January-February 2020
ISSN: 0193-4120 Page No. 10973 - 10977

Smart Agriculture Monitoring System Using IOT

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Abstract

The agriculture quality management system is composed of monitoring unit which monitors the quality of crops, vegetables yielded by the farmers in the particular land and sends it to the quality rating unit and finally send it to the Farmers web portal automatically so that users can buy according to quality of the vegetables and freshness through online. This system reduces the marketing stress and wastage of goods by expiry. More over this system increases agriculture management to next level. We intend to apply IOT in agriculture especially in Indian Farming as India still tends to use primitive methods of farming which are quite inefficient and require a lot of man-power. Agriculture is our country's top profession with great concern for people's welfare. But now agriculture is plagued by migration of people from rural to urban areas. So, we are concentrating on smart farming techniques using IOT to address this problem. This work is based on various features such as remote controlled monitoring based on GPS, humidity and temperature sensing, scaring intruders, health, and proper irrigation facilities.

Keywords: *Sensor for moisture, Wi-Fi module(IOT), Soil Sensor, Temperature Sensor, pH sensor.*

1. Introduction

Agriculture is the principal foundation of development in the Indian economy. Climate change is the most significant challenge that occurs in old farming. The amount of effects of climate change includes the most severe storm and heat waves with heavy rainfall, the less rainfall etc. As a result, the output will decrease to a significant extent. Climate change also raises the environmental consequences of the plant's life cycle, such as the seasonal change. There is a need to use innovative technology and methodology called the Internet of Things to boost production and raising the barrier in agriculture sector. Industrial developments are gathering momentum in their areas and this means retaining them as a summary. Smart farming is essential for measuring the environment and for water management. The explanation for that is that plant growth is influenced by environmental and water management [5]. The paper aims at making farming smart by using IOT technologies. This paper's highlights include smart farming, with smart power based on real-time field data.

2. Proposed System Overview

In the future, all data from different sensors, such as temperature, humidity, moisture and other environmental factors will be collected and analysed on the same. During the study if the combination of the data collected from the specific sensor gets better results then those data for further use to the entire volunteer. The system will contain a lot of module at different topographical positions and all of these modules will send the data to this platform. It gives some idea to concentrate on the factor for the weather which is good for the crop or farm.

3. Block Diagram

Block Diagram and Block Illustration

This section discusses the block' Agriculture's Quality Management System.' This is comprised of certain parts where the main tasks are conducted. The block diagram is reflecting on necessary element, and is used to easily execute a lot of projects. The figure below shows the Bricks diagram.

January-February 2020
ISSN: 0193-4120 Page No. 10973 - 10977

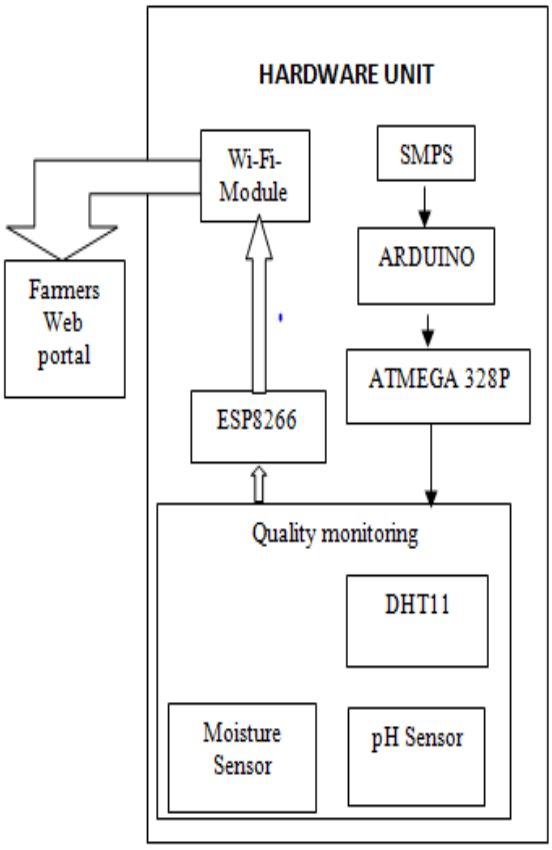

Figure1: Block diagram

4. Hardware Components

A. Arduino

Arduino is an electronic device for open-source hardware, and software. Arduino board is able to read and translate inputs into output, activate a motor and turn an LED on. A collection of instructions for using Arduino programming language (based on Wiring) and Arduino Software (IDE) based on Processing should be provided to the microcontroller on board.

