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Efficient Agricultural Monitoring and Water Mangement System with Powerful IOT Strategies

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I. ABSTRACT

The agriculture society of the majored sources for the food supplies to all over world countries. Farm is to be backbones with the improvement from the India. Nowadays the farm cultivating products is the most important in our life. The agricultural is the most critical advancement in the farmer's for enhanced crop cultivations. The IOT (Internet of things) based on agricultural monitoring systems are start to the checking into water levels, temperatures etc. Waters are necessary sources into agricultures. In the automatic irrigations & crop cultivations monitored systems are uses from optimizing in the water level agricultures. In proposed systems consisting of the sensors networking with the humidity, temperatures, colours, soil moistening and water levels etc is placing into root region to the crop cultivations. The Arduino controller units with the programming into threshold value to the moisture and temperature substance in these controller units are using of the controlling irrigation motors in that way waters flowing in the fields. In soil moisture sensors are placed in the crop cultivations, therefore excess in the waters level motor obtain automatic pumped to the external areas. Therefore higher field is to be achieved, in sensing values are sending to Wi-Fi modules in a while validating values data's are send to the farmer with IOT during Think speak & too notifying through Liquid Crystal Display (LCD). The algorithms are developed into irrigation system data to programming a node MCU for the managed water capacity.

Keywords: IOT (Internet of Things), Soil Moisture, Arduino, LCD (Liquid Crystal Display), Sensor Inputs etc.

II. INTRODUCTION

India is still depended on agriculture for the people's livelihood. Agriculture being both a source of ncome and food security for a multitude of poor income and endangered sections of the society, its impact on production and growth of people's livelihood is significant for the development of newer interventions. Agriculture is a holistic value chain which includes farming to retailing the products. Major need for reformation in agriculture research and development of extension system help farmers to a vast extent for a sustainable growth in the domain. The existing services are declined over the period due to underfunding of construction and operations and minimum access to state of art technologies [1]. The intervention of ICT in development of extension services has proven extending the resources and opportunities to promote sustainability and agriculture production on major aspects in several developing countries. People in agriculture are in need of agriculture knowledge to make optimal and informed decisions. Various methods are proposed to record domain specific knowledge and to improve the access of scattered unstructured and structured data. The State-of -art technologies have widened boundaries in various sections in many domains by development of wireless technology, network, mobile, GIS, iot, etc., Substantial investments from various sources which includes both private and government sectors have driven effective development of ICTs extension in productive domains. Irrigated agriculture is not so pliable when there is physical groundwater depletion with no alternatives. Although implementing micro irrigation practices with options of less water intensive crops, the agriculture productivity deprives in a face of scarcity [6].

III. LITERAURE SURVEY

I Mohanraj et al. (2017) aim of the author is to achieve the intelligent drip irrigation using wireless sensor networks. These wireless sensor networks collect the data from the crops and send the data from the soil and atmosphere and calculate using the microcontroller and send the back the signal using the gsm technology for the transmission of the data of the fields which contains the all the information about the crops using the

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gsm technology. Limitations: the gsm has less range of transferring the data [1]. Li Sha , He Xin-lin et al. (2011) main aim of the authors in this paper was to use the drip irrigation water consumption of the cotton yields in an efficient way and this is achieved by using the drip irrigation and providing the sufficient amount of water in the yields the usage of the saline water for the cotton crops in an efficient way. Limitations: The drip irrigation is of the saline water is limited for only the cotton crops [2]. Yuan-FengQiu, GeMeng et al. (2013) stated in the paper that the usage of drip irrigation methods water saving is done in schedules, the scheduling is done for supplying the water for the crops and the scheduling is based on the time and according to the scheduling the water is supplied to the crops. Limitations: This scheduling doesn't let us know the yield require enough [3].

