IJIREEICE

ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 3, March 2021

DOI 10.17148/IJIREEICE.2021.9316

SMART FARMING USING SOIL CHARACTERIZATION

Senthilrani S [1], Hency Gladys D [2], Muthugomathi S [3]

Associate Professor, Velammal College of Engineering Technology, Madurai, India[1]

Student, Velammal College of Engineering Technology, Madurai, India[2,3]

Abstract: Agriculture plays a vital role in developing countries. The project aims at making agriculture smart using automation and IOT technology. The highlighting feature of this project includes irrigation with smart control and intelligent decision making based on accurate real time field data. Next thing is monitoring the operation via android application in smart phones. In this project three sensors such as soil moisture sensor, temperature and LDR sensor, level sensor has been used. The moisture sensors measure the moisture level (water content) of different plants. If the moisture level is below the desired level the moisture sensor sends signal to the Arduino board which triggers the Water Pump to turn ON and supplies water to the plant. When the desired moisture level is reached the system halts on its own and the Water Pump is turned OFF. It senses the water level in the well and sends the information to the microcontroller. If the water level is low Water Pump is turned OFF. The whole information about the agriculture field is send to android application.

Keywords: ET Analysis, GSM module, IoT module, Arduino, level converter, sensor, Android application

INTRODUCTION:

Farming is the backbone of Indian economy. The large population of country depends on farming for living the day-to-day life. Around 70% of Indian population depends on cultivation. And more over many of the crops are exported from our country to other countries. Most of the cultivation cannot be productive by incorporating the traditional System. Hence there is need arises of innovative technology in agricultural sector. One such innovative method is deploying Internet of things (IoT) in agriculture. Therefore, we use IoT innovation to address the critical part of farming[2]. The advancement in field of electronics has enhanced the automation in reason days. Automation is a technique which employ computing devices for monitoring and controlling the entire system operation. The standard of our life can be elevated by implementing automation for day-to-day activities. An automation becoming efficient with the support of sensor technology and IoT. In traditional system maintenance of the Paddy field and monitoring the irrigation are the major problems. Hence to address the problems in the traditional system the proposed system uses the field of automation in agricultural sector. By using the field of automation, the agriculture activities can be made smart. the proposed system uses IoT where communication is established the farmer and the irrigation. In this work the effective utilization and conservation of resources can be attained Such effectiveness' is highly demanded in current agricultural scenario. This demand is addressed by the Machine to man communication It is a bidirectional communication where data flows between the farmer and irrigation system. With the lack of awareness farmers grow unsuitable plants in their Paddy field. It is mandatory to know the nutrient level of the soil, moisture content of the field to increase the agricultural yield. In the proposed system such parameters are considered as the control signal between M2M (Machine to Man) communication system. In this work the Node MCU acts as a hub to which different types of sensors such as moisture sensor, humidity sensor, temperature sensor and ultrasonic sensor are connected[1].

LITERATURE SURVEY:

Tittle: Applications of IoT for soil quality
Year: January 2020
Author: K. Standana and Suresh pabbogu
The farming industry has become more important than ever before in the next few decades. Farmers and agricultural companies are turning to the Internet of Things (IoT) to meet demand. Since we need to continuously take measures manually it requires large amount of time. So using this Smart Agriculture we can effectively take the measurements in less amount of time. In this Smart Agriculture sensors can provide

IJIREEICE
ISSN (Online) 2321-2004
ISSN (Print) 2321-5526
International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering
Vol. 9, Issue 3, March 2021
DOI 10.17148/IJIREEICE.2021.9316

continuous measurements with respect to climate changes. Using Internet of things we can produce different ways to cultivate soil. Smart Agriculture and Smart Farming applications will help the farmer with 24/7 visibility into soil, crop health, and energy consumption level. This paper presents how to analyse soil moisture levels, soil type and soil quality according to the water and climate change. By considering all this factors, farmers can decide which type of crop is suitable for the particular soil to get profit instead of using traditional lengthy methods, and how much fertilizers have to use according to nutrients level in soil[3].

