International Research Journal in Global Engineering and Sciences. (IRJGES)
ISSN : 2456-172X | Vol. 2, No. 2, June-August, 2017 | Pages 44-51

IMPROVING THE YIELD AND EFFICIENT USE OF AGRICULTURAL RESOURCES USING IOT

Dr. Sujatha Anand, Alice Christy, G.Kaarunya, R.SowmiyaFathima, V.Sherin Agnes

Dr.SujathaAnand
Principal, Loyola Institute of Technology, Chennai
Alice Christy
Assistant professor, Loyola Institute of Technology,Chennai
G.Kaarunya
Student, Loyola Institute of Technology,Chennai
R.SowmiyaFathima
Student, Loyola Institute of Technology,Chennai
V.Sherin Agnes
Student, Loyola Institute of Technology,Chennai

Abstract **:** India is country where agriculture is the major occupation.The yield has increased in a minimal rate in conventional agricultural practice. This innovation of precision agriculture has helped a great deal of agriculturists in expanding their product yield . Soil moisture sensor is utilized to sense the moisture in the soil at the root level as opposed to the surface level. Water system is provided in view of soil moisture level and the information from weather estimate. The sound sensors are utilized to identify the nearness of vermin at a beginning period and sprinklers are utilized for pest control. omron D6T sensor is been used to avoid animal grazing. The agriculturists get alert against human and creature trespassing. The field database is put away in cloud and the farmer gets an intermittent report of his crop land to his portable. Utilizing this method the agriculturist will have the capacity to expand the yield and will be educated about his soil conditions.

Index Terms— precision farming, soil moisture sensor, IOT and cloud

INTRODUCTION

Due to urbanization and increase in the craze for industries and technology farming have lost their importance. Due to Climatic conditions, the farming environment has changed drastically..The agricultural practice has dipped drastically in recent times. 70%of the Indian family rely on rural income. Agriculture share in Indian economy has reduced by 15%the farmers are not aware how fertile their crop.

Due to lack of knowledge, proper utilization of resources is a serious problem .Timely monitoring of all the factors to grow a crop cannot be monitored. Hence Precision agriculture comes into picture which can increase the crop yield effectively. It is studied that the precision agriculture has made the work of the farmer easier. It also helps the farmer know his farm land better. Soil moisture sensors which is used to monitor the moisture content in the soil. The readings from moisture sensors are used to irrigate the crops.

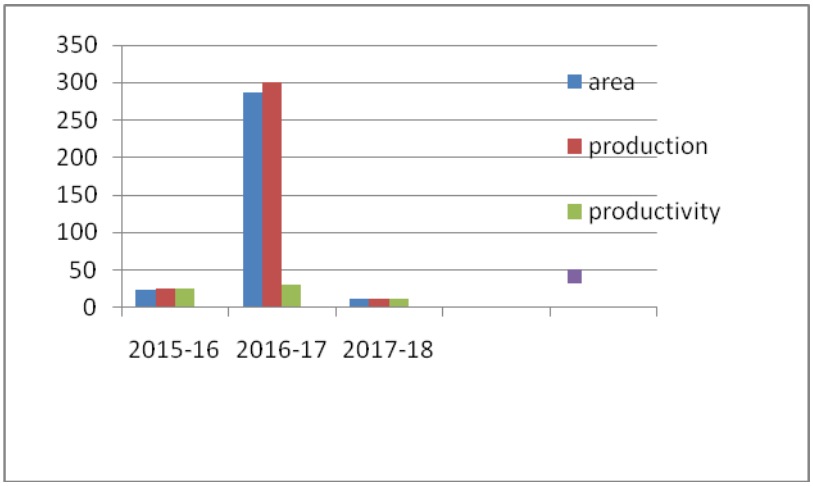


Fig:1 Agricultural production in conventional method

The drip irrigation is used as it is the effective way of irrigation and also helps in conserving water. The Omron D6T sensors are used as it acts as a sensor which alerts the farmer against animal grazing. This sensor has a speciality of detecting only the presence of plants and animals. Pest in plants is the major threat in agriculture lands. Pests destroys the crop,so early detection of pests is required to prevent crop destruction. Hence we use sound sensors which senses the frequency of pest in the plant and sprays pesticides using sprinklers automatically. The farmer gets periodic information of his crop land in his handset. The data provide by the sensors are recorded in cloud. The farmer gets the prediction of how his soil fertility would be and he can decide what crops can be used to increase the yield. The main idea behind this project is to increase the crop yield and reduce the work of the farmer

