IOT Based Agriculture Monitoring System Using Wemos

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ABSTRACT*:-*Modernization of the farming process is one of the crucial steps for a country like India, which has to import tremendous amountof grains and agro products from other countries to meet the demand of 1.2 billion populations. Various architectural andtechnological improvements have been suggested in the past and have been widely adopted over the years to improve theproductivity of the agricultural field. One of the major challenges of the agriculture is the propermonitoring of the soil health, theenvironment, and adjusting the irrigation as well as the plant clear Issues which results in less efficient and less productive crops.

The proposed work is about having control over the irrigation and monitoring of the agricultural field using IOT. The system connects physical sensing devices with the cloud and connects the irrigation control mechanism with the cloud. This keeps an immense analysis and problem solving capability to the overall architecture.

The Internet of Things can be defined as "a global, immersive, invisible, ambient networked computing environment built through the continued proliferation of smart sensors, cameras, software, databases, and massive data centers in a world-spanning information fabric known as the Internet of Things."1 The basic idea of the lOT is that virtually every physical thing in this world can also become a computer that is connected to the Internet. Internet of Things (IOT) aims to extend Internet to large number of distributed devices by defining standard, interoperable communication protocols.

Fluctuations in rainfall or market prices can cause profits to quickly rise or plummet. Obtaining accurate, ongoing data on operations has historically also been a challenge. Unlike cars or microprocessors, you can't mass produce identical tomatoes. Companies like Clean Grow and Slum have begun to bring Big Data to the field with tools that can dynamically calibrate moisture and other metrics. Between efforts to eat more food grown locally, a younger generation of farmers and cheaper component-farming is getting an infusion of data and technology.9 As the concept of the 'Internet of Things' becomes increasingly prevalent, many systems are being devised to allow all manner of data to be gathered and analyzed and devices controlled via wireless data networks.

KEYWORD *:- IOT, Wemos, Arduino, Humidity Sensor, Soil Moisture Sensor, Temperature Sensor, Water Level Sensor.*

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I. INTRODUCTION

India's major source of income is from agriculture sectorand 70% of farmers and general people depend on theagriculture. Internet of things (IOT), is a cloud of interconnected physicaldevices, which can communicate with each other over theInternet.Physical devices such as microcontrollers and sensors will not directlycommunicate with the Internet; they do so by using an IOTgateway. This entire infrastructure is known as IOTinfrastructure. For example we can take a Home LightingSystem where all the switches are been connected to the main controller which is connected to the internet.

Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy. It also provides large ample employment opportunities to the people. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield.

The smart farm, embedded with IOT systems, could be called a connected farm, which can support a wide range of devices from diverse agricultural device manufacturers. Also, connected farms could provide more intelligent agriculture services based on shared expert knowledge. Improvement of agriculture field has become biggestchallenging for the countries like India, so new technologieshave to be adopted.

Wehave used temperature sensorand the moisture sensor. These sensors have been installed inthe agriculture field to collect the data, and thus data ismitigated into the cloud with the help of IOThub(Thingspeak), monitoring of agricultural field and optimization of agricultural resources. WSNs also help to know the real time data related to the agricultural field and the condition of the crop, so the farmers can make sure that they
are ready to face the future conditions related to their agricultural field.
The realization of precision agriculture monitoring system based on wireless sensor network, has used wireless sensor networks to design the monitoring of agriculture, at the same time the system is based on the real time monitoring of agriculture environmental

information such as temperature, humidity and the soil moisture. Precision agriculture monitoring framework based on WSN, The realization of precision agriculture monitoring systembased on wireless sensor network,

II. RELATED WORK

Monitoring of soil moisture and groundwater levels usingultrasonic waves to predict slope failures,

[1] Used an ultrasonic wave to predict the slope failures when there is a heavy rainfall, and they have used a method of monitoring of soil moisture. Optimal sensor placement strategy for environmental monitoring using Wireless Sensor Networks,

[2] has used wireless sensor networks to determine the optimal sensor placement method for the monitoring of environmental changes. They have also been used age statistical analysis and Monte Carlo theory to develop the strategy.The system architecture is composed of sensors (temperature,moisture, rainfall and the light), which are installed in theagriculture field. These sensors will be collecting theenvironmental parameters. The sensed data is mitigated intothe cloud through an IOT gateway (thingspeak); thingspeakgives a real time data visualization.

