

RESEARCH ARTICLE

IOT BASED SMART FARMING STICK - A SURVEY

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Manuscript Info

Abstract

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*Key words:-*PH Value, Water, Light, Temperature, Nutrition, Iot, Smart farming Stick in Iot Internet of Things (IOT) technology has brought revolution to each and every field of common man's life by making everything smart and intelligent. IoT refers to a network of things which make a selfconfiguring network. The development of Intelligent smart farming IOT based devices is day by day turning the face of agriculture production. The Objective of this project is to propose a smart farming stick assisting farmers in getting live data [PH value, Water, Light, Temperature, Nutrition] for efficient environment monitoring which will enable them to do smart farming and increases their overall yield and quality of products. The agriculture stick being proposed via this project is integrated with pH Sensor, PIC16F877 Microcontroller Board, PIC16F877A Microcontroller and live data can be obtained from 162A LCD display.

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Introduction:-

As the world is trending into new technologies and implementations it is a necessary goal to trend up in agriculture also. Many researches are done in the field of agriculture. The Internet of Things (IoT) has the capability to transform the world we live in; more-efficient industries, connected cars, and smarter cities are all components of the IoT equation. However, the application of technology like IoT in agriculture could have the greatest impact. The global population is set to touch 9.6 billion by 2050. So, to feed this much population, the farming industry must embrace IoT. Against the challenges such as extreme weather conditions and rising climate change, and environmental impact resulting from intensive farming practices, the demand for more food has to be met. In Older days, the strength and adaptability of IoT has been changed and nowadays it is being used even by normal user. The IoT provides various products like smart living, e-health services, automation and even smart education. And from commercial point of view, IoT these days is being used in business management, manufacturing, intelligent transportation and even agriculture. Smart farming based on IoT technologies will enable growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized to the number of journeys the farm vehicles have made.

In IoT-based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. One of main areas where IoT based research is going on and new products are launching on everyday basis to make the activities smarter and efficient towards better production is "Agriculture". Agricultural production requires lots of activities like soil and plant monitoring, environmental monitoring like moisture and temperature, transportation, supply chain management, infrastructure management, control systems management, animal monitoring, pest control etc. The implementation of scientific methods in the field of agriculture can bring about radical changes in the productivity of crops, due to improved efficiency in the farming techniques. Monitoring

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the environmental factors is not the complete solution to increase the yield of crops. There are number of other factors that decrease the productivity to a greater extent.

In terms of environmental issues, IoT-based smart farming can provide great benefits including more efficient water usage, or optimization of inputs and treatments. The soil nutrient is one of the major factors. This is also be monitored. The soil is a major source of nutrients needed by plants for growth. The three main nutrients are nitrogen (N), phosphorus (P) and potassium (K). Together they make up the trio known as NPK. Other important nutrients are calcium, magnesium and sulphur. Most plants, therefore, require nitrogen compounds to be present in the soil in which they grow. Carbon and oxygen are absorbed from the air while other nutrients are absorbed from the soil. Green plants obtain their carbohydrate supply from the carbon dioxide in the air by the process of photosynthesis. The objective of our project is to propose IoT Based Smart Agriculture Stick which will enable farmers to have live data of soil moisture, soil nutrients, temperature, light, water content at very low cost so that live monitoring can be done.

Literature Survey:-

Suma et al.,(2017) says that, Monitoring the environmental factors is not the complete solution to increase the yield of crops [1]. There are number of other factors that decrease the productivity to a greater extent. Various sensors are deployed in the field like temperature sensor, moisture sensor and PIR sensor. The data collected from these sensors are connected to the microcontroller through RS232.In these Problems are recovered using the sensors and monitoring the factors. GSM Modem can accept any GSM network operator SIM and it can act just like a mobile phone with its own unique phone number. The necessity to use this is it can use RS-232 protocol which can be easily connected to the controller. It can be used like a phone where it can send and receive SMS and make a call. Soil moisture sensor is a sensor which senses the moisture content of the soil. The sensor has both the analog and the digital output. The digital output is fixed and the analog output threshold can be varied. For future developments it can be enhanced by developing this system for large acres of land. Also the system can be integrated to check the quality of the soil and the growth of crop in each soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes.

George Chisholm et al.,(2017) says that, the world's population has doubled in the past three decades and continues to grow [2]. Intensive farming practices have so far met the increasing demand for food, but they have had a significant, negative environmental impact. Precision agriculture uses technology to increase efficiency and reduce the environmental impacts of farming. A novel sensor concept has been designed for measuring spatial and temporal variability of soil properties. The design uses an array of circumferential electrodes to take a series of four-point resistivity measurements; this allows a depth profile of soil properties to be obtained. The design concept was implemented and evaluated in a range of contexts, including controlled and real-world soil tests. The effects of agricultural inputs on soil properties can be identified from the system's measurements. The sensor showed significant responses to temperature, ionic content and soil moisture content. However, the influence of each parameter cannot be determined without supplementary sensors. The addition of other sensing technologies will allow the device to be calibrated to specific soil parameters.