RELATED WORKS

The current technique and one of the most seasoned routes in farming is the manual technique for checking the parameters. In this technique the ranchers they themselves check every one of the parameters and ascertain the readings. [1]It centers around creating gadgets and instruments to oversee, show furthermore, caution the clients utilizing the benefits of a remote sensor arrange framework. [2]It goes for influencing agribusiness to brilliant utilizing computerization and IoT advances. The featuring highlights are shrewd GPS based remote controlled robot to perform errands like weeding, splashing, Moisture detecting, human identification and keeping cautiousness. [3]The cloud registering gadgets that can make an entire figuring framework from sensors to apparatuses that watch information from farming field pictures and from human performing artists on the ground and precisely bolster the information into the vaults alongside the area as GPS coordinates.[4]This thought proposes a novel philosophy for savvy cultivating by connecting a savvy detecting framework and shrewd irrigator framework through remote correspondence technology.[5]It proposes a low cost and productive remote sensor arrange procedure to get the Soil Moisture and temperature from different area of soil and according to the need of harvest controller to take the choice whether the water system is empowered or not.[6]It proposes a thought regarding how robotized water system framework was produced to upgrade water use for rural crops. What's more, a passage unit handles sensor information.[7]The air conditions are checked also, controlled online by utilizing Ethernet IEEE 802.3.The fractional root zone drying procedure can be actualized to a most extreme extent.[8]It is intended for IoT based checking framework to break down harvest condition and the strategy to enhance the effectiveness of basic leadership by breaking down reap statistics.[9]In this paper picture handling is utilized as an apparatus to screen the sicknesses on natural products amid cultivating, right from estate to reaping. The varieties are seen in shading, surface

and morphology. [10]In this paper, nursery is a working in which plants are developed in shut condition. It is utilized to keep up the ideal states of the earth, nursery administration and information obtaining.

BLOCK DIAGRAM

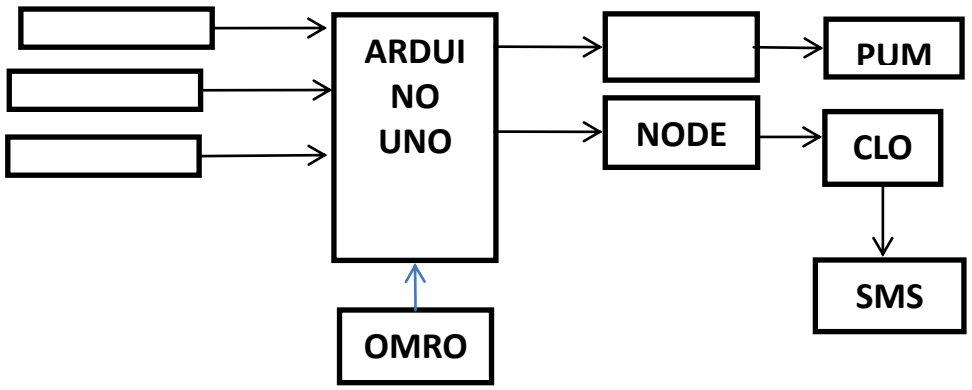


Fig:2 Block diagram

HARDWARE

1) ARDUINO UNO:
Arduino is a single-board microcontroller, intended to make the application of interactive items or environments further useful. It involves the whole lot had to support the microcontroller; without problems connect it to a laptop with a USB cable or power it with an ac to dc adapter or battery to get began out. The Uno differs from all previous boards in that it does no longer use the FTDI USB to- serial using drive. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a USB connection, a vigor jack, a reset button and more. It includes everything needed to aid the microcontroller; conveniently join it to a laptop with a USB cable or vigour it with a AC-to-DC adapter or battery to get started

2) SOIL MOISTURE SENSOR:

Soil Moisture sensor is a sensor which detects the Moisture substance of the Soil. At the point when the Soil is dry, the current won't pass through it thus it will go about as open circuit. Subsequently the yield is said to be most extreme. At the point when the Soil is wet, the current will go from one terminal to the next and the circuit is said to be short and the yield will be zero. The sensor is metal covered to make the proficiency high. The scope of detecting is likewise high

3) GRAVITY SOIL MOISTURE SENSOR:

This product measures soil moisture levels through capacitive sensing, rather than resistive sensing .It's fabricated from a corrosion resistant fabric giving it a long carrier lifestyles. The product entails an on-board voltage regulator which offers it an operating voltage variety of 3.3 ~ 5.5V. It is compatible with low-voltage MCUs (both three.3V and 5V good judgment). To make it suitable with a Raspberry Pi, an ADC converter is required. It has an accuracy of 12%

.