Qinghua Kong et al. (2010) main focus of the paper is the drip irrigation is optimised for bell pepper using water and nitrogen under sub surfaced the water and nitrogen are used for the drip irrigation and it is especially for the bell pepper and works under the subsurfaced Limitatiion: this doesn't work for the surface methodology of the drip irrigation [4]. Edmundo Sánchez Salguero et al. (2017) stated that the irrigation is executed using the measurements of the dampness automatically. The external noise from the surroundings which create noise to the sensors are damped for the accurate output for the drip irrigation. Limitation: It works automatically with the dampness measurements [5]. SubhashreeGhosh et al. (2016) stated that the irrigation is done using the cloud using the android and data mining all the information is stored into the cloud and when required data mining is done for the information using the sensors collects all the information. Limitation: This requires complexity for coding and requires cloud controlling operating system which increases the cost [6]. Wang Yang-ren et al. (2016) main focus of the paper is to drip irrigation is which is done economically with scheduling for the tomato agriculture. This is done for the tomato yields and how much water is required for the tomato yields economically by scheduling methods which provide time to time irrigation of the agriculture. Limitation: the main focus is on the tomato irrigation methods and providing the best for the tomato yielding [7]. Anusha I. Walisadeera et al. (2014) states in this paper is done using the method ontology this is study of the ontoilogy and doing the irrigation.These havecollective amount concept and categorization in areas where the are where their these reflect the properties among themit is create automatically from large data sets. Limitation: This paper discusses more about the ontology [8]. D. Liying, L. Hongjuan et al. (2012) main focus of the author is the done using the ontology which has more study of the ontology. These have collective amount concept and categorization in areas where the are where their these reflect the properties among themit create automatically ontology using large data sets. Limitations: The research is mainly based on agricultural information on ontology [9].

Xingye Zhu ; Shouqi Yuan et al. (2009) main focus of the author is the done using the sprinkler irrigation. This is a concept in which the water sprinkler sprinkles using matlab coding methods and reduces the energy consumption. Limitations: It uses the matlab techniques are which are complicated to program [10]. Sanjay Chaudharyl, M. B et al. (2015) main focus of the authors in this paper is agriculture should be done using the agro diversity systemthe food and agriculture has the vital role in terms of the diversifying the agriculture. Limitations: It mainly focused on cotton crops [11]. G. Shruthi et al. (2017) main focus of the author in this paper is real time smart sprinkler irrigation control system using the GSM technology and by sending and receiving the information through it. Limitations: The irrigation control is done using the gsm technology limited range of operation[12]. T.C. Meyer ; G.P. Hancke. et al. (2015) stated in this paper that irrigation of crop is done using the smart sprinkler system using the wireless sensor networks by zigbee technology by using this data is transferred and received and controlled through it. Limitations: It require more computing in the cloud for the execution [13]. Richard K. Lomotey et al. (2014) stated in this paper that the using the mobile data the data is transmitted to the other devices it uses the sensors to detect the information from the crops and these are sent using the mobile data Limitations: The mobile data need to have constant data speeds for constant reliability [14]. Yandong Zhao et al. (2009) stated that in this paper that they are using accurate and exact amount of water to be saved for irrigation purpose and phsyocolgy is studied by using the GSM technology it can transfer, receive and control through it . Limitation: The irrigation control is done using the gsm technology limited range of operation [15]. Muhammad Ahsan et al. (2014) stated in this paper use of the ontology for the irrigation purpose These have collective amount concept and categorization

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in areas where the are where their these reflect the properties among them it create automatically ontology using large data sets. Limitations: It only models the agriculture using ontology [16].

IV. PROBLEM STATEMENT AND OBJECTIVES

4.1 Problem statement

As the time of heavy crops season there is a huge problem to monitor the crops so it takes lot of time to monitor the crops to overcome this disadvantage different techniques are developed among some of them I had found some problems which are stated below:

- Some of them use GPS technology to the data which has the low range ti send the information.
- Some of the use ontology methods which are not efficient in modern agricultural methods.
- Some of them used cloud data to store the information they faced a problem when the cloud server is slow.
- Most of them did not include the modern of technology for technology for efficient agricultural methods.
- Some does not water management system in order to prevent the wastage of water.