III. ELECTRONIC COMPONENTS

[1] WEMOS D1
The D1 is a mini wifi board based on ESP-8266EX.11 digital input/output pins, all pins have interrupt/pwm/I2C/one-wire supported(except D0)

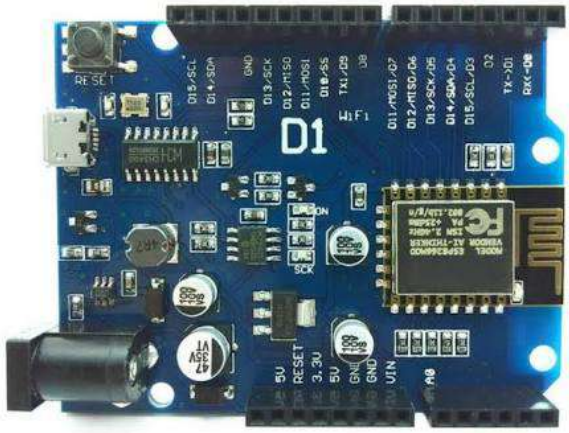

Fig.(1).Wemos D1

Pin	Function	ESP-8266 pin
TX	TXD	TXD
RX	RXD	RXD
AO	Analog I/P,MAX 303V I/P	AO
DO	IO	GPIO 16
D1	IO,SCL	GPIO 5
D2	IO,SDA	GPIO 4
D3	IO,10K pull up	GPIO 0
D4	IO,10K pull-up	GPIO 2
D5	IO,SCK	GPIO 14
D6	IO,MISO	GPIO 12
D7	IS,MOSI	GPIO 13
D8	IO,LOK pull down,SS	GPIO 15
G	GROUND	GND

TECHNICAL SPECIPICATION	
Micro-controller	ESP-8266 EX
Operating voltage	3.3V
Digital I/O pins	1(max input 3.2v)
Analog input pins	80Mh/160MH
Clock speed	4m byte
Flash	3402mm
Length	2506mm
Width	

Tabel(1)&(2):- Functional & Specificationtable of WEMOS

[2] SOIL MOISTURE SENSOR

Our VH400 series soil moisture sensor probes enable precise low cost monitoring of soil water content. Because our probe measures the dielectric constant of the soil using transmission line techniques, it is insensitive to water salinity, and will not corrode over time as does conductivity based probes. Our probes are small, rugged, and low power. Compared to other low cost sensor such as gypsum block sensors, our probes offer a rapid response time. They can be inserted and take an accurate reading in under a second.

Soil Moisture Sensor Probe Features

- Extreme low cost with volume pricing.
- Not conductivity based.
- Insensitive to salinity.
- Probe does not corrode over time.
- Small size.
- Precise measurement.
- Measures volumetric water content (VWC) or gravimetric water content (GWC).
- Output Voltage is proportional to moisture level.
- Wide supply voltage range.
- Can be buried and is water proof

Fig.(2) Soil moisture sensor

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[3] WATER LEVEL SENSOR(Ultrasonic)

The sensing probe element consists of a special wire cable which is capable of accurately sensing the surface level of nearly any fluid, including water, salt water, and oils. The sensor element is electrically insulated and isolated from the liquid into which it is inserted, and will not corrode over time.

Fig.(3)Water level sensor

Unlike, other sensors, the measurement range is adjustable from a few centimeters to over several meters. The reading is reported back as an analog voltage ranging from 0V to 3V where 0V represents the sensor not beingsubmersed, and 3V represents the maximum water level.

The AquaPlumb water level sensor can be easily calibrated to nearly any range and any fluid in the field with the use of two buttons. One button records the minimum fluid level (0V level), and the other button records the maximum fluid level (3V level). After being calibrated, the sensor will return a value of 0 to 3 volts linear with the liquid level. The AquaPlumb water level sensor is compact, low cost, low power, easy to use, and can take an accurate reading in less than a second. The AquaPlumb has an easy to mount water resistant enclosure. The cable can be made taut with a cable clamp, which can be mounted to the side of a reservoir, to a small weight, or to a stick.

Water Level Sensor Probe Applications

- Flood and spill alarms.
- Rain barrel monitoring.
- Reservoir monitoring.
- Environmental monitoring.
- Water conservation applications.
- Mechanical float replacement.
- Electronic toilets.
- Aquaponics.
- Monitoring of Aquariums.
- Sensor for Internet of Things.

[4] TEMPERATURE SENSOR

Soil temperature sensors come in a variety of designs using thermistors, thermocouples, thermocouple wires, and averaging thermocouples. The electrical signals transmitted from the sensors to our dataloggers can be converted to different units of measurement, including °C , °F, and °K. Our dataloggers are also capable of measuring most commercially available soil temperature sensors.

Temperature Sensor Probe Features

- Low cost.
- No need to calibrate.
- Rugged design for long term use.
- Small size.
- Consumes less than 3mA for very low power operation.
- Precise measurement.
- Output Voltage is linear to temperature.