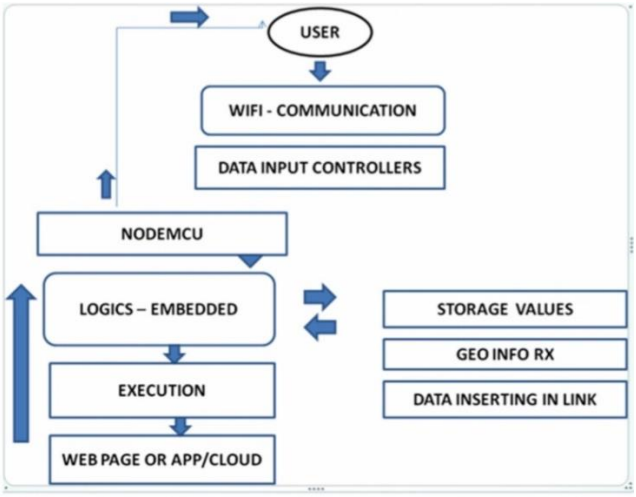

Figure 1: Systematic overview design

PROPOSED WORK:

The prototype we used comprises of moisture sensors temperature and water level sensors, Arduino Uno and water pipes to supply water from tank controlled by water pump. Moisture sensors are installed near the roots and temperature sensor is installed further away to detect the temperature. These sensors send their data to the Arduino Uno to analyze the results [4]. The Arduino Uno will turn the inlet value on, to water the crop, until the soil moisture value becomes greater than the threshold value. The temperature values are above the reference value. The water pump will be turned on. The pesticide motor will be turned on when the farmer needs the operation will work on its state, then the entire value will be updated in the IOT (esp2886) module using wi-fi.

METHODOLOGY:

In the proposed architecture, microcontroller (ESP 8266) and WIFI router that is attached with it (i.e.) moisture sensor, ultrasonic sensor, temperature sensor, humidity sensor and NPK sensor are connected at the field side. The entire module is in turn connected to Arduino node MCU where the sensor signals are processed. At the user end the output device enumerates the agriculture monitor system data through Arduino node MCU. Arduino node MCU and It output to the field. The Arduino node MCU is a micr1ocontroller board based on the ESP8266. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator a USB connection, a power jack, an ICSP header, and a reset button. in this system for irrigation and fertigation two motors are deployed and control signal provided via Arduino node MCU.

IJIREEICE
ISSN (Online) 2321-2004
ISSN (Print) 2321-5526
International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering
Vol. 9, Issue 3, March 2021
DOI 10.17148/IJIREEICE.2021.9316

BLOCK DIAGRAM:

