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THE SMART FARMING SYSTEM BASED ON IOT

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Abstract:

Internet of Things is the each and every field of common man's life by making everything bright and intelligent. Internet of things refers to a network of things which make a self configuring network. The main intension of smart farming is to improve agriculture yield with few resources and less labour efforts. The growth of thinking Smart Farming internet of things based devices is day by day turning the face of agriculture production by not only enhancing it but also making it cost-effective and reducing wastage. According to forecast figure , we know that in 2050 the world population in increasing 25% with comparing to current population. By this we have double amount of food in future , so the crop production should increase by the need of the population. Unfortunately, a limited portion of the earth's surface is suitable for agriculture uses due to various limitations, like temperature, climate, topography, and soil quality, fertility and even most of the suitable areas are not homogenous.Moreover, the available agricultural land is further shaped by political and economic factors, like land and climate patterns and population density, while rapid urbanization is constantly posing threats to the availability of arable land.As such, the gap between demand and supply of food is becoming more significant and alarming with the passage of time. Smart Farming System assisting farmers in getting Live Data (Temperature, Soil Moisture) for efficient environment monitoring which will enable them to expand their general surrounder and quality of products. Theinternet of things based Smart Farming System being proposed via this report is integrated

Keywords: Smart farming, IOT based Agriculture, Smart farming Internet,

I. INTRODUCTION:

The impartial of this outline is to proposed IoT based Smart Farming System which will enable farmers to have live data of soil moisture environment temperature at very low cost so that live monitoring can be done. After the examination showed that every crop field has different characteristics that can be measured separately in terms of both quality and quantity. Critical characteristics, like soil type, nutrient presence, flow of irrigation, pest resistance, etc., define its suitability and capability for a specific crop.Considering the standard farming procedures, farmers need to computing the agriculture plots frequently throughout the crop life to have a better idea about the crop conditions. For this, the need of smart agriculture arises, as 70% of farming time is spent monitoring and understanding the crop states instead of doing actual field work. Wireless of the sensors are facilitating the monitoring of crops constantly with higher accuracy and are able to, most importantly, detect early stages of unwanted state. This is the purpose of that why modern agriculture involves the usage of smart tools and kits, from sowing to crop harvesting and even during storage and transportation.Timely reporting using a the value of sensors that makes the entire operation not only smart but also cost effective due to its precise monitoring capabilities. Different of autonomous tractors, harvesters, robotic weeders, drones, and satellites currently complement agriculture equipment. Sensors can be of the installed and start collecting data in a short time,

which is then available online for further analyses nearly immediately. Sensor the application of scientific crop and site-specific agriculture, as it supports precise data collection of every site.

II. EXISTING SYSTEM

IOT Enabling Technologies:

Internet of Things has a strong backbone of various enabling technologiesWireless Sensor Networks, Cloud Computing, Big Data, Embedded Systems, SecurityProtocols and Architectures, Protocols enabling communication, web services, Internetand Search Engines. The enabling of Wireless Sensor Network (WSN): It consists of various sensors/nodes whichare integrated together to monitor various sorts of data.Cloud Computing: Cloud Computing also known as on-demand computingis a type of Internet based computing which provides shared processing resources and datato computers and other devices on demand. They can be in different forms like IaaS, PaaS,SaaS, DaaS etc. Big Data Analytics: Big data analytics is the process of examining large datasets containing various forms of data types—i.e. Big Data – to uncover hidden patterns,unknown correlations, market trends, customer preferences and other useful businessinformation.Communication Protocols: They form the backbone of IoT systems toenable connectivity and coupling to applications and these protocols facilitate exchange ofdata over the network as these protocols enable data exchange formats, data encoding andaddressing.Embedded Systems: It is a sort of computer system which consists of bothhardware and software to perform specific tasks. It includesmicroprocessor/microcontroller, RAM/ROM, networking components, I/O units andstorage devices.

III. PROPOSAL SYSTEM

With the assuming of internet of things indifferent areas like Industry, Homes and even Cities, huge potential is seen to make everything Intelligent and Smart. the proposal system of even the Agricultural sector is also adopting IoT technology these days and this in turn has led to the development of "AGRICULTURAL Internet of Things (IoT)".