Fig 3: Gravity soil sensor

EC SOIL MOSITURE SENSOR

Electrical Conductive soil moisture sensor works on the principle of electrical conductivity between the two metal probes in the presence of water content in the soil. They are considered economic and have a shorter life span than gravity soil moisture sensor. Stainless Steel probes of 10cm is used to monitor the soil moisture content. Stainless steel rods are used to reduce corrosion and improve conductivity.

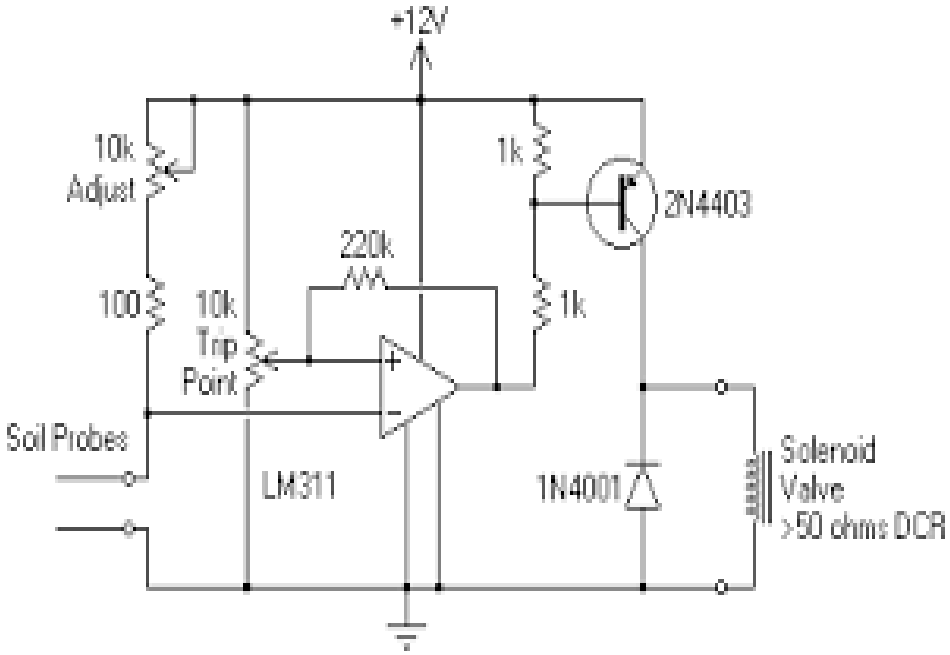


Fig 4: circuit of electrical conductive sensor

COMPARITIVE STUDY

The readings of gravity soil sensor and EC soil sensor are recorded using ubidots cloud. Then an Equivalent reading of Gravity soil moisture sensor is taken for every reading of EC soil sensor. .Hence one Gravity sensor can be introduced in the farmland and it can act as the reference sensor for all the other EC soil moisture senor implemented on field.The threshold is set based on the readings on gravity soil sensor. The threshold value is tentatively estimated to be 600 to water the crops

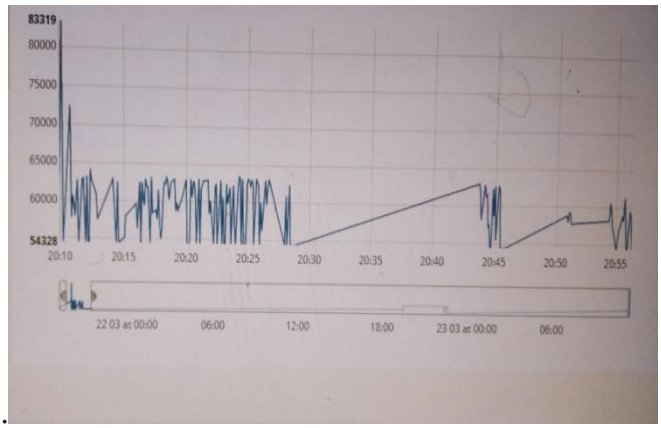


Fig 5: Graphical represenattion of soil moisture reading at cloud

NODE MCU

The NodeMCU (Node MicroController Unit) is an open supply application and hardware progress environment that is built around an awfully low-cost system-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif methods, contains all important elements of the latest laptop: CPU, RAM, networking (wifi), and even a modern working process and SDK. When purchased at bulk, the ESP8266 chip costs best $2 USD a piece. That makes it an best alternative for IoT projects of all kinds.