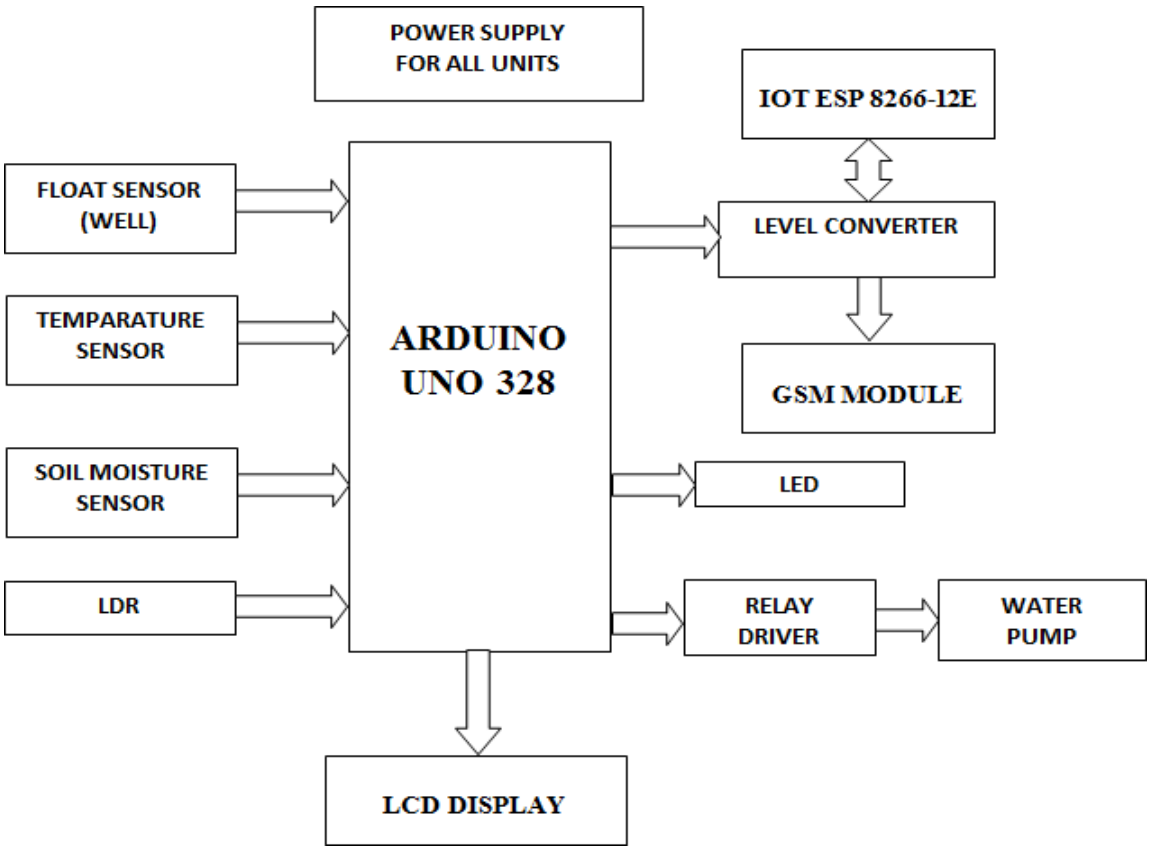

Figure 2: Block diagram

ACTUAL RESULT:

It allows the farmer to maximize the yield using minimum resources such a water, fertilizer. By using this system farmers can quickly respond to any significant change in weather, humidity as well as the health of each crop or soil in the field. It is the cost effective method. It delivers high quality crop production. The message will send to the framers via gsm module. And the whole data will be stored in the cloud also. They can refer those data to improve their yield. If the downloaded the gyene application in their mobile phones. They can able to see the accurate values. And if the water and fertilizer is needed then it will intimate them to on the pipe. So correct amount of water and fertilizer will be provided to the plants

SNO	SOILNAME	SOIL MOISTURE	TEMP	HUMIDITY	PH	CROPTYPE
1	RED	50	20	50	4	WHEAT
2	BLACK	75	24	70	6	COTTON
3	RED	60	30	60	7	RICE
4	BLACK	45	21	45	5	OIL
5	LATERITE	70	25	40	5	COCONUT

Table 2: Analysis of soil categorization

IJIREEICE

ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 3, March 2021

DOI 10.17148/IJIREEICE.2021.9316

RESULT AND DISCUSSION:

The entire system gives the field automation in agriculture, which makes farmer's work easier. It helps in increasing the agricultural production and reduces the time and money of the farmer. Android application can be further developed for easier access to all elements in the field and can be used to control the field. Temperature and Humidity values can be used to make statistical analysis regarding the weather conditions in the past and predict the future.