V. PROPOSED METHODOLOGY

5.1 Proposed Methodology: In this paper, we focus on a efficient agricultural methods based on INTERNET OF THINGS technology, which has more advantages than GSM TECHNOLOGY. In such a system all information is sent through the IOT which has long range of transferring the data and controlling it , so that they can be tracked by any device equipped with an iot technology - for example, a mobile phone iot app . Intuitively this brings the following benefits.

- The crops which are connected to iot devices can be automatically read and monitor the information can also be transferred to the iot app through the iot module. As a result, we can access the information at any anywhere at any time at anywhere.
- It becomes easy for the person to manages the field crops automatically and read and easily accessed.

We propose the use of iot technology in the smart agricultural system, as iot modules have a longer range, and can be accessed at any where. Previous research on the design of gsm technology mainly focused on using gsm signals, which have inadequate ranges, and leave farmers with the low frequency to stay in the surroundings of the gsm signal is available .In our proposed system, iot module sends the data through the internet that can be accessed and where and can be monitored, The iot module gets the information automatically from the sensors which are kept into the crops. A micro controller is installed for data processing and a LCD is equipped as the user interface. In order for the data to displayed and communicate with the server, we have connected to the iot module as it is low-power.

SYSTEM DESIGN

- The proposed system is divided into two parts first is Collecting data from the fields and second is sending the data to the online for monitoring purpose using the IOT module which is present in the onboard
- Firstly using onboard sensors such as Temperature sensor, IR sensor, Light sensor, Soil moisture sensor, Smoke sensor, we will collect the data from the fields and these values are processed in Arduino controller and these values are produced in real time ad are displayed on board LCD display.
- Using the onboard IOT module which is connected to the internet will send the real time data and can be monitored from anywhere on the online website THINGSPEAK in real time.

5.2 Proposed system flow

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Step 1: Switch ON power for the onboard system. The designed system diagram and Hardware components of the proposed system is presented down below.

1. Arduino UNO
2. Light sensor
3. Obstacle (IR) sensor
4. Smoke sensor
5. Soil moisture sensor
6. Temperature sensor (LM 35)
7. Relay module
8. Submerged motor pump
9. IOT module
10. LCD display
11. Buzzer
12. Power supply

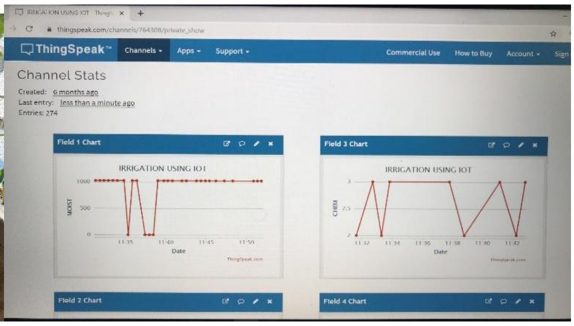

Fig1. Onboard system at sample soil Fig2. Online monitoring system THINGSPEAK website

Fig3. LCD Onboard display in fields

Step 2: Let the sensors onboard collect the data from the fields and show the real time results on the display which is present onboard.

If there is no sufficient sunlight, water moisture, or obstacles blocking the sunlight, or any animals entering the fields and fire or smoke which is coming out from the fields and sudden rise in temperatures in fields these sensors will detect and gives alarm buzzer at fields for better monitoring.

