheric sensors and environmental information to predict crop expansion and production volume. Demand for agricultural products is currently expected to be quantitative demand due to consumption, but no fluctuations in harvest or production volume due to changes in cultivated area, weather changes, disease or pest damage, etc. can be expected. Expected to increase availability and demand for poorly controlled agricultural products. To go beyond that, this paper also designed an IoT-based observation system to study harvesting atmospheres and a methodology to improve the efficacy of higher-order cognitive processes by analyzing harvesting statistics. Therefore, in this paper, we developed Choice Web for predicting IoT sensors for victimization of agricultural production. This method was also a unified system that supported the seeding process by trading produce with buyers. Corresponding author

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IoT-based agricultural production systems have increased flexibility for farmers, researchers, and organizations to investigate current conditions and predict future yields through correlation analysis between applied mathematical information and agro-atmospheric information. rice field. His IoT-powered phone network also improves the quality of produce by observing farmers through the full cycle, from planting seeds to falling victim to mercantilism.

In today's world, embedded systems surround everything from tiny needles to heavier-than-air planes. Embedded system technology not only lays the foundation for development, but serves as the backbone of humans in almost every field of science, technology, analysis, and everyday life. The world of embedded systems is largely surrounded by his microcontrollers and microprocessors. Navigating the style and development of embedded systems is fascinating and rewarding. It's fascinating because everything is getting smarter, smarter, and more sophisticated every day, and the field of embedded systems is advancing by leaps and bounds. The methods are hard, but these resources are very limited in style and implementation.

Which Programmer Should I Use? is the most significant difficulty facing embedded system engineers today. Which compiler should I use when developing source code? Which simulator should be used to replicate the system's overall behaviour? The choice of the optimal compiler, programmer, or simulator for a given task has always been difficult because each has unique features. The main goal of this research paper is to eliminate that difficulty by offering researchers and embedded system engineers an exhaustive platform of compilers, programmers, and simulators for all types of embedded system technologies, including 8051, PIC, ARM, AVR, and Arduino, making it simple and time-saving for everyone working in the field to select the best platform in terms of compiler, programmer, and simulator.

PROPOSED SYSTEM:

Every day, intelligent and meaningful IoT devices for agriculture are created that not only improve agricultural production, but also increase profitability and eliminate waste. The purpose of this text is to develop a brand new agricultural stick to help farmers gather real environmental knowledge (temperature, soil moisture) to observe wise farming and improve overall yields and product quality. It is to propose a sensible IoT of assistance. The farming device is powered by Arduino technology and is accessible via his online check board with dozens of sensors and live knowledge broadcasts via Thingspeak.com. The planned product has been tested in active fields and offers 98+ accuracy in knowledge transfer. Various factors square the next measurement.

GPS, power supply unit, ESP8266, soil moisture and temperature sensor. Here we use the controller to connect all the elements that are connected to the microcontroller. This is often

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the cornerstone of a project. Performance is simply displayed on the alphanumeric display screen.

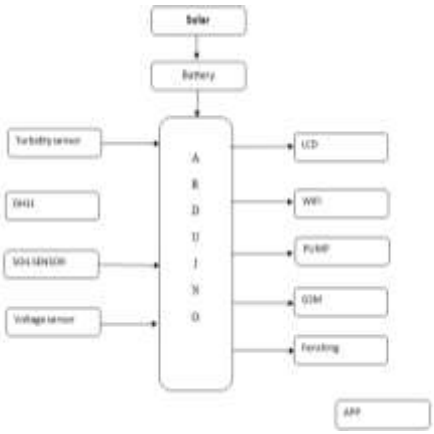

Fig. 1: Block diagram of Proposed Work

The 16*2 LCD display's contrast is adjusted using a variable resistance. We also employ GSM technology in our operations. In our work, the Android device's status is determined by the GPS module.