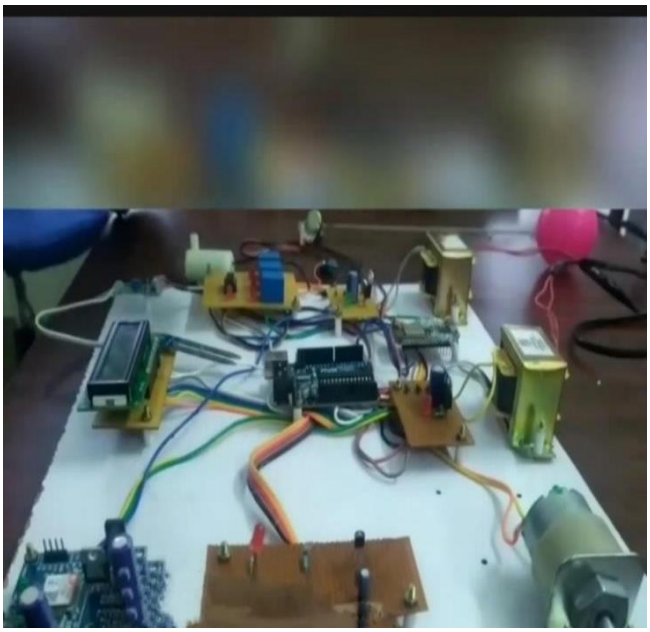

Figure 2: Hardware kit

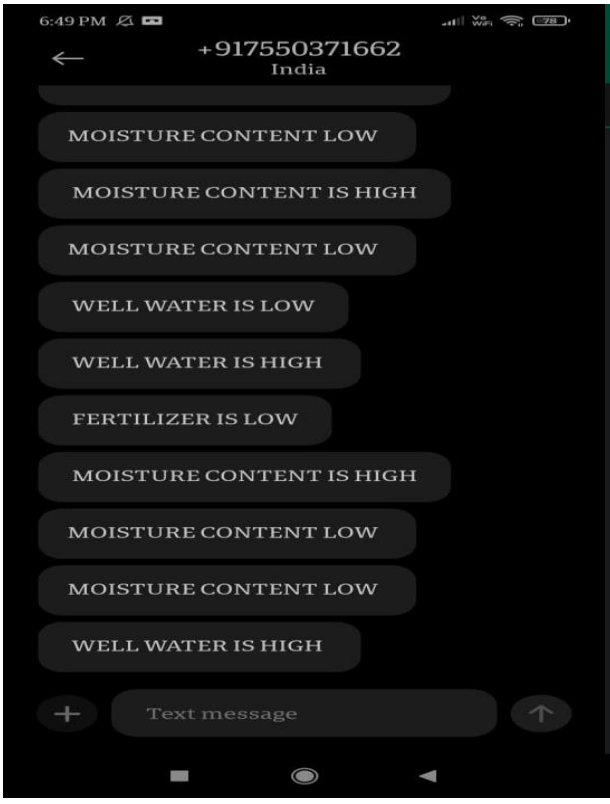

Figure 3: output on normal message

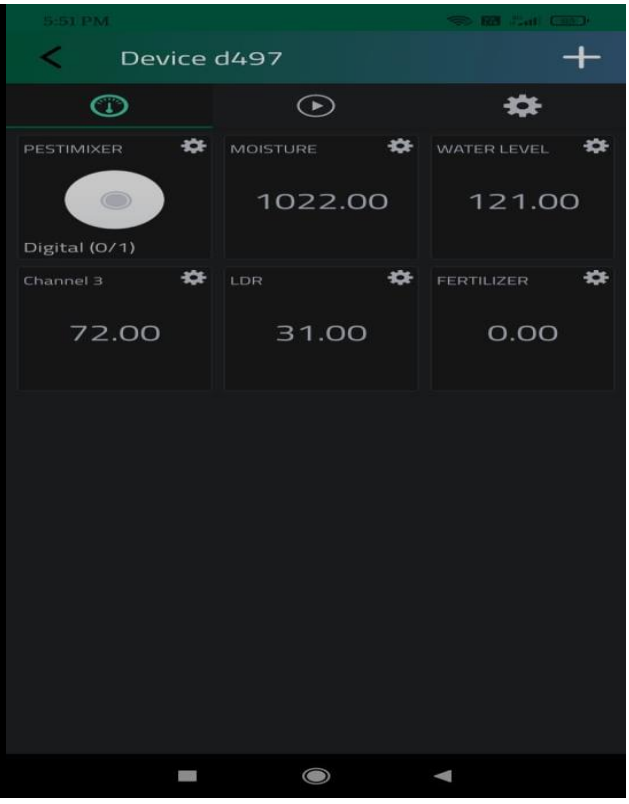

Figure 4: output oh cyene application

IJIREEICE

ISSN (Online) 2321-2004
ISSN (Print) 2321-5526

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

Vol. 9, Issue 3, March 2021

DOI 10.17148/IJIREEICE.2021.9316

CONCLUSION:

Hence by using this system the farmers can be able to cultivate the land in a efficient way. The water scarcity will be reduced by the controlled irrigation. The crop growth will be increased in this method because limited level of fertigation. This is also user friendly to the farmers. Hence smart farming enhances the live hood of the farm. After using this many of the farmers will get the good yield and increase their productivity. The actual result of this project is to maintain the moisture level, temperature and all the fertilizer contents. So by this we can get a good result

REFERENCE:

[1] K. Standana and Suresh pabbogu," Applications of IoT for soil quality", Department of CSE, CBIT, gandipet Hyderabad India, ICICCT-2019 – System Reliability, quality control, safety, Maintenance and management(pp.277-286), January 2020[1]

[2] Mohanraj.I, Ashokumar, K. NarenJ," Field monitoring and automation using IOT in agriculture domain",6th International Conference on Advances in Computing &Communications, ICACC 2016, pp. 931–939, September 2020[2]

[3] G. Vennila, Dr.G. Aivalagan, Dr.R. Jeyavadivel" An investigation of IoT based smart agriculture",International journal of scientific and technology research, January 2020[4].