OMRON D6T

Omron D6T thermal sensor is an enormously touchy thermal sensor used to notice human presence or motion. The sensor is available with detection zones either four x 4 Detection detail broad for usual environment detection or 1 x eight Detection element for broad or tall perspective detection. The constructed in circuitry eliminates or limits false triggering brought about with the aid of outside influences and backgrounds. In view that the D6T is tuned to appreciate the heat signature of human wavelength, applications can incorporate stationary or moving human presence detection, energy conservation where gadgets energy down when no human presence is detected, and safety detection functions

ACOUSTIC SENSOR

An acoustic sensor is an insect pest detection sensor which works by using monitoring the noise degree of the insect pests. Wi-fi sensor nodes related to a base station are placed within the field. When the noise stage of the pest crosses the brink, a sensor transmits that knowledge to the manage room laptop, which then appropriately suggests the infestation field.
These sensors aid detect an infestation at an awfully early stage, consequently broadly lowering crop injury. These are a fine instrument for the monitoring of giant field areas with very low vigour consumption.

DRIP IRRIGATION

Drip irrigation is a kind of micro-irrigation that has the potential to save lots of water and nutrients via permitting water to drip slowly to the roots of plants, both from above the soil surface or buried beneath

the skin. The intention is to place water instantly into the foundation zone and curb evaporation. Drip irrigation programs distribute water through a community of valves, pipes, tubing, and emitters. Relying on how good designed, mounted, maintained, and operated it is, a drip irrigation system can also be more effective than other forms of irrigation methods, akin to surface irrigation or sprinkler irrigation. India utilizes 25 percent of its water assets to develop rice. Agribusiness expends 83 percent of India's water assets, leaving just 17 percent for residential and modern utilize. As indicated by the 2030 Water Resources gathering (WRG) report, by 2030, India will have the capacity to meet just 50 percent of its anticipated request of 1,498 billion cubic meter (m3) of water. A guideline target of the National Water Mission is to build water utilize productivity by 20 percent. This goal is famously feasible when we take a gander at some concentration zones that would help accomplish this. An examination by the National Mission on Micro-Irrigation demonstrates a 22 for each penny to 40 percent sparing in water crosswise over various agriculture crops. A similar report demonstrates a sparing of up to 20 percent and 40 percent in sugarcane and cotton separately.

SOFTWARE:

ARDUINO IDE

The open-supply Arduino application (IDE) makes it easy to put in writing code and upload it to the board. It runs on home windows, Mac OS X, and Linux. The environment is written in Java and established on Processing and other open-supply application. This program can be utilized with any Arduino board.

CLOUD

Cloud computing is the on-demand delivery of compute vigour, database storage, applications, and different IT resources via a cloud offerings platform through the web with pay-as-you-use. With cloud computing, you don't have to make giant upfront investments in hardware and spend plenty of time on the heavy lifting of managing that hardware. As a substitute, that you may provision exactly the correct type and size of computing assets you have got to energy your most recent bright thought or function your IT department. You can entry as many resources as you need, close to immediately, and simplest pay for what you use. Ubidots cloud has been used to provide user in depth information about the farm land

WORKING

Firstly the soil moisture sensor senses the soil moisture level. Once the threshold level is reached the soil moisture is measured by the capacitive soil moisture sensor. The irrigation is provided after checking the weather report. If both the soil moisture content and the weather report details provide that the water in soil is insufficient, then the water gets irrigated. The multiple crops require multiple amount of water based on which water is irrigated. The Omron d6T sensor is used to alert farmers when it detects change in heat in the environment. The farmer gets a SMS in his handset about animal trespassing. The Acoustic sensor is used to detect the presence of pests in the crop land. All these sensors are interconnected. The readings are stored in cloud using ubidots.The complete analysis is provided to the farmer using an application.

CONCLUSION

The Internet of things has accelerated its provider to the field of agriculture. Precision agriculture has

helped farmers to increase their crop yield. The longer term advancement can be completed with the aid of using pest detection and control drones. Community protection may also be extended on this mission to withstand against hacking. This method improves cost efficiency in the long run. Thus it is estimated that the cost of cultivation of vegetable crop in a year is costlier with internet of things compared to conventional menthod. But it proves to be economical in later times.