[5] HUMIDITY SENSOR

The sensor and electronics are enclosed in a weather resistant flanged box for easy mounting. The electronic sensor is directly connected to the outside air through a small inlet tube, on the bottom side of the box near the cable gland. Because the small inlet tube isolates the sensor from the rest of the air volume in the box, latency to changes in relative air humidity is reduced.

Relative Humidity Sensor Features

- Low cost.
- Output Voltage is proportional to relative humidity.
- Rugged design for long term use.
- Compact size.
- Very low power operation.
- Precise measurement.
- Wide supply voltage range (3.5 to 20VDC).
- Weather resistant enclosure.
- Compatible with Arduino.

Fig. (4) Temperature & Humidity sensor

[6] IOT

The Internet of Things can be defined as "a global, immersive, invisible, ambient networked computing environment built through the continued proliferation of smart sensors, cameras, software, databases, and massive data centers in a world-spanning information fabric known as the Internet of Things."1 The basic idea of the lOT is that virtually every physical thing in this world can also become a computer that is connected to the Internet. Internet of Things (IOT) aims to extend Internet to large number of distributed devices by defining standard, interoperable communication protocols.

The basic concept of IOT is that together with web services, such as Radio Frequency Identification (RFID), infrared sensor, Global Positioning System (GPS), laser scanner, a network of Internet-enabled objects connected with the Internet based on the conventional protocol, to exchange information and communicate, in order to achieve intelligent identify, locate, track, monitor and manage a network. The decline of size, cost and energy consumption, hardware dimensions that are closely linked to each other, now allows the manufacturing of extremely small and inexpensive low-end computers.2 First, in order to connect everyday objects and devices to large databases and networks, and indeed to the network of networks (the internet) a simple, unobtrusive and cost effective system of item identification is crucial. Only then can data about things be collected and processed. Radiofrequency identification (RPID) offers this functionality. RPID technology, which uses radio waves to identify items, is seen as one of the pivotal enablers of the Internet of Things. Although it has sometimes been labeled as the next generation of bar codes, RPID systems offer much more in that they can track items in real-time to yield important information about their location and status.

Second, data collection will benefit from the ability to detect changes in the physical status of things, using sensor technologies. Embedded intelligence in the things themselves can further enhance the power of the network by devolving information processing capabilities to the edges of the network. Finally, advances in miniaturization and nanotechnology mean that smaller and smaller things will have the ability to interact and connect.In the Internet era, where information plays a key role in people's lives, agriculture is rapidly becoming a very data intensive industry where farmers need to collect and evaluate a huge amount of information from a diverse number of devices (e.g., sensors, farming machinery, meteorological sensors, etc.) in order to become more efficient in production and communicating appropriate information. These efforts deal with a number of factors such as ecological footprint, product safety, labour welfare, nutritional responsibility, plants' and animals' health and welfare, economic responsibility and local market presence. The efforts cover almost all steps in the production chain concerning the daily agricultural tasks, the transactional activities for all involved stakeholders and the support of information transparency in the food chain.

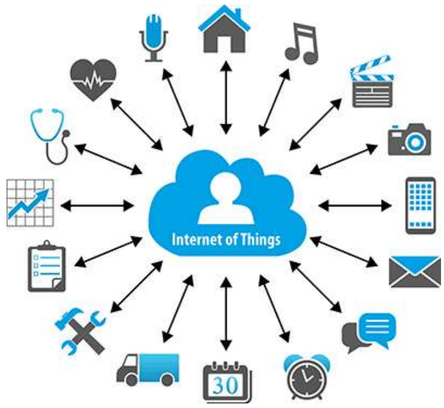

Fig. internet of thing

Agriculture has been a leader for years in automation—many industrial farms rely on harvesters guided by GPS. It is also an industry starving for more data. Fluctuations in rainfall or market prices can cause profits to quickly rise or plummet. Obtaining accurate, ongoing data on operations has historically also been a challenge. Unlike cars or microprocessors, **you** can't mass produce identical tomatoes. Companies like CleanGrow and Slum have begun to bring Big Data to the field with tools that can dynamically calibrate moisture and other metrics.Between efforts to eat more food grown locally, a younger generation of farmers and cheaper component-farming is getting an infusion of data and technology.9 As the concept of the 'Internet of Things' becomes increasingly prevalent, many systems are being devised to allow all manner of data to be gathered and analyzed and devices controlled via wireless data networks.10 Connected devices such as smart thermostats and lighting systems are making their way into homes, but another big opportunity for the Internet of Things could be outdoors, in the area of agriculture.

