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SMART FARMER – IoT Enabled Smart Farming Application

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ABSTRACT

The Agriculture Parameters are utilizing an IOT Technology and system availability that draw in these objects to assemble and deal information. Agriculture is the primary occupation in our country for ages. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. But now due to migration of people from rural to urban there is hindrance in agriculture. To overcome this problem we go for smart agriculture techniques using IOT. provide the information about the various environmental factors. Monitoring the environmental factors is not the complete solution.

Keywords: IoT, LED Display, PH Color Sensor ,Soil Moisture Sensor, Humidity Sensor, DHT11 Sensor, NodeMCU esp32.

I. 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. Most projects signify the use of wireless sensor network collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data The Internet of things (IOT) is remodeling the agriculture enabling the farmers with the wide range of techniques such as precision and sustainable agriculture to face challenges in the field. IOT interconnects human to thing, thing to thing and human to human. IOT enables the objects to be sensed and controlled remotely across existing network model. The paper comprises of sensors that sense the field parameters are temperature, humidity, moisture and fertility in the farm. The sensed values are validated and later sent to the WI-FI module and from WI-FI module the validated data are sent to the farmer's mobile or laptop using cloud to increase the yield of crops. There are number of other factors that decrease the productivity to a greater extent. Hence automation must be implemented in agriculture to overcome these problems. So, in order to provide solution to all such problems, it is necessary to develop an integrated system which will take care of all factors affecting the productivity in every stage. But complete automation in agriculture is not achieved due to various issues. Though it is implemented in the research level it is not given to the farmers as a product to get benefitted from the resources. Hence this paper deals about developing smart agriculture using IoT and given to

the farmers. In this paper,IOT technology helps in collecting information about conditions like temperature, humidity, moisture and control motor using microcontroller.

IOT leverages farmers to get connected to his farm from anywhere and anytime.

II. Related Work

Low-cost and low-power are the key factors

to make any IoT network useful and acceptable to the farmers. In this paper, we have proposed a low-power, low-cost IoT network for smart agriculture. For monitoring the soil moisture content, we have used an in-house developed sensor. In the proposed network, the IITH mote is used as a sink and sensor node which provides low-power communication. We have evaluated our network with state of the art networks, proposed for agriculture monitoring. Power and cost are the two metrics used for evaluation of these networks. Results show that the proposed network consumes less power and has on average 83% prolonged lifetime at a lower cost compared to previously proposed network in the agriculture field

Description:

IoT is a network of Internet enabled objects, web services interact with these objects. Here, the development of intelligence based systems for the farming sector has to concentrate. The system monitors and alerts based on IOT with real time monitoring environmental parameters, which, is aimed at monitoring and managing the growth of crops in the farm. It includes mobile inspection device, data receiving devices, data acquisition units, data storage servers. So, the system can automatically collect environmental parameters such as air temperature, air humidity and soil moisture, etc from the environment. It automatically judges the parameters and presents a graphical reading for the users to understand the requirement of the parameters. This will also enable the farmers to control the different devices using application.

Description:

Agriculture is the major source of income for the largest population in many countries and is major contributor to the country's economy. However technological involvement and its usability still have to be grown and cultivated for agro sector in India. Some initiatives have also been taken by the respective Governments by providing online and mobile messaging services to farmer related to agricultural queries, agro vendor information to farmers, it provides static data related to soil quality at each region. The system has not been implemented which can utilizes real time data of soil quality based on its current properties. Soil properties determine the quality of soil. Also health of soil can be maintained by applying only required amount c fertilizers with the help of real time monitoring. Soi moisture analysis helps to supply the water wheneve necessary avoiding wastage of water. Also environmental conditions such as temperature and moisture also affect the crop production and crop diseases. In this respect we need a dynamic model which collects such real time data. To increase the production and ease the distribution of agricultural products all agriculture entities need to be connected to have decision making system from farmers to marketing agencies and from vendors to farmers. Such system will also be responsible for controlling other parameters like, agro product.

Existing System:

- ✓ Sensors to monitor and track the status of crops and insects.
- ✓ Drones for monitoring the livestock such as hens.

- ✓ Automated water pumping systems to water the crops according to convenient times.
- ✓ Machines for performing route operations and ensuring proper functioning of systems.