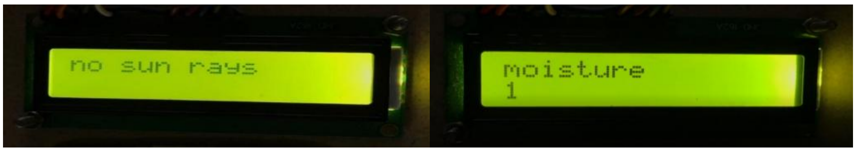

Fig4. No sunrays detectedFig5. Moisture level 0Fig6. Moisture level 1

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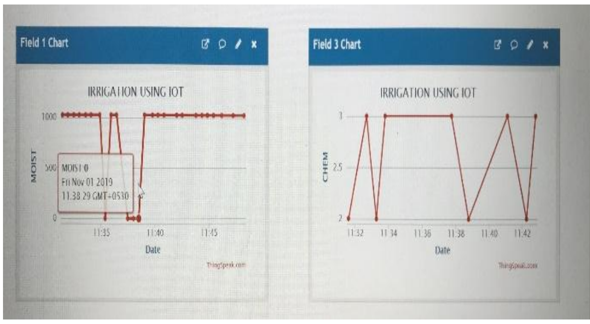
Fig7. Chemical (smoke detect) Fig8. Moisture level 3 Fig9. Object is detected

Step 3: All the data which is collected from the sample soil not only displays information on the onboard display and also due the inclusion of the IOT module onto the system which is connected to the internet helps to record the data from the fields and sent to the online web service WWW.THINGSPEAK.COM where this is free for use and the data information can be monitored by logging into the THINGSPEAK account anywhere in the world until and unless we are connected to the internet.

This gives far more flexibility for the farmers to monitor their fields without reaching the fields for inspections and can have close monitoring and accurate results for whether sensitive or controlledenvironmental crops such as medical crops.



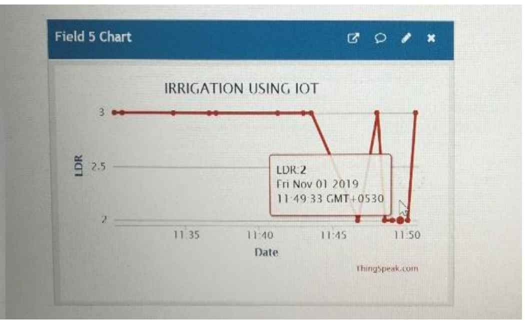


Fig10.Mositure and smoke sensors analyticsFig11. Light sensor analytics

Fig12.Temperature and obstacle sensors analytics

Step4: The relay which is present onboard automatically gets turned on whenever the water level or moister level present in the soil is very low hence achieving the right moisture level automatically whenever the crop is needed and we can keep the moisture level stable for moisture sensitive crops. For motor pump separate power supply is provided to turn on it.

Fig13. Relay moduleFig14. Motor pump

VI. PROJECT RESULT

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6.1 Analysis: The proposed method is sectioned into two parts, first part is which are collecting the data from the fields using the sensors like Temperature sensor, IR sensor, Light sensor, Soil moisture sensor, Smoke sensor and then display the values onto to the onboard LCD display and then Second part is sending the data collected data from the sensors to the online webserver using the IOT module We can monitor each and every update from the fields in real time using the online website which is connected to the onboard system using the internet connectivity and accurately measure the values and store them for the further use in which these can used for the controlled environment crops such as medical crops etc.

6.1.1 Collecting the data from sample soil

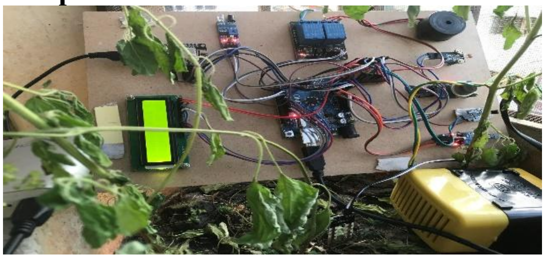

Fig15. Sample soil system

Fig16. soil moisture test

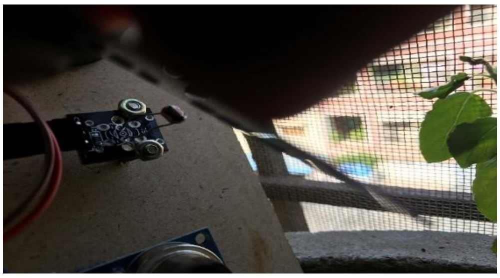

Fig17. Light or Sunrays test

Fig18. Temperature Sensing test

Fig19. Smoke test

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Fig20. Object detect test

- Turn on the on board system and make sure that every sensor is working properly.
- Place the system from where the data need to be collected for the monitoring purposes
- Note down the reading from the LCD Display for the quick glance of the real time data which is sensed from the crops.
- These sensor values are further sent to the online server website and useful for further monitoring.