Figure 2: Arduino Microcontroller

B. pH sensor

The soil's pH value is an important factor which affects plant growth. Appropriate pH values are modified from one another for different plants. PH is a measure of a solution's acidity or alkalinity, the pH value ranges from Zero to Fourteen. The pH shows the specific solutions found in the hydrogen [H] ion concentration. For the crop being planted, the soil pH value is measured and optimized using the standard pH-range value table.

Table 1: Value of pH

DENOMINATION	pH RANGE
Alkaline	7.5 pH
Medium Acid	6.0 pH
Neutral	7.0 pH
Very Strong Acid	5.0 pH
Strongly Acid	5.5 pH
Extremely Acid	4.5 pH

Table 2: pH value according to the soil

SOIL TYPE	pH CHANGE
Silt soil	0.5 - 0.7
Loam	0.3 - 0.5
Clay	0.2 -0.3

January-February 2020
ISSN: 0193-4120 Page No. 10973 - 10977

Table 3: Classification of crops according to the pH value

Value of pH	Crops
6.6-7.0	Watermelon, Beetroot, Onion, Spinach
6.1-6.5	Sweet Corn, Cabbage, Cauliflower, Cucumber, Peas, Pumpkin, Strawberry, Tomato, Turnip, Squash
5.6-6.0	Rhubarb, Carrot, Bean, Violet, Clover, Peanut, Soya Bean, Rice, Cucurbit, Aster, Ales
5.1-5.5	Parsley, Conifers, Maize, Oat, , Potato, Sweet Potato, Radish, Ferns
4.5-5.0	Watermelon, Onion, Beetroot, Spinach

C. LM35 Temperature sensor

In LM35, temperature can be measured more accurately compared to Thermostat. Changes in soil temperature have a direct impact on soil nutrient absorption. [5] The soil temperature plays a role in many of the soil's physical processes.

Some Features of LM35:

- Can be calibrated in degree Celsius (Centigrade)
- Linear at 0.01 V/ °C scale factor
- Measure from -55 °C to 150 °C range
- works between 4 and 30 volts
- Current drain fewer than 60mA
- Low self-heating, instill air 0.08 °C
- Low output impedance, 0.1 = 0.001 A load

D. Soil Moisture Sensor

The humidity sensor is used to sense moisture in the soil. This operates on the electro-conductivity principle. Sensor resistance is inversely proportional to soil humidity. Soil moisture content is a key determinant of plant growth. The present work consists of the creation of a sensor for soil moisture. Moisture sensor used as indicator for soil.

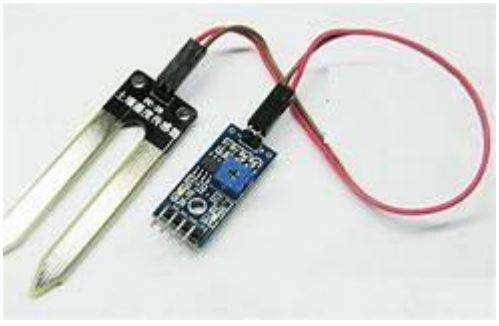

Figure 3: Moisture sensor

E. IoT and Wi-Fi module

The IoT is a network that could be linked to devices and objects using the built-in sensors. Unique identity systems exchange the most valuable information for computer contact, without human to human or pet. IoT-based smart farming helps farmers improve productivity by reducing water and fertilizer wastage.