Table: Various projects and applications are integrated in Agricultural fields leading to efficient management and controlling of various activities.

Application Name	Description
Cwm	In order to perform agriculture activities in inefficient manner, adequate water is essential. Agriculture IoT is based on the integrated with Web Map Service (WMS) and Sensor Observation Service (SOS) to ensure proper water management for irrigation and in turn reduces water wastage.
Accuracy Agriculture	High accuracy is required is required in terms of weather information which reduces the chances of crop damage. The Agriculture IoT based on that ensures timely delivery of

	real time data in terms of weather forecasting, quality of soil, cost of labour and much more to farmer.
(IPM/C)	Agriculture IoT systems assures farmers with accurate environmental data via proper live data monitoring of temperature , moisture, plant growth and level of pests so it can be that particular care can be taken during production
Food and Productionand Safety	Agriculture IoT system accurately monitors various parameters like warehouse temperature, shipping transportation management system and also integrates cloud based recording systems.
Other Projects Implemented Till Date	1. The Phenonet Project by Open IoT. 2. CLASS Equipment 3. Precisionhalk's UAV Sensor Platform 4. Cleangrow's Carbon Nanotube Probe 5. Temputech's Wireless Sensor Monitoring .

IV. DESIGN AND DEVELOPMENT

Internet of things based on the regarded as IoT gadget focusing on Live Monitoring of Environmental data in terms of Temperature, Moisture and other types depending on the sensors integrated with it. The provides the concept of "Plug & Sense" in which farmers can directly implement smart farming by as such putting the System on the field and getting the based on different mechanism like Smart Phones, Tablets etc. and the data developed via sensors can be easily shared and viewed by agriculture consultants anywhere remotely via Cloud Computing technology integration. The smart farming system also enables analysis of various sorts of data via Big Data Analytics from time to time.

V. COMPONENTS AND MODULES

In this the components and modules section, various components and Modules being used for IoT based SMART FARMING SYSTEM development is discussed:

ARDUINO UNO:

It is a microcontroller board based on the ATmega328(datasheet).It has 14 digital input/output pins(of which 6 can be used as PWM outputs),6 analog inputs, a 16 MHz crystal oscillator, a USB connection ,a power jack, an ICSP header ,and a reset button.

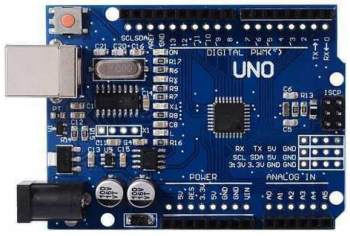

Figure 1: ARDUINO UNO

WIFI MODULE-ESP 8266:

Wi-Fi Module is system on a chip refers to integrating all necessary electronic components on a single integrated circuit .with Transmission control protocol stack integrated which facilitates any microcontroller to access Wi-Fi network. This module is cost effective module and supports APSD for VOIP Applications and Bluetooth co-existence inWi-Fi Direct, 1MB Flash Memory, SDIO 1.1/2.0, SPI, UART, Standby Power Consumption of <1.0mW.

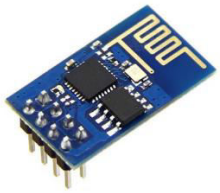

Figure 2: WIFI MODULE-ESP 8266

SENSORS:

TEMPERATURE SENSOR-DS18B20:

The temperature sensor provides 9-bit to 12-bit Celsius temperature measurements and has alarm function with non-volatile user-programmable upper and lower trigger points. The DS18B20 has 64-bit serial code which allows multiple DS18B20s to function on same 1-wire bus.

Unique 1-Wire Interface; Measures Temperature from -55oC TO +125oC; Coverts temperature to 12-bit digital word in 750ms.

Figure 3: TEMPERATURE SENSOR-DS18B20

SOIL MOISTURE SENSOR-FC 28:

Soil Moisture Sensor is used for measuring the moisture in soil and similar materials. The sensor has two large exposed pads which functions as probes for the sensor, together acting as a variable resistor. The moisture level of the soil is detected by this sensor. When the water level is low in the soil, the analog voltage will be low and this analog voltage keeps increasing as the conductivity between the electrodes in the soil changes. This sensor can be used for watering a flower plant or any other plants requires automation.