Meonghun Lee et al.,(2013) proposed that , The IoT(Internet of Things) based agricultural convergence technology is a technology to create a high value such as improvement of production efficiency, quality increase of agricultural products in the whole process of agricultural production In addition, implementing precision agriculture, which is an alternative to the future agriculture, through the convergence technology allows prediction of supply and demand, real-time management and quality maintenance during the entire life cycle of agricultural products .[3]Methods of harvest forecasting have become increasingly elaborate. This system is designed an agricultural decision support system to predict crop growth by monitoring periodically using the IoT sensor technology. Agricultural production prediction system is to predict the future short and long-term supply demand conditions by collecting and analysing internal, external environment and growth information of agricultural products in greenhouse. The IoT-based crop environment data system was launched with an aim to build the entire agricultural forecast system. The purpose of this system is to build a reliable data collection system within a short time, based on IoT device. The IoT-based agricultural production system through correlation analysis between the crop statistical information and agricultural environment information has enhanced the ability of farmers, researchers, and government officials to analyse current conditions and predict future harvest. Additionally, agricultural products quality can be improved because farmers observe whole cycle from seeding to selling using this IoT- based agricultural production system.

Prathibha et al.,(2017) says that , Internet of Things (IoT) is widely used in connecting devices and collecting data

information [4]. Internet of Things is used with IoT frameworks to handle and interact with data and information. In the system users can register their sensors, create the farmers are still using traditional methods for agriculture, which results in low yielding of crops and fruits. So the crop yield can be improved by using automatic machineries. There is need to implement modern science and technology in the agriculture for increasing the yield. By using IoT, we can expect streams of data and process information. The increase in production with low cost by monitoring the efficiency of the soil, temperature and humidity monitoring, rain fall monitoring, fertilizers efficiency, monitoring storage capacity of water tanks and also theft detection in agriculture areas. Smart agriculture system has been designed and synthesized. The developed system is more efficient and beneficial for farmers. It gives the information about the temperature, humidity of the air in agricultural field through MMS to the farmer, if it fallout from optimal range. The system can be used in green house and temperature dependant plants. The application of such system in the field can definitely help to advance the harvest of the crops and global production. In future this system can be improved by adding several modern techniques like irrigation method, solar power source usage.

Patilet al., (2016)says that Improvement of agriculture field has become biggest challenging for the countries like India, so new technologies have to be adopted [5]. We have implemented a novel methodology of physical parameter monitoring, data display, data integration to the cloud, alert generation and predicting the future values with the help of MATLAB analysis. We have used temperature sensor, rainfall sensor, light sensor and the moisture sensor. These sensors have been installed in the agriculture field to collect the data, and thus data is mitigated into the cloud with the help of IoT hub(Thingspeak).So user can have a real time data visualization, with the help of MATLAB analysis user can predict the future parameter values. By predicting the moisture value user can have control over the agriculture field. User can analyze the output in the thingspeak, which will give the graphical notations of all the values. Thingspeak is an internet of things application and is an open source. Thing speak can also acts as an application programming interface in order to store and retrieve the data using the HTTP protocol over the internet or via a Local area. We can see the graphs of temperature value, light value, soil moisture value and the rainfall value.

Proposed System:-

In proposed system, we are create the new agriculture smart stick. It is used to detect the pH value, temperature, light, water content and nutrients (Potassium, Phosphorus, Nitrogen) with the help of sensor. The current data of soil displayed to the farmer without any internet connection. It is cost ineffective.

The proposed system provides the concept of "Plug & Sense" in which farmers can directly implement smart farming by as such putting the stick on the field and getting Live Data. All the data of soil simply displayed by the LCD display. So the farmers don't need to know the technological devices like mobile and laptops.



Figure1:- Hardware Implementation.

Conclusion:-

In this project, a Smart Farming Enabled: IoT Based Smart Farming Stick for monitoring of pH value, Water content, Light, Temperature, and Nutrients has been proposed using Sensor, Microcontroller and LCD Display. The stick has high efficiency and fetching the live data of pH value, Water content, Light, Temperature, and Nutrients. The Farming stick being via this project will assist farmers in increasing the agriculture yield as the stick will always provide helping hand to farmers for getting accurate live feed of environmental temperature, soil moisture and nutrients.

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