Sensors including temperature, soil moisture, and moisture sensors can track crop fields and the parameters are sent to the IoT module to automate the irrigation and fertilization system. Not only do conventional and large-scale farming operations using intelligent IoT-based agriculture, yet IoT is also used in organic farming and family farming, producing high quality varieties and encouraging highly transparent agriculture. The ESP8266EX microcontroller features a 32-bit RISC L106 processor that provides extra-low power consumption and a maximum 160 MHz clock speed. The Wi-Fi stack and RTOS provide about 80 percent of the processing power available for programming and user application development.

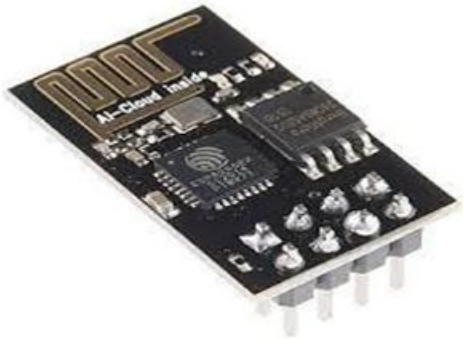

Figure4 : Wi-Fi module

F. DHT11

Humidity sensor tests the relative humidity in the air. Therefore, the measurement of humidity and humidity in the air is the ratio of actual humidity in the air to the average humidity that can be sustained at that temperature. Humidity directly affects plant water relations, and indirectly affects leaf growth, photo synthesis, pollination, and ultimately economic yield. Leaf growth depends not only on the synthesis of biochemical processes, but also on the physical cell enlargement process.

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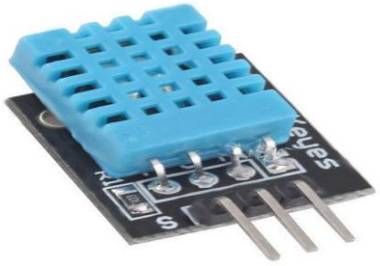


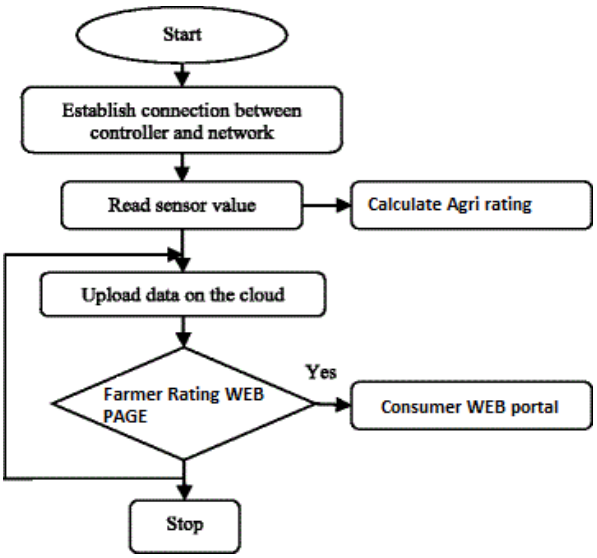
Figure 5: DHT11 sensor

January-February 2020
ISSN: 0193-4120 Page No. 10973 - 10977

5. Working

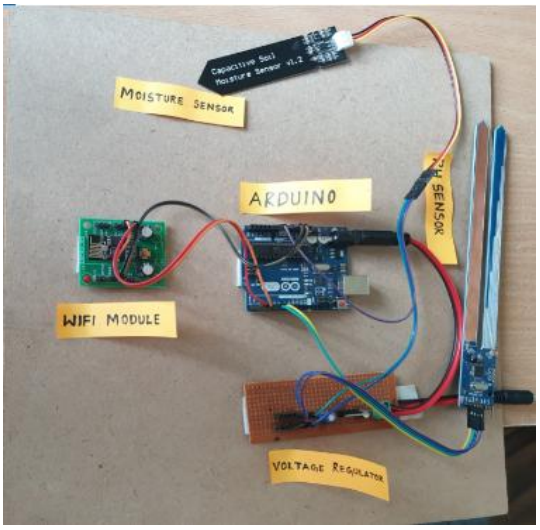
The first step is to measure the quality of agricultural products so that different types of sensors are mounted in the device to monitor the soil quality, air quality, harmful odors and freshness of the product and rate the individual farmer out of 5 and sends the value to the cloud and online web page is designed for individual farmers and customers and the rating is fetched from cloud.