IV. DESINGN AND IMPLEMENTATION

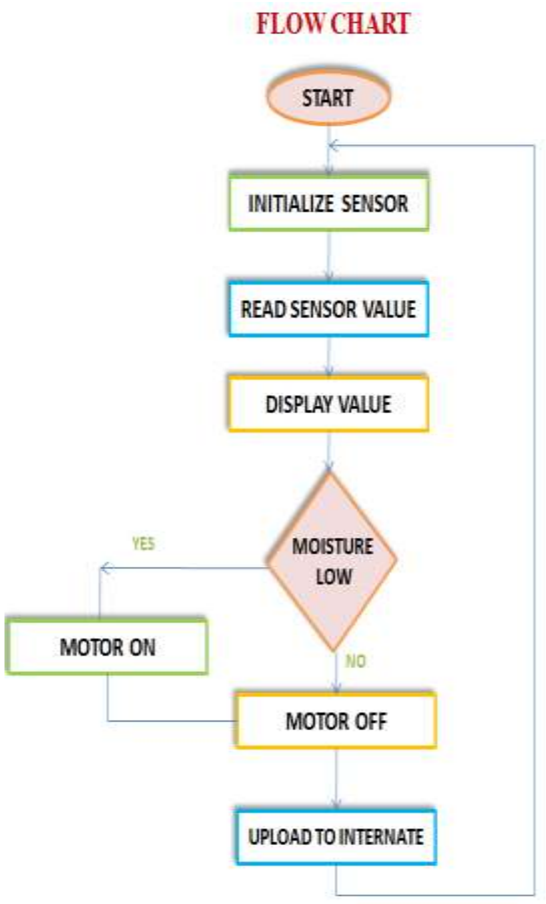

Fig.(5):- Flow Chart

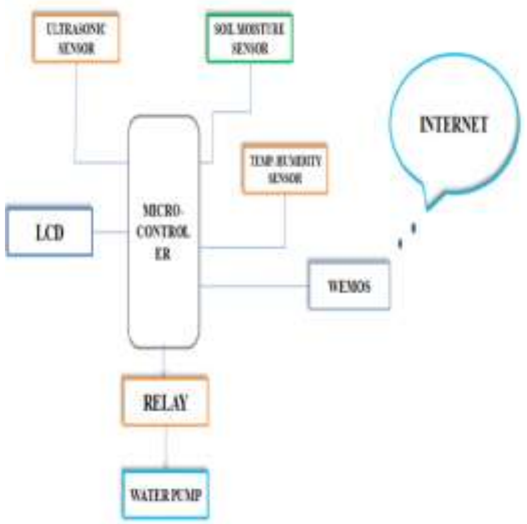

Fig.(6):- Block Diagram

V. WORKING AND RESULT

It state the steps that the proposed system is working which is shown in fig.(5).

STEP 1:- Start the process.

STEP 2:- Initialize all the sensor to the system by using the IOT.

STEP 3:- Check the sensor value is less or more, soil moisture sensor gives the moisture level reading from humidity sensor we get the reading of humidity level present in the atmosphere also, temperature sensor gives the temperature present in soil and most important sensor is water level sensor which gives the water in the soil is less or more.

STEP 4:- If the water level and soil moisture level the a fixed criteria. There is no need to give to irrigation.
STEP 5:- If the soil moisture level or water level is less than the fixed criteria. We start the motor pump.

STEP 6:- After the step 5 we need to initialize the all the sensor value. The process will be completed. After the process completed. It moves to the original state.

It in field sensing sensor monitor the field condition of soil moisture, soil temperature and humidity in air. We get monitors the information on the field i.e. humidity, temperature of soil, etc. All in field sensor data are wirelessly transmitted to our system.In the day to day life atmospheric condition is change fastly and climate is change due to this type of the change that's effects on the agriculture or the production of the crops. Some time water in the agriculture field is over does of water given by the former also the production of crop is less due to the less rainfall or less does of the water. There are many types of the reason for the less production of crop for overcome fall this type of query this projects is designed and it is handled from any place.

VI. CONCLUSION

In the fierce global competition environment, our country agriculture highlights the low level of industrialization, the low value chain level, low management level, low level of information. In order to solve the above problem, the application of new technology is a feasible method. In this paper, the applications of the Internet of things technology to the agricultural products supply chain, in order to improve the operation efficiency of the supply chain of agricultural products, promote the development of agriculture in our country. Of course, there are many factors affecting the adoption of agricultural products supply chain of the Internet of things. There is still a long run for the

internet of things to enter into the practical stage of agricultural supply chain. There are also many problems for the
internet of things to solve, which include how to reduce costs, carry on the R&D of core technology, develop ndustry standards, protect the privacy and so on.

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