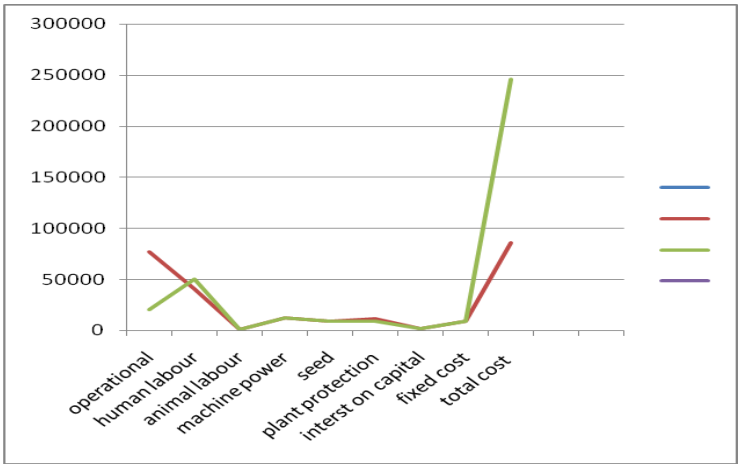
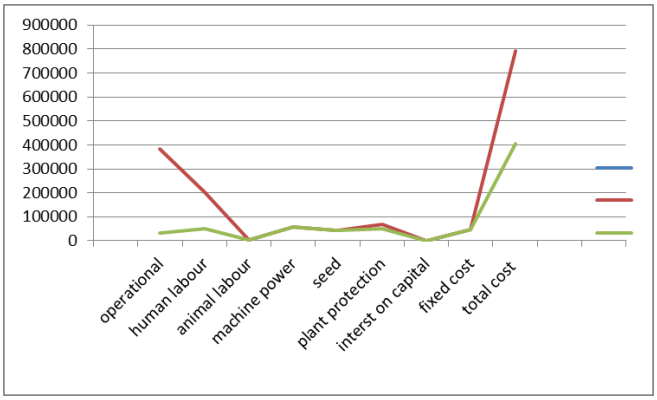


Fig:6 Cost comparison for 1 year



Fig;7 cost comparison for 5years

REFERENCES

[1] Subba Rao,“ Indian Agriculture–Past Laurels & Future Challenges”, In Indian Agriculture: Current Status, Prospects & Challenges, 27th Convention of International Journal of Computer Applications (0975 – 8887) Volume 57– No.18, November 2012 48 Indian Agricultural. University Association. 9-11 Dec 02, pp.58-77

[2] Krishna Reddy and Ankaiah, “A framework of information technology based agriculture information dissemination system to improve crop productivity”, In the proceedings of 27th Convention of Indian Agricultural Universities Association, Dec 9-11, 02, Hyderabad, India, pp. 437-459.

[3] VidyaKumbhar, “IT for sustainable agriculture development in India”, In the proc. of the 3rd National Conf. India-Com, Feb 26–27, 2009, New Delhi,India, pp. 94 – 98.

[4] M.S.Ramananda, "Problems and Prospects in Agricultural Marketing in Karnataka", In Radix International Journal of research in marketing, Vol 1, Issue 8, Aug 2012.
[5] Robert Jensen, "Information, Efficiency and Welfare in Agricultural Markets", In the proceedings of the 27thInternational Association of Agricultural Economists Conference, Beijing, China, Aug 16 – 22, 2009, pp 1 – 29.
[6] Agmarknet: A Step towards globalization of Indian agriculture, Web Page retrieved on 12th Feb 2012, 06.12 pm from http://agmarknet.nic.in/.
[7] Jadhav and Shinde, "Web Based Information System for Agriculture", In International Journal of Innovative Technology and creative engineering, Vol 1, No.2, Feb 2011
[8] K.Lakshmisudha, SwathiHegde, Neha Kale, ShrutiIyer, " Smart Precision Based Agriculture Using Sensors", International Journal of Computer Applications (0975- 8887), Volume 146-No.11, July 2011
[9] NikeshGondchawar, Dr. R.S.Kawitkar, "IoT Based Smart Agriculture", International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), Vol.5, Issue 6, June 2016.
[10] M.K.Gayatri, J.Jayasakthi, Dr.G.S.Anandhamala, "Providing Smart Agriculture Solutions to Farmers for Better Yielding Using IoT", IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).
[11] ChetanDwarkani M, Ganesh Ram R, Jagannathan S, R. Priyatharshini, "Smart Farming System Using Sensors for Agricultural Task Automation", IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015).
[12] S. R. Nandurkar, V. R. Thool, R. C. Thool, "Design and Development of Precision Agriculture System Using Wireless Sensor Network", IEEE International Conference on Automation, Control, Energy and Systems (ACES), 2014.