6. Flow Diagram



7. Result

Thus the Quality monitoring unit produces the response, which is graphically presented here. This response is frequently sent to farmer's web portal so as to make him do farming in a smart way.



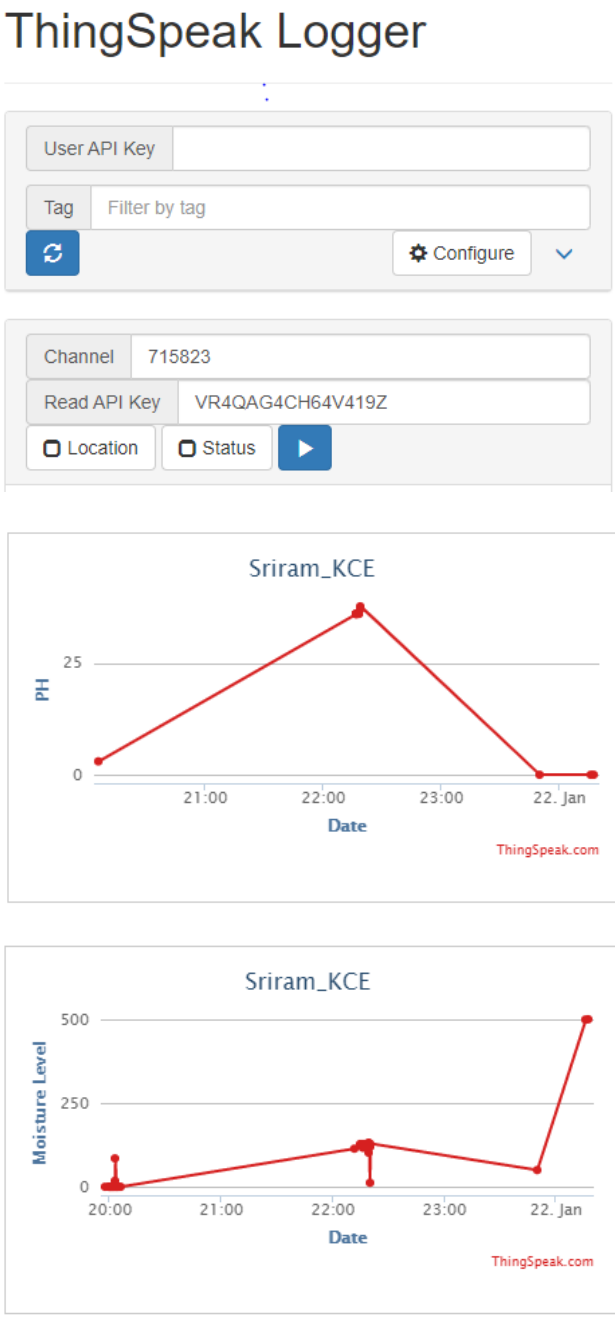


Figure 6: pH and moisture level

8. Conclusion

This system is found to be viable and cost effective for maximizing nutrient resource in farming production, and will also continue a balanced nutrient resource in the soil using pH sensor. Precision water supply can reduce water and energy loss, while at the same time optimizing crop yield it also provides fertilizers in a reasonable proportion. Automated irrigation system has enormous demand, and hope for the future too. This saves time, contributing to the reduction of human errors in soil moisture change. Continuous monitoring of the

January-February 2020
ISSN: 0193-4120 Page No. 10973 - 10977

documented process is used to evaluate the crops net profit through the web page generated by IoT.

9. Future Work

This program has wide potential for future development, including the introduction of new criteria for monitoring and regulating. We can also warn the user about the operating system through a mobile app. In this paper IoT platform is a viable solution in the process of making a "Smart India" to improve farming techniques. Due to the scale of operations, the involvement of large corporations and government would play a vital role in the development of this emerging technology.

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