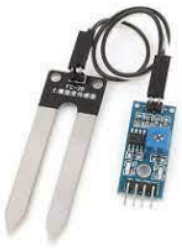

Figure.4: SOIL MOISTURE SENSOR-FC28

POWER SUPPLY:

RECHARGEABLE BATTERY

The sealed lead-acid (SLA) 12V, 9Ah rechargeable battery is rated at a 5-hour (0.2) and 20-hour (0.05C) discharge. Longer discharge times produce higher capacity readings because of lower losses. The lead-acid performs well on high load currents. This battery act as an internal power supply for the whole circuit.

Figure 5: Rechargeable Battery

BATTERY CHARGING CIRCUIT WITH TRANSFORMER:

The circuit acts as a 12 volt battery charger for Lead Acid battery. It gives 12 volt and 5 Amps current for quick charging of the battery. If the battery is partially discharged, full charge will be attained in one hour. The circuit is connected with a 0-14 volt 5 Ampere Step down transformer to convert AC to DC. Since pulsed DC is good for Lead Acid battery, a low value smoothing capacitor is used in the circuit .In the circuit, LED act as the Charger on status.

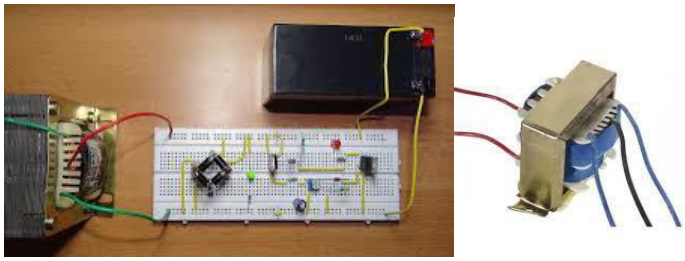

Figure 6: Battery charging circuit

EXTERNAL AC ADAPTER:

A 12V AC adapter can also be considered as a component in the circuit for external power supply for the circuit which enabled the circuit to be switched 'ON' in case if the battery power is very low for use. The adapter can directly act as an AC/DC convertor to provide pure DC current externally to the circuit.

Figure 7: External AC Adapter

VI.RESULT

In this circuit there is a programmed ARDUINO which is connected with sensors(soil moisture and temperature)and a wifi module .The working principal of the model based on storing data from the sensors with the help of ARDUINO and passing it to wifi module .The wifi module gives the updates of data in a device through cloud computing. In the device the real time data comes through wifi to the channel named SMART FARMING which we can access through the URL :https//:thingspeaks.com/channels/625454.In the channel the graph is plotted through mat lab technology .There is a chargeable battery which connected with the power supply of ARDUINO so that the circuit start working. There is also charging circuit with AC/DC converter for charging battery .In the case if the battery is not charged there further an adaptor which can explicitly gives power to ARDUINO circuits.

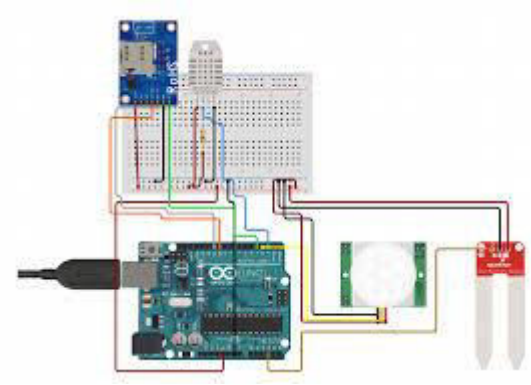

Figure 8: Circuit Design Process

VII.CONCLUSION

Internet of things based on the SMART FARMING SYSTEM for Live Monitoring of Temperature and Soil Moisture has been proposed using Arduino and Cloud Computing . The System has high productivity andauthenticity in fetching the live data of temperature and soil moisture.The internet of things based

smart farming System being proposed via this report will assist farmers in increasing the agriculture yield and take efficient care of food production as the System will always provide helping hand to farmers for getting accurate live feed of environmental temperature and soil moisture with more than 99% accurate results.

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