"Wireless Agriculture Monitoring System Using Raspberry Pi"

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Abstract

The Internet of Things plays an important role in the design of human life in that objects can easily be remotely recognized or controlled via other existing networks. Traditional assembly methods can be replaced with modern technologies that save farmers time and effort. We have planned to use technologies such as IoT, AI, cloud computing, big data and wireless sensor networks to help farmers by reducing their effort and time spent on various processes in agriculture.soil, moisture, etc., which affect plant growth, are taken into account through the use of sensors.

Keyword: calculating the ph value of soil ,temperature of soil,and calculate the soil moisture and analysis

1.INTRODUCTION

Internet of things IOT consists of two words Internet and Things The term things in IOT refers to various IOT devices having unique identities and have capabilities to perform remote sensing actuating and live monitoring of certain sort of data. IOT devices are also to have live exchange of data with other connected devices and application either directly or indirectly, or collected data from other devices and process the data and send the data to various servers. The other term internet is define as Global communication Network connecting Trillions of computers across the planets enabling sharing of information .Thus the IOT can be define as :"A dynamic Global Network Infrastuctre with self configuring capabilities based on standard and inter operable communication to protocol where physical and virtual things have identities, physical attributes ,and virtual personalities and use intelligent interfaces and are seamlessly integrated into the information network ,often communicate data associated with user and their environment.

2.Literature Review

According to Andrew Moela [4], in the next decades, the farming industry is expected to become more important than any other time before. It is expected by the United Nation that the world population of the world by 2050 would reach 9.7 billion, which would require a rise in the global agricultural goods production in agriculture to about 69%. To reach this vision goal, farming companies started to adopt the Internet of Things for accurate analysis and higher better production of agricultural goods. The IoT is a technology that came out to help in pushing agricultural fields into a higher level. Nowadays, smart farming is already adopted by a number of modem farmers and its use is increasing and becoming more and more common among the new generation of educated young farmers. In the modern agriculture the use of sensors, drones, and high-tech agriculture technologies is becoming quickly the new norm [4]. The collection and the analysis of big data in agriculture will represent a very big deal in the future of modem farming, in preserving ecosystems and it would help the overall production growth of developing countries, such as Morocco. In fact, IoT technology offers more benefits in the real life. Researchers are doing more investigations into this technology toward a wider use and for a maximum of profits

3. METHODOLOGY

IoT based is 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 system 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 Live Data feeds on various devices like Smart Phones, Tablets etc. Consultant anywhere remotely via Cloud Computing technology integration. The system also enables analysis of various sorts of data via Big Data Analytics from time to time.

4.SYSTEM ARCHITECTURE DIAGRAM:

The proposed system constists of process like calculating the ph value of soil ,temperature of soil,and calculate the soil moisture and analysis on it give the exact data :

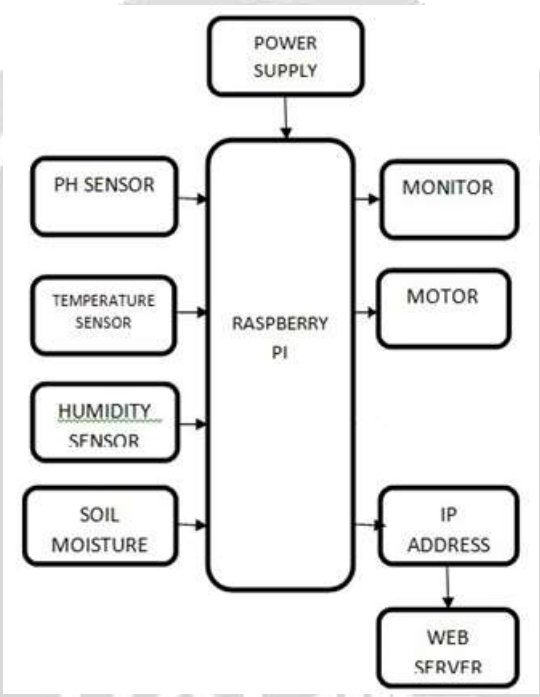

Figure: System Architecture

5. HARDWARE REQUIREMENT

5.1 RASPBERRY PI

The Raspberry pi 3 Model B was used. Fig. 7 shows the hardware kit of raspberry pi. It has the specifications of 1GB RAM, 1.2 GHz & 64 bit, 4 USB ports, 40 GPIO pins, Ethernet port, Full HDMI port, Camera interface (CSI), Display interface (DSI), Micro SD card slot.

Figure: Raspberry PI

5.2Wi-Fi Module

Wi-Fi Module is SOC with TCP/IP protocol stack integrated which facilitates any microcontroller to access Wi-Fi network. ESP8266 module is cost effective module and supports APSD for VOIP Applications and Bluetooth co-existence interfaces. Technical Specifications: 802.11b/g/n; Wi-Fi Direct, 1MB Flash Memory, SDIO 1.1/2.0, SPI, UART, Standby Power Consumption of <1.0mW.

Figure: WIFI MODULE

5.3 SENSORS

TEMPRATURE SENSORS:
The DS18B20 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.

Technical Specifications: Unique 1-Wire Interface; Measures Temperature from -55^{o}C TO +125^{o}C;
Coverts temperature to 12-bit digital word in 750ms.

Figure: TEMPERATURE SENSOR-DS18B20

5.4 SOIL MOISTURE SENSOR

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 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: SOIL MOISTURE SENSOR

5.6 PH SENSOR

PH sensor is used to detect the acidity and alkalinity level in the water. It tells whether the water content is acid, base or neutral.

Figure: PH sensor

6. FUTURE SCOPE

Future work would be focused more on increasing sensors on this system to fetch more data especially with regard to Pest Control and by also integrating GPS module in this system to enhance this Agriculture IoT Technology to full-fledged Agriculture Precision ready product.

7. CONCLUSION

IOT based wireless monitoring agriculture using raspberry pi 3 for Live Monitoring of Temperature and Soil Moisture has been proposed using Raspberry pi and Cloud Computing. The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture. The IOT based wireless monitoring agriculture using raspberry pi 3 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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