Drawbacks

- ✓ Deficient production information.
- ✓ Less knowledge about the weather forcast.
- ✓ Lack of awareness among farmers about the
- ✓ benefits of ICT in agriculture.
- ✓ Marketing research skills and research centre.

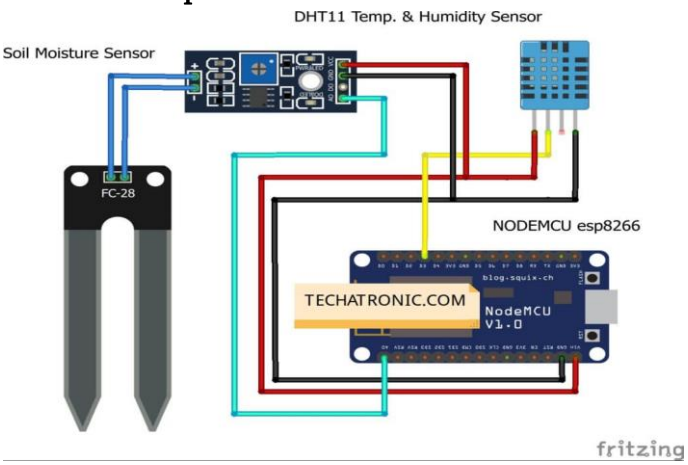
III. Proposed System

- ✓ The main objective is to obtain an effective low-cost and flexible solution for monitoring.
- ✓ The purpose of the system is to develop centralize monitoring and control for the agriculture land. This can be managed and functioned from any location wirelessly using a mobile device. The application user can control basic operations of collection of environmental, soil, fertilization, and irrigation data; automatically correlate such data and filter -out invalid data from the perspective of assessing crop performance; and compute crop forecasts and personalized crop recommendations for any particular farm using the application.

Merits

- ✓ Whenever a problem occurs, it's get notified to the Farmer directly.
- ✓ This may also increase the production.
- ✓ Sensors is used for monitoring Virtually.

Module Description



A module is a Hardware and software component or part of a program that contain one or more routines.

ARDUINO UNO

The Microcontroller used here is an Arduino UNO. The UNO is a Microcontroller board based on ATMEGA 328P. The ATMEGA 328P has 32kB of flash memory for storing code. The board has 14 digital input and output pins, 6 analog inputs, 16 MHz quartz crystal, USB, an ICSP circuit and a reset button. The UNO can be programmed with the Arduino software.

SENSORS

a sensor is a device, module, machine, or subsystem whose purpose is to detect events or changes depends upon transducer in its environment and send the information to other electronics, frequently a microcontroller. A sensor is always used with other electronics.

ESP8266 WIFI

The ESP8266 arduino compatible module is a low-cost Wi-Fi chip with full TCP/IP capability, and the amazing thing is that this little board has a MCU (Micro Controller Unit) integrated which gives the possibility to control I/O digital pins via simple and almost pseudo-code like programming language. This device is produced by Shanghai-based Chinese manufacturer, Espresso if Systems.

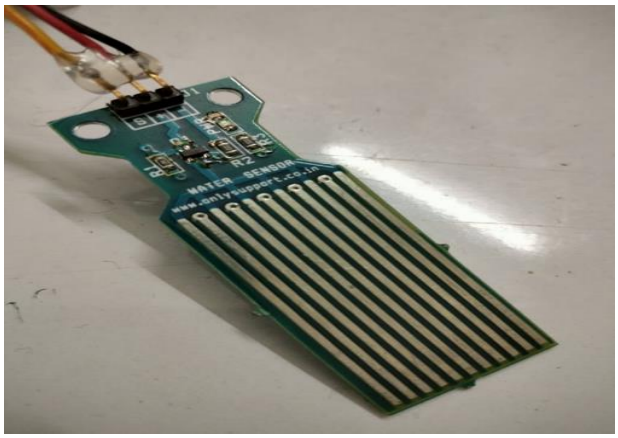
IV. Results and Discussion

LED Display

An LED display consists of many closely-spaced LEDs. By varying the brightness of each LED, the diodes jointly form an image on the display. To create a bright colour image, the principles of additive colour mixing are used, whereby new colours are created by mixing light in different colours. An LED display consists of red, green and blue LEDs mounted in a fixed pattern. These three colours combine to form a pixel. By adjusting the intensity of the diodes, billions of colours can be formed. When you look at the LED screen from a certain distance, the array of coloured pixels is seen as an image.