6.1.2 Monitoring the data online

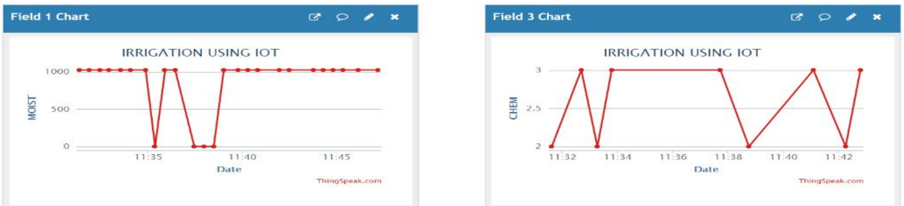

Fig21. Moisture sensor analytics and Smoke sensor analytics

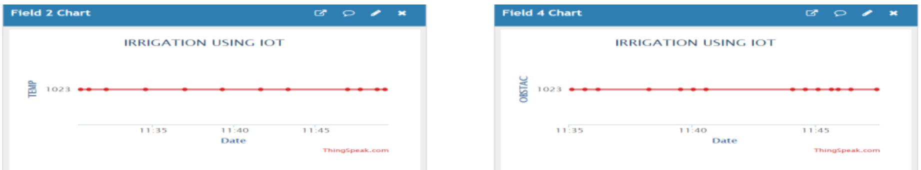

Fig22. Temperature sensor analytics and Obstacle sensor analytics

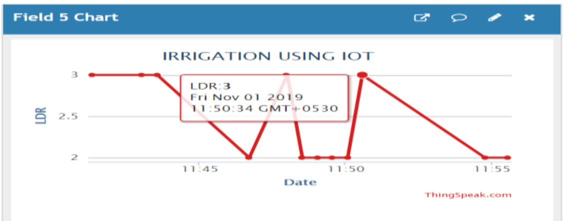

Fig23. LDR sensor analytics

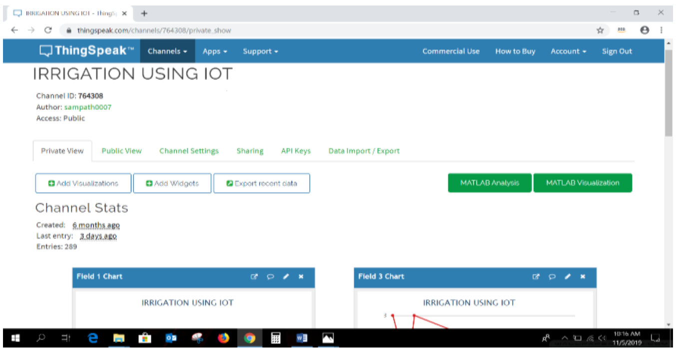

Fig24. Accessing website from PC

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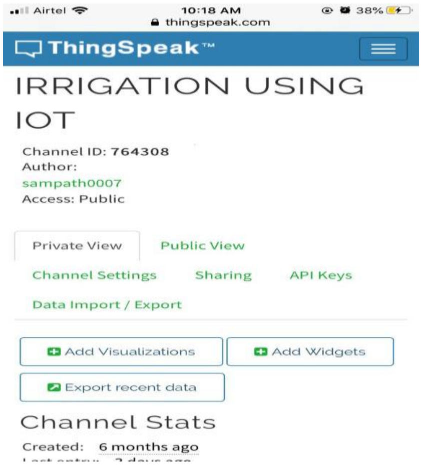