[4] S.R. Nandrkar ,V.R.Thool,R.C. thool,"Design and development of precision Agriculture system using Wireless sensor Network",IEEE International Conference on Automation, Control Energyand Systems ,2020[5]

[5] Ritika Srivastava1, Vandana Sharma2, Vishal Jaiswal3, Sumit Raj4 "A RESEARCH PAPER ON SMART AGRICULTURE USING IOT", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 Issue: 07 | July 2020

[6] Muhammad Ayaz1, Mohammad Ammad-uddin, Zubair Sharif2 , Ali Mansou and el-Hadi M 1 "Internet-of Things(IoT) based Smart Agriculture" Sensor Networks and Cellular Systems Research Center, University of Tabuk, Tabuk 71491, Saudi Arabia,,December 2020

[7] Zhang, X., Davidson, E. A, "Improving Nitrogen and Water Management in Crop Production on a National Scale", American Geophysical Union, December, 2020

[8] Abhishek D. et al., "Estimates for World Population and Global Food Availability for Global Health", Book chapter, The Role of Functional Food Security in Global Health, 2019.

[9] Elder M., Hayashi S., "A Regional Perspective on Biofuels in Asia", in Biofuels and Sustainability, Science for Sustainable Societies, Springer, 2019.

[10] Zhang, L., Dabipi, I. K. And Brown, W. L, "Internet of Things Applications for Agriculture". In, Internet of Things A to Z: Technologies and Applications, Q. Hassan (Ed.), 2020.

[11] S. Navulur, A.S.C.S. Sastry, M.N. Giri Prasad, "Agricultural Management through Wireless Sensors and Internet of Things" International Journal of Electrical and Computer Engineering 2019

[12] E. Sisinni, A. Saifullah, S. Han, U. Jennehag and M. Gidlund," Industrial Internet of Things: Challenges, Opportunities, and Directions," in IEEE Transactions on Industrial Informatics, Nov. 2019.

[13] M. Ayaz, M. Ammad-uddin, I. Baig and e. M. Aggoune, "Wireless Possibilities: A Review," in IEEE Sensors Journal, Jan.1, 2019.

[14] J. Lin, W. Yu, N. Zhang, X. Yang, H. Zhang and W. Zhao, "A Survey on Internet of Things: Architecture, Enabling Technologies, Security and Privacy, and Applications," in IEEE Internet of Things Journal, ,Oct. 2019.

[15] O. Elijah, T. A. Rahman, I. Orikumhi, C. Y. Leow and M. N.Hindia, "An Overview of Internet of Things (IOT) and Data Analytics in Agriculture: Benefits and Challenges," in IEEE Internet of Things Journal, Oct. 2019.

[16] Khanna A., Kaur S., "Evolution of Internet of Things (IOT) and its significant impact in the field of Precision Agriculture", Computers and Electronics in Agriculture, Vol. February 2019.

[17] Cerchecci, M.; Luti, F.; Mecocci, A.; Parrino, S.; Peruzzi, G.; Pozzebon, A." A Low Power IOT Sensor Node Architecture for Waste Management within Smart Cities Context". Sensors, January 2019

[18] Lozano, A.; Caridad, J.; De Paz, J.F.; Villarrubia González, G.; Bajo, J. "Smart Waste Collection System with Low Consumption LoRaWAN Nodes and Route Optimization". Sensors 2018

[19] Zhang, X.; Zhang, J.; Li, L.; Zhang, Y.; Yang, G. Monitoring Citrus Soil Moisture and Nutrients Using an IOT Based System. Sensors 2017

[20] Hicham, K.; Ana, A.; Otman, A.; Francisco, F." Wireless Sensor Network with Application in Smart Agriculture. Proceedings of the 4th International Electronic conference on Sensors and Application, November 2017.