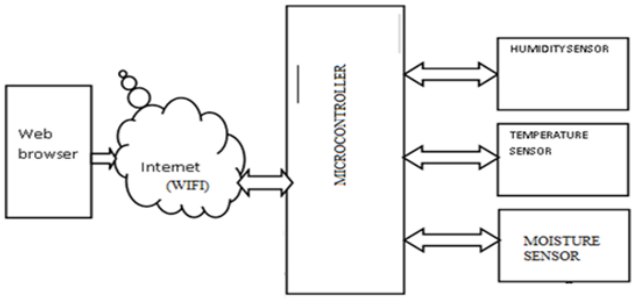
Water level Sensor

It's a device that measures the high or low level of a liquid in a fixed vessel. According to the method of liquid level measurement, there are two types of contact and non-contact. What we call input water level transmitter is a contact measurement, which converts the height of liquid level into electrical signal output. It is a widely used water level transmitter at present.



Soil Moisture sensor (YL-69):

Soil moisture sensor measures the water content in soil. It uses the property of the electrical resistance of the soil. The relationship among the measured property and soil moisture is calibrated and it varies depending on environmental factors such as temperature, soil type, or electric conductivity. Here, It is used to sense the moisture in field and transfer it to raspberry pi in order to take controlling action of switching water pump ON/OFF.



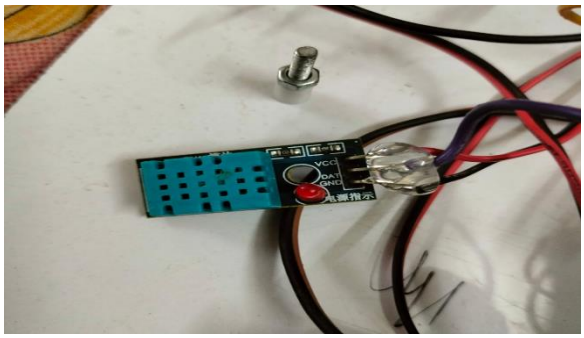
Humidity Sensor

A humidity sensor (or hygrometer) senses, measures, and reports both moisture and air temperature. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. Relative humidity becomes an important factor when looking for comfort.

DHT11 Sensor

DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature. The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The

IC measure, process this changed resistance values and change them into digital form.



PH COLOR SENSOR

Colour sensors contain a white light emitter to illuminate the surface. Three filters with wavelength sensitivities at 580nm, 540nm, 450nm to measure the wavelengths of red, green and blue colors respectively. Based on the activation of these filters, the color of the material is categorized. A light to voltage converter is also present in the sensor. The sensor responds to color by generating a voltage proportional to the detected color.

Another way of detecting color is by illuminating the material surface by Red, Blue and Green LED's one at a time. Here the sensor contains no filters but light to voltage converter. The highest amount of light reflected back by the material surface while illuminated with the red, blue and green light is calculated to detect the color.

Electronics

IR Animal Detection Sensor

An animal detector and driver warning system is provided having a compact and portable housing supported to the dashboard of a car or truck by a mounting bracket. A thermometer is included for reading and indicating ambient temperature, and an infrared sensor is mounted in the housing for reading and indicating localized increased fluctuations in infrared radiation. A signal processor converts the sensed radiation signal from the infrared sensor, and it is displayed on a temperature intensity indicator. Ambient temperature is also displayed and monitored.

An animal detector and driver warning system comprising:

A detector housing, said housing being compact and portable and having a front control panel on a front of said housing;

A mounting bracket for affixing to and supporting said detector housing, said mounting bracket for temporarily attaching to the dashboard of the car or truck;

A thermometer mounted in said housing for reading and indicating ambient temperature;

An infrared sensor mounted in said housing for reading and indicating localized increased fluctuations in infrared radiation;

A signal processor for converting the sensed radiation signal from said infrared sensor