Fig25. Accessing website from cell phone

- The data which is collected from the sample soil is sent to the online server using the IOT Module
- This data can be viewed anywhere in the world and can be accessed from long ranges
- The selective crops can be closely monitored and can provide better control over the crops
- The data can be stored or take hardcopy for the further use and can be for different purposes
- If there is no sufficient sunlight, water moisture, or obstacles blocking the sunlight, or any animals entering the fields and fire or smoke which is coming out from the fields and sudden rise in temperatures in fields these sensors will detect and gives alarm buzzer at fields for better monitoring

6.2 Result: The farmer places the system in the crops for the monitoring purpose and the data is collected from the sensors the information is sent over to LCD which installed on a system and also the collected data is transferred to the online server where the farmer can see the accurately even he is not at the fields and can be accessed the data from anywhere. This gives far more flexibility for the farmers to monitor their fields without reaching the fields for inspections and can have close monitoring and accurate results for whether sensitive or controlled environmental crops such as medical crops.

VIII. CONCLUSION AND FUTURE SCOPE

The development of the current can be useful for many agricultural lands which need to be improved and advanced and should benefit from the technology. This can improve of the monitoring the crops accurately and predict the outcomes approximately. Due to the inclusion of the IOT module the advancement is increased and moreover agricultural lands can be yielded smartly with the help of the sensors and other onboard system components. By carrying out this experiment we came to know and prove that this is efficient solution for all crops monitoring and help framers to make smart decisions where ever they are with the help of the internet. Inclusion of this kind of technology for sure will improve the crop growth and its production rate.

REFERENCES

1) I Mohanraj ; V Gokul ; R Ezhilarasie ; A Umamakeswari

Intelligent drip irrigation and fertigation using wireless sensor networks2017 IEEE Technological Innovations in ICT for Agriculture and Rural Development (TIAR) Year: 2017.

2) Wang Yang-ren ;ZhengZhi-wei.

Research of tomato economical irrigation schedule with drip irrigation under mulch in greenhouse 2016 Fifth International Conference on Agro-Geoinformatics (Agro-Geoinformatics)

3) Li Sha ; He Xin-lin

ISSN:0971-1260

Vol-22-Issue-41-December-2019

The effect of irrigtion on water consumption and yield of cotton under drip irrigation in Saline land2011 International Conference on New Technology of Agricultural

4) Yuan-FengQiu ;GeMeng

The Effect of Water Saving and Production Increment by Drip Irrigation Schedules2013 Third International Conference on Intelligent System Design and Engineering Applications Year: 2013

5) QinghuaKong ;Guangyong Li ; Yonghong Wang ; HongxuHuo

Precision application of water and nitrogen for bell pepper under subsurface drip irrigation2010 World Automation Congress Year: 2010

6) Edmundo Sánchez Salguero ; Hugo Sánchez Salguero

Automated system of irrigation for drip based on measurements of dampness2017 IEEE 37th Central America and Panama Convention (CONCAPAN XXXVII) Year: 2017

7) SubhashreeGhosh ;SumaiyaSayyed ; KanchanWani ; MrunalMhatre ; Hyder Ali Hingoliwala

Smart irrigation: A smart drip irrigation system using cloud, android and data mining2016 IEEE International Conference on Advances in Electronics, Communication and Computer Technology (ICAECCT) Year: 2016

8) Anusha I. Walisadeera, A. G. (2014). User centered ontology for Srilankan Agriculture Domain. International Conference on Advances in ICT for Emerging Regions (pp. 149-155). IEEE.

9) D. Liying, L. Hongjuan, H. Dongbin, W. Zhe, and L. Milling, "Research on Intelligent Searching of Agricultural Information Based on Ontology," 2012 International Conference on Computer Science and Service System, pp. 1026-1029, Aug. 2012. 131.

10) Xingye Zhu ; Shouqi Yuan ; Junping Liu ; Yin Luo. Strategy of Energy-saving for Variable-Rate IrrigationSprinkler. 2009 International Conference on Engineering Computation.