The ESP8266 Wi-Fi module transmits data from the ESP8266 soil temperature and moisture checking system inside the IoT-based Smart Farming Stick to the cloud. Figure 2 shows the stick-based Internet of Things with Arduino model [11] [12]. This IoT gadget calculates three different factors that feed the entire framework: the environment, soil moisture, and sunlight-based board voltage. The Proverb 1 driver bus protocol is used by the DS18B20 optical temperature sensor to send and receive bytes of information as well as to aid status parasites. The following comparison shows the calculated temperatures. The soil moisture sensor element changes the resistance principle. It consists of two main pads for measuring soil moisture and is the resistive part [13].

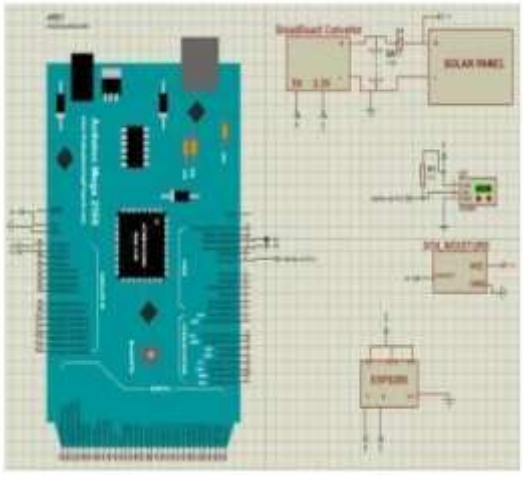

Fig. 2: Stick based on IoT contains the Arduino

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Conduction between coils is low where the soil has low water content and high resistance. The signal strength is healthier when the bottom water level is higher because pad-to-pad conduction and therefore resistance is lower. The ESP8266 is an inexpensive series for Wi-Fi modules that plugs easily into the Arduino Mega 2560. AT commands are built into the ESP8266 and support the entire communication protocol/UDP stack. The Arduino is intended as a wireless DC meter for live star voltage [14]. The normal management of the Arduino Mega 2560 is analog pins up to 5V square. A diode is used between the solar cell and the electrical equipment to protect the battery from the electrical equipment [15]. At this time, most people were driving their own cars, so the parking lot was often intimidating. Automotive safety is important for public vehicles. Car lock systems are used to accommodate cars.

METHODOLOGY:

In the recent era of IoT, there are many new and meaningful IoT-based analyzes, mostly related to product development. This enables farmers to practice meaningful farming in terms of crop management, pest management, agricultural accuracy, and field observation. Even completely different sensors and drones. This half develops a rational IoT-based primarily agricultural stick to monitor temperature live, wet the Arduino, and use a variety of alternative electrical components. The temperature device can operate under a wide range of operating conditions. capture the operating ambient temperature of the When the device detects descent, the pump motor can stop pumping water into the sphere and update the GSM/GPRS technology at the expense of the user. As soon as it rains unconditionally, the attached panels mechanically close to protect your crops. Displays information using a character set liquid crystal {LCD | digital display | alphanumeric display}.

A. Software Used

Open-source software called Arduino IDE enables users to create and upload code to the board while working in a real-time environment. It is frequently used by individuals looking for an additional level of redundancy because this code will then be saved in the cloud. The Environment is a Java-based programme that is built using Processing and other open-source applications. Any Arduino software board is entirely compatible with the system.

B. Internet of Things-(IoT)

It consists of two words, net and things. The term "things" in IoT refers to a large number of IoT devices with different identities and capabilities, performing remote sensing, root cause, and live observation of information in bound form. IoT devices can exchange information live, directly or indirectly, with various connected devices and applications, collect information from various devices, process that information, and send that information to numerous servers. You can send The antonym "Internet" has been outlined as an international communication network that connects trillions of computers around the world and enables the

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sharing of knowledge. Various researchers predict that by 2020, 50 billion of his IoT-enabled devices will be connected worldwide. Here's an overview of the Web of Things (IoT) (Smith, 2012).

A dynamic, self-configuring international network infrastructure integrates seamlessly into data networks, typically using intelligent interfaces and area units that communicate information to identify physical and virtual "things". , physical attributes, and virtual personalities, supported the usual practical communication protocols. to the user and their surroundings". A complete IoT device consists of different interfaces for creating properties of different devices (wired or wireless). All IoT-based devices mainly consist of the following components:

- I/O interfaces for sensors.
- An interface for connecting to the network.
- Memory and memory interfaces.
- Interface for audio/video.

IoT devices often take many forms, such as wearable sensors, smart watches, IoT home monitoring, IoT intelligent traffic systems, and IoT health devices.

C. Arduino Mega 2560

The Arduino Mega 2560 is made for researching 3D printing technologies and creating Arduino-based robots. Technical details: The ATmega2560 is the basis for the Arduino Mega 2560 consists of 4 UART, 16 analogue inputs, and 54 digital input/output pins.easily connects to a computer using a USB port.

SYSTEM IMPLEMENTATION AND RESULTS:

The overall operation of the system is covered in this section. The suggested Smart IoT-Based Agriculture Stick for Monitoring Agriculture Temperature and Moisture is depicted in the following diagram in an animated view.

Fig. 3 Hardware circuit

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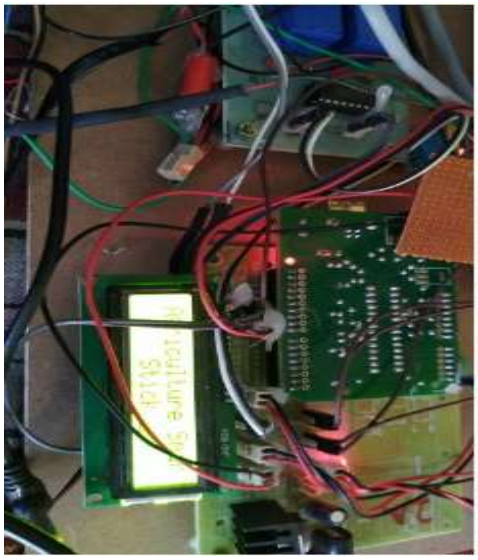

Fig. 4 Circuit Working

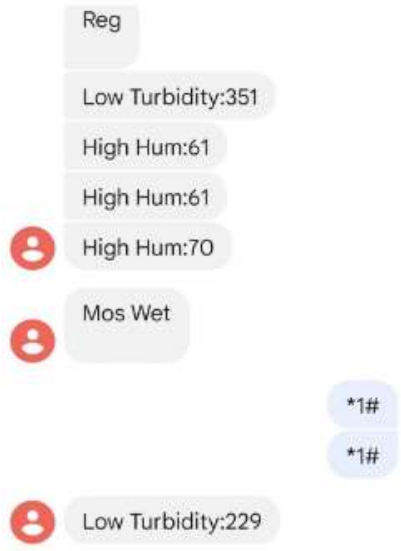

Fig. 5 message alert

CONCLUSION:

This project proposes a low-cost monitoring system to understand the state of harvest coils, collect knowledge using IoT technology and transfer it over the network. This method is supported by alternative energy when PV panels are used for battery charging and discharging. Utilizing Arduino, cloud computing and Star technology, he plans to develop his IoT-based, primarily agricultural sticks for live temperature and soil moisture monitoring, which are excellent for agriculture. Sticks have high potency and accuracy in attracting live knowledge of temperature and soil moisture can help farmers increase agricultural yields and manage food production economically.

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FUTURE SCOPE:

By building this system over broad tracts of land, it may be improved for future expansion. Additionally, the system can be incorporated to monitor soil quality and crop growth in each soil. Successful link between the sensors and microcontroller allows for wireless communication between various nodes. Future development will also concentrate on enhancing the stick's sensors to collect more data, particularly in relation to pest control, and incorporating GPS modules to transform the IoT Stick into a fully functional device that is ready for agriculture precision.

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