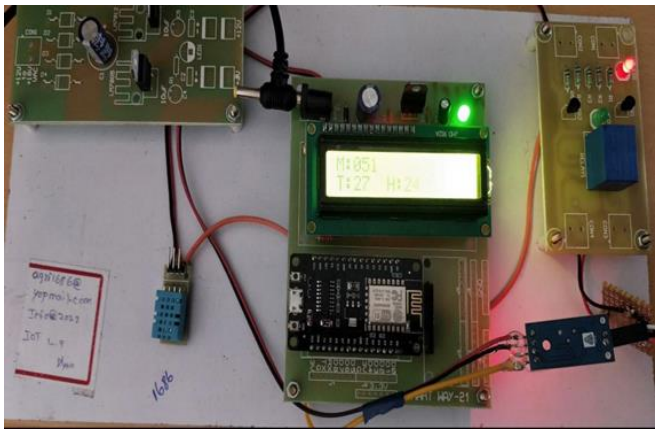
A first electronic signal, said signal processor further for receiving and converting the ambient temperature signal from said thermometer into a second electronic signal;

A temperature intensity indicator for receiving said first electronic signal and displaying temperature intensity in proportion to the sensed intensity of the infrared radiation given off by the animal and received by said infrared sensor.

SOFTWARE USED:

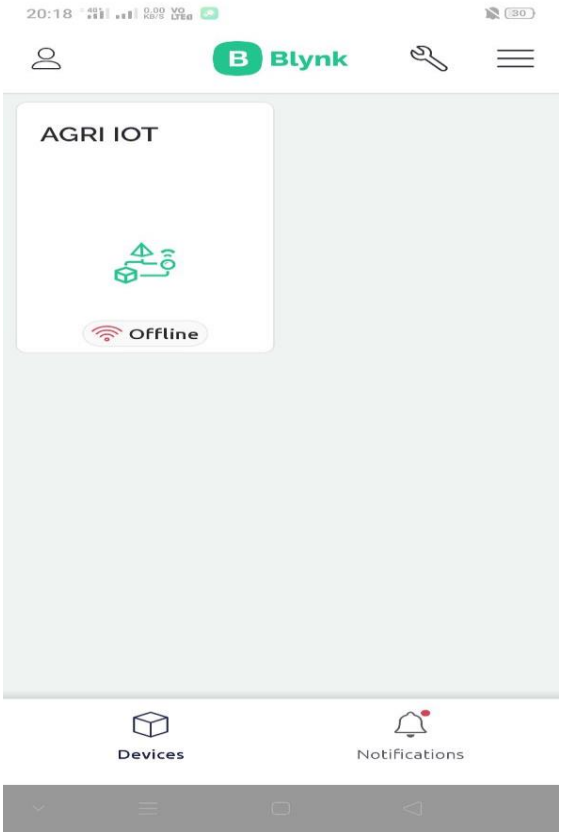
Python:

Python is an interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum and first released in 1991, Python has a design
philosophy that emphasizes code readability, and a syntax that allows programmers to express concepts in fewer lines of code, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales.



SOFTWARE IMPLEMENTATION

Blynk is an IoT platform for iOS or Android smartphones that is used **to control Arduino, Raspberry Pi and NodeMCU via the Internet**. This application is used to create a graphical interface or human machine interface (HMI) by compiling and providing the appropriate address on the available widgets



V. Conclusion and Future Work

Agriculture are gradually being replaced and enhanced by more sophisticated and accurate digital and electronic device. A high percentage of agriculture revenue is lost to power loss, incorrect methods of practicing. This is reduced by the use of smart sensors. The proposal is to perform the agriculture in smart and more efficient way. In addition, this method advocates for the use of the Internet of Things. Internet of Things has enabled the agriculture crop monitoring easy and efficient to enhance the productivity of the crop and hence profits for the farmer. Sensors of different types are used to collect the information of crop conditions and environmental changes and this information is

transmitted through network to the farmer/devices that initiates corrective actions. Farmers are connected and aware of the conditions of the agricultural field at anytime and anywhere in the world.

By further enhancement of this project farmers can bring large areas of land under cultivation. Only the exact amount of fungicide and pesticide can be used. The system can further been improved by incorporating new self-learning techniques which could deployed in the cloud to understand the behavior of the sensing data and can take autonomous decisions. The other problem farmers are facing is the crop destruction by the wild animals. So the future work include the design of the system that may monitor the farm by installing sensors at the boundary of farm and camera module which may take a snapshot once the sensor detects the entrance and transmit the real time pictures by integrating it with other information.

In this monitoring and management for green environment.

Cite this article as :

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