11) Sanjay Chaudharyl, M. B. (2015). Agro Advisory System for Cotton Crop. AGRINETS Workshop, COMSNETS. IEEE.

12) G. Shruthi ; B. Selva Kumari ; R. Pushpa Rani ; R. Preyadharan.A-real time smart sprinklerirrigation control system. 2017 IEEE International Conference on Electrical, Instrumentation and Communication Engineering (ICEICE).

13) T.C. Meyer ; G.P. Hancke. Design of a smart sprinkler system. TENCON 2015 - 2015 IEEE Region 10 Conference.

14) Richard K. Lomotey, R. D. (2014). Management of Mobile Data in a Crop Field. 2014 IEEE International Conference on Mobile Services (pp. 100-107).

15) Yandong Zhao ; Junfu Zhang ; Jinfeng Guan ; Weilun Yin. Study on precision water-saving irrigation automatic control system by plant physiology. 2009 4th IEEE Conference on Industrial Electronics and Applications.

16) Muhammad Ahsan, Y. H. (2014). Knowledge Modeling for e-Agriculture using Ontology. IEEE, 112-121.

17) Haijun Liu ; Kang Yaohu ; Yao Sumei ; Sun Zeqiang ; Liu Shiping ; Wang Qinggai.Water use efficiency of winter wheat under sprinkler or surface irrigation2011 International Symposium on Water Resource and Environmental Protection.

18) Lala Bhaskar ; Barkha Koli ; Punit Kumar ; Vivek Gaur. Automatic crop irrigation system. 2015 4th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO) (Trends and Future Directions).

ISSN:0971-1260

Vol-22-Issue-41-December-2019

19) Kizito Masaba ; Amini Ntakirutimana ; Taha Selim Ustun Design and implementation of a smart irrigation system for improved water-energy efficiency. 4th IET Clean Energy and Technology Conference (CEAT 2016)

20) Vandana Dubey ; Nilesh Dubey ; Shailesh Singh Chouhan. Wireless Sensor Network Based Remote Irrigation Control System and Automation Using DTMF Code. 2011 International Conference on Communication Systems and Network Technologies

21) Chuang Wei ; Ming-si Li. Advantages and problems of developing pipeline Transportation water irrigation technology in Xinjiang. 2011 International Conference on New Technology of Agricultural

22) Anis Diyana Rosli ; Nor Salwa Damanhuri ; Nurlida Ismail ; Shabinar Abdul Hamid ; Aida Zulia Zulhanip ; Nadiah Ismail ; Nor Adni Mat Leh. Intelligence irrigation system employing the use of solar PV. 2012 IEEE International Conference on Control System, Computing and Engineering.

23) Muzammil Hussain ; S.P. Gawate ; P.S. Prasad ; P.A. Kamble. Smart irrigation system with three level access mechanisms. 2015 International Conference on Computation of Power, Energy, Information and Communication (ICCPEIC)

24) Yunseop Kim ; Robert G. Evans ; William M. Iversen. Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network. IEEE Transactions on Instrumentation and Measurement.

25) Ravi Kishore Kodali ; Lakshmi Boppana. Irrigation with grid architecture sensor network. 2014 International Conference on Advances in Computing, Communications and Informatics (ICACCI).

26) Sandeep Kumar, P.Raja and G. Bhargavi, “A Comparative Study on Modern Smart Irrigation System and Monitoring the Field by using IOT” in IEEE International Conference on Computing, Power and Communication Technology, (GUCON), pp. 637-641, September 28th-29th, 2018.

27) Hemlata Dalmia, Nikhil, Shilpa Choudhary, and Sandeep Kumar, “Pre Disaster Management Using ICT Technology” in 4th International IEEE Conference on Computing Communication and Automation (ICCCA-2018), December 14-15, 2018.

28) Sandeep Kumar & Hemlata Dalmia, “A Study on Internet of Things Applications and Related Issues”, International Journal of Applied and Advanced Scientific Research, Vol. 2, No. 2, pp. 273-277, 2017 with ISSN: 2456-3080.