IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Special Issue-14, May 2019 E-ISSN: 2347-2693

IoT Based Advanced Smart Cultivation System

Tanmoy Chowbey[1*], Mallikarjun M Kodabagi[2]

[1,2] Student, School of Computing & IT, Reva University, Bengaluru,India

Corresponding Author: tanmoychowbey.tc4000@gmail.com

DOI: https://doi.org/10.26438/ijcse/v7si14.165170 | Available online at: www.ijcseonline.org

Abstract— Agriculture plays a vital role within the lifetime of associate degree economy. It's the backbone of our financial system. Agriculture not solely provides food and stuff however additionally employment opportunities to a really giant proportion of population. The manual assortment of information and human intervention within the field is labor intensive. Automation of information assortment at regular and frequent interval reduces labor demand and price. The aim of this work is introduce a system to gather field knowledge at regular and frequent interval and to scale back labor with the assistance of ESP 32.It is a IoT based system for effective assortment and method. The method is tested in the field considering various parameters. It works efficiently in all environmental condition and variation of parameters such as soil moisture, tempreture, humidity. This process is very economical and price effective crop yielding.

Keywords— IoT, Automation, ESP32, Process all knowledge, Information transfer, cost effective, reduce labor

I. INTRODUCTION

Water shortage is one amongst the main drawback within the world. Many various ways are incorporated for conservation of water. We'd like water in every and each field for each kinsfolk, animals, plants, etc. Agriculture is one such field wherever water is needed in high amount. Wastage of water may be a major drawback in agriculture. When far more than water is given to the fields variety of techniques are on the market to avoid wasting or to manage wastage of water from agriculture.

Ditch Irrigation: Ditch Irrigation is one amongst the recent methodology, wherever ditches are mammary gland out and seedlings are planted in horizontally aligned pattern. Water is formed to maneuver to totally different canals via siphon tubes.

Terraced Irrigation: During this method the land is withdraw multiple steps and supported by keeping walls whereas the plain areas are used for plantation and also the plan is that the water runs down every step watering every column. This crystal rectifier steep land to be used for multiple crops. This can be a awfully labour involvement technique of irrigation.

Drip Irrigation: The foremost water effective technique of irrigation is that the drip irrigation technique. During this technique, water is born close to the basis level of a plant during a slow steady motion. The loss of water through evaporation and runoff will be faded to a way high extent if the system is put in effectively.

Sprinkler System: This irrigation system is intended on overhead sprinklers fastened on permanent risers. The system is put in underground and also the sprinklers level up once water pressure will increase, that may be a celebrated irrigation system to be used on golf courses and parks.

Rotary Systems: This technique will be used once irrigating space is giant. During this technique sprinklers will reach the realm of up to one hundred feet. During this technique sprinklers move in circular direction covering larger areas.in this technique touch of water will irrigate giant space of a field.

In this paper we've got a soil detector to see the activity of the soil and provides constant updates to the golem application regarding a similar mechanical device algorithmic program. The wet detector provides the water content level within the soil and sends it to the ESP 32. It'll method this knowledge by examination it with the edge price. If it's but the predefined threshold price then begin the irrigation.

Connect the ESP 32 board with tempreture sensor, humidity sensor, soil moisture sensor, with relay and motor. Sensors check the value and send the data to ESP 32 board. We can monitor all the things through Blynk's app in our smart phone.

It allows the farmer to actually view and edit the settings of the system, and also to view the current status of the farm. Essentially, the existing product is only hardware based as opposed to this being an amalgamation of both hardware and

software, making it extremely user friendly. 'Intelligation' also facilitates remote access and management via a simple mobile application. While 'Intelligation' stores and retrieves data from a server on the cloud, making it interactive and dependable in the existing product uses memory card for storage making it highly inconvenient due to repetitive switch from hardware to computer for data retrieval and analysis.

II. RELATED WORK

Abdurrahman, et al [1] propose a efficient product with affordable sensors and straightforward electronic equipment to mechanically controls the flow of water. Higher and lower threshold wet values are pre-configured by the merchandise delivery specialists on the hardware. These values vary between totally different components of a farm, particularly during a water scarce region. But, the farmer, because the user has no real say within the operating of the system as re-configuration of those values is sort of complicated, and will need to be done by the merchandise skilled when the necessity arises.

Dixit and Bhosale [2] discuss a product that contains varied sensors for police investigation wet, temperature and wind that they believe would aid in higher irrigation of the crop. This setup as an entire is pricey because of its many sensors. Also, the info is sent to the user in kind of SMS or hold on into a memory card. These aren't user friendly for associate degree Indian farmer not tuned to SMS alerts. Also, a passive SMS based alert mechanism fails in essential things.

Balendonck, et al [3] place forth a FLOW-AID system that consists of a network of in-field irrigation controllers and soil sensors, connected via a wireless link to the farmer's laptop associate degreed uses a choice web that helps farmers to decide on an acceptable irrigation planning strategy. But, the planning ways associate degreed detector thresholds ar to be programmed into the irrigation controllers that ar outside the skill-set of an Indian farmer, with restricted acquirement.

Ingale and Kasat discuss the 'Microcontroller primarily based drip irrigation system' [4] that uses sensors to discover dynamical humidness levels in step with that farmers are ready to schedule the correct temporal order for water. The developed system has varied benefits like automation, user friendly activity and movability. However it needs a farmer to follow the irrigation timetable meticulously, with none complacence. It additionally desires a supervisor to be gift for the full day because it permits the chance of over or underneath irrigation, that in-turn might have an effect on the yield. They additionally use solely associate degree liquid crystal {display|LCD|digital display|alphanumeric display} display to gift the main points to the farmer, that is a rich mode, within the Indian state of affairs.

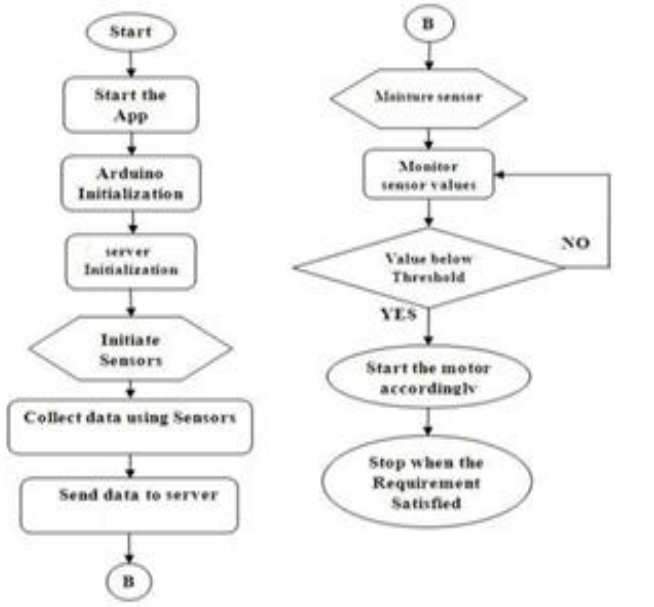


Fig. 1

III. METHODOLOGY

The sensible Irrigation System is Associate in Nursing IoT based mostly device, that is capable of automating the irrigation method by analyzing the wet of soil and also the climate condition (like raining). It offer water system at the correct time, in right amount and at the correct place in field, that plays an important role within the plant's growth. Water management remotely is additionally difficult task, particularly the management becomes harder throughout the shortage of water, which can otherwise harm the crop. By victimisation sensors like wet, rain, etc. water system for irrigation will be managed simply by analyzing the condition of soil and climate. Soil wet sensors well live the soil wet and supported that knowledge, field is get irrigated mechanically with less human interventions. The whole knowledge of wet is accessible to the farmers at distance on the mobile during a graphical kind.

In this project, we've got other a soil moisture sensor and DHT 11 to see the activity of the soil and provides constant updates to the golem application regarding a similar mechanical device algorithmic program. The wet detector provides the water content level within the soil and sends it to the ESP 32. It'll method this knowledge by examination it with the edge price. If it's but the predefined threshold price then begin the irrigation. One ultra sonic sound sensor is used to check the water level of tank in which submersible pump is dipped.

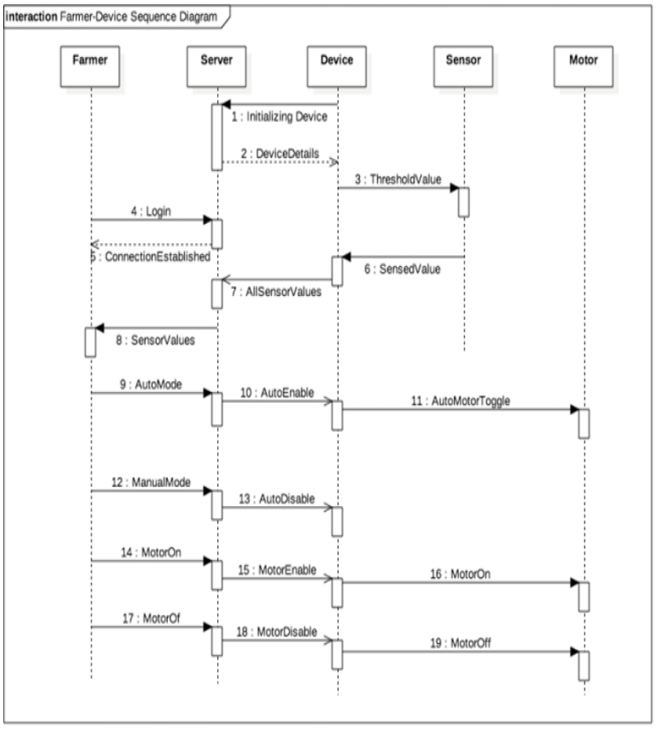


Fig. 2

Development of supporting infrastructure, advanced irrigation, raised production and attenuated food value, nutrition and food utilization, access to land and different resources, remote access to farm settings, and also the utilization of all out there resources square measure a number of the and points of technology in agriculture.

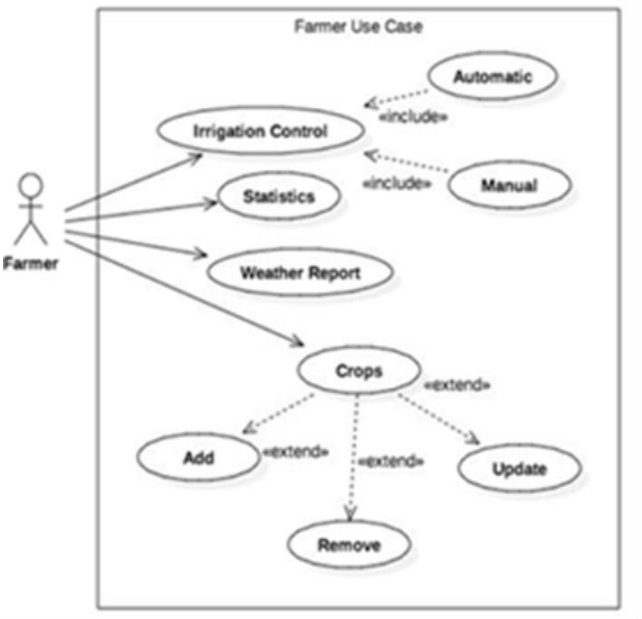


Fig. 3

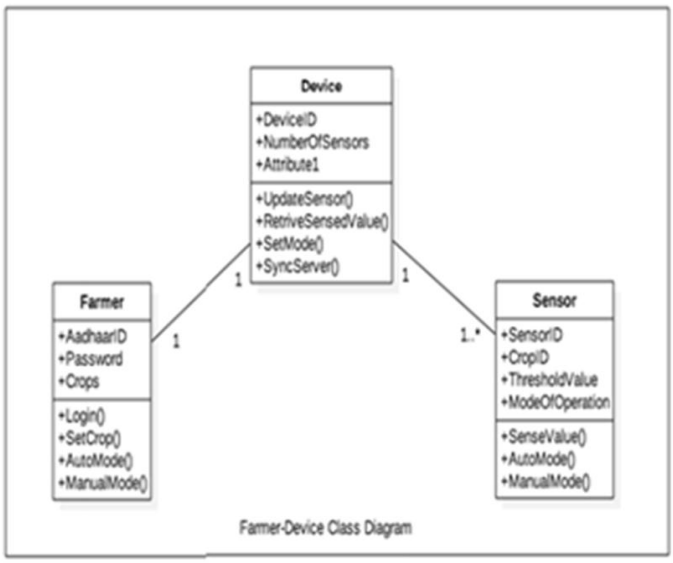


Fig. 4

We connect the ESP 32 board with tempreture sensor, humidity sensor, soil moisture sensor, with relay and motor. Sensors check the value and send the data to ESP 32 board. We can monitor all the things through Blynk's app in our smart phone.

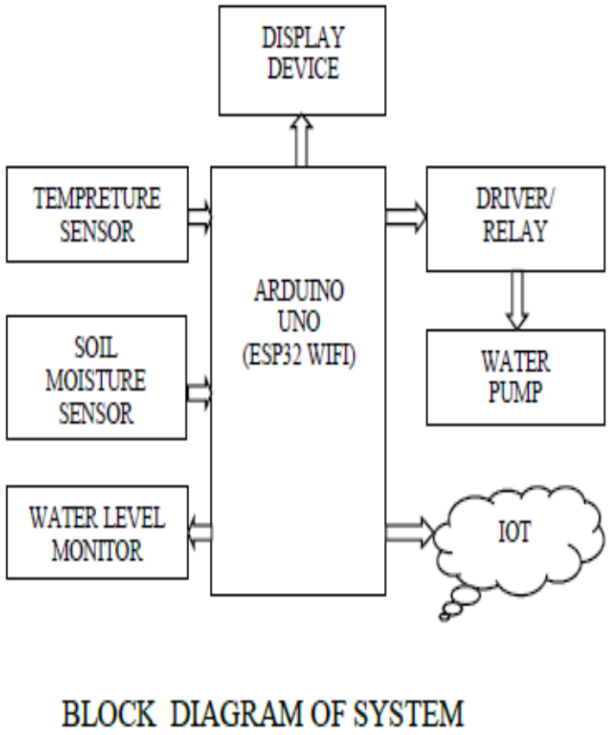
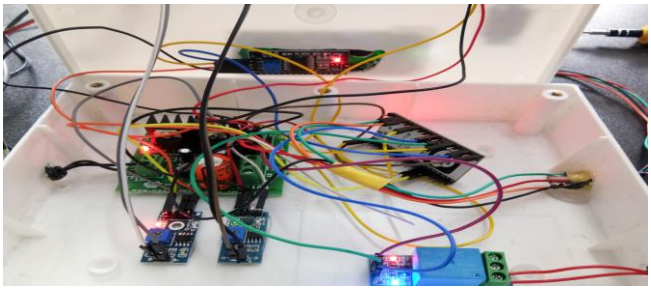


Fig. 5

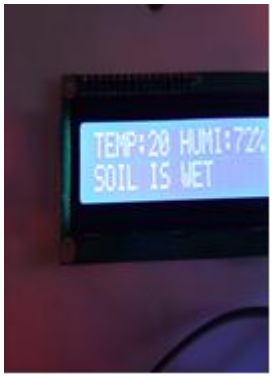
IV. RESULTS AND DISCUSSION

It allows the farmer to actually view and edit the settings of the system, and also to view the current status of the farm. Essentially, the existing product is only hardware based as opposed to this being an amalgamation of both hardware and software, making it extremely user friendly.'Intelligation' also facilitates remote access and management via a simple mobile application. 'Intelligation' focuses solely on the soil threshold making it cost-effective when compared to Dixit and Bhosale's proposed system [2], a purely hardware based system without any user interface. While 'Intelligation' stores and retrieves data from a server on the cloud, making it interactive and dependable in the existing product uses memory card for storage making it highly inconvenient due to repetitive switch from hardware to computer for data retrieval and analysis.

'Intelligation' has a server based database which can be accessed from any corner of the world (through internet) as opposed to the local database of the system. 'Intelligation' allows remote access allowing the farmer to be anywhere while controlling the irrigation. It does not need constant supervision. Also, it uses a computer website and a mobile application as output parameters instead of only an expensive LCD display as used in [4].



Connect the ESP 32 board with tempreture sensor, humidity sensor, soil moisture sensor, with relay and motor. Sensors check the value and send the data to ESP 32 board. We can monitor all the things through Blynk's app in our smart phone. Farmer first login to the server and a connection is established with server and farmer. From server device details sent to device and the device is initialized. Then device check the threshold values of sensors. Then sensed values are sent to the device .All sensor values sent to the farmer through server. If the threshold value is above 4000 then the soil is in dry state and from farmer an auto mode command sends to server and server auto enable device.Then auto motor toggle is on. When the threshold value is btween 2000 to 3000 then it is in moderate state. In this state farmer can starts the motor through the smart phone manually. When it is in moderate state a continuous notification will come. When the soil again reached to its desired moisture then automatically device switched off the motor. When the threshold value is less than 2000 then the soil is wet and motor will switched off.Here we use Arduino IDE and Blynk's App as software. Water level sensor is used which is a ultra sonic sound sensor. Ultrasonic sound sensor checks the water level of the tank in which submersible pump is dipped.



V. CONCLUSION AND FUTURE SCOPE

The sensible irrigation system enforced is price effective for optimizing water resources for agricultural production. The planned system may be wont to switch on/off the water mechanical device reckoning on the soil wet levels thereby creating the method easier to use. Through this project it may be ended that there may be extended development in irrigation with those of IOT and automation. Therefore this method may be a resolution to the issues moon-faced within the existing method of irrigation.

Technology is rising the potency of agriculture, in terms of production and economic process. This directly creates a sway on employment and labour opportunities, environmental property, granger financial gain, sensible security, and also the quality and value of food. the employment of sensible technologies within the field of farming has been growing and is especially causative towards improved varieties within the production of grains. Advances in farm management technology have additionally become in style, in terms of providing accuracy, simple management and security. Development of supporting infrastructure, advanced irrigation, raised production and attenuated food value, nutrition and food utilization, access to land and different resources, remote access to farm settings, and also the utilization of all out there resources square measure a number of the and points of technology in agriculture. Of these lead to the remodeled reformed economic process for mortal. it's a proverbial proven fact that the agricultural areas of our nation, wherever nearly all the farmers square measure gift, square measure subject to long power cuts and solely receive power throughout midnights. The farmers so have to be compelled to come to life throughout unreasonable times simply so as to modify on the water pumps.

REFERENCES

[1] Mehamed Ahmed Abdurrahman, Gebremedhn Mehari Gebru & Tsigabu Teame Bezabih, "Sensor Based Automatic Irrigation Management System",in International Journal of Computer and Information Technology (ISSN: 2279 – 0764), Volume 04 – Issue 03, May 2015

[2] Pranita A. Bhosale, Prof. V. V. Dixit, "Water Saving-Irrigation Automatic Agricultural Controller",in International Journal of Scientific and Technology Research, Volume 1, Issue 11, December 2012 (ISSN 2277-8616)

[3] J. Balendonck, A. Pardossi, H. Tuzel, Y. Tuzel, M. Rusan, F. Karam, "FLOW-AID – a Deficit Irrigation Management System using Soil Sensor Activated Control: Case Studies", in The Third International Symposium on Soil Water Measurement Using Capacitance, Impedance and TDT 2010, Murcia, Spain), State of the Art, Paper 1.8

[4] H.T.Ingale, N.N.Kasat, "Automated Irrigation System", International Journal of Engineering Research and Development", e-ISSN: 2278- 067X, p-ISSN : 2278-800X, www.ijerd.com, Volume 4, Issue 11 (November 2012), PP. 51-54

[5] Robert Jensen(2009), "Information, Efficiency and Welfare in Agricultural Markets", In the proceedings of the 27th International Association of Agricultural Economists Conference, Beijing, China, Aug 16 – 22, pp 1 – 29.

[6] Krishna Reddy and Ankaiah(2011), "A framework of information technology based agriculture information dissemination system to improve crop productivity", In the proceedings of 32 nd Convention of Indian Agricultural Universities Association, Dec 13-14, Jorhat, Assam, India, pp. 437-459

[7] Jadhav and Shinde(2011), "Web Based Information System for Agriculture", In International Journal of Innovative Technology and Creative Engineering, Vol 1, No.2, Feb 2011, pp 78-88

[8] Vidya Kumbhar(2009), "IT for sustainable agriculture development in India", In the proc. of the 3rd National Conf. India-Com, Feb 26–27, New Delhi,India, pp. 94 – 98.

[9] Subba Rao(2011),"Indian Agriculture–Past Laurels & Future Challenges", In the proceedings of 32 nd Convention of Indian Agricultural Universities Association, Dec 13-14, Jorhat, Assam, India,pp.58-77.

[10] Ovidiu Vermissan, Peter Friess(2013), "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", Rivers Publishers Series in Communications.

[11] D. Giusto, A. Iera, G. Morabito, L. Atzori (Editors - 2010), "The Internet of Things, Springer, 2010.

[12] C. Aggarwal, N. Ashish, and A. Sheth(2013), The Internet of Things: A Survey from The Data-Centric Perspective, Book Chapter in "Managing and Mining Sensor Data", Springer.

[13] 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

[14] JoaquínGutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara, "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module",IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, 0018-9456,2013

[15] Dr. V .Vidya Devi,G. Meena Kumari, "Real- Time Automation and Monitoring System for Modernized Agriculture" ,International Journal of Review and Research in Applied Sciences and Engineering (IJRRASE) Vol3 No.1. PP 7-12, 2013

[16] Y. Kim, R. Evans and W. Iversen, "Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network", IEEE Transactions on Instrumentation and Measurement, pp. 1379–1387, 2008.

[17] Q. Wang, A. Terzis and A. Szalay, "A Novel Soil Measuring Wireless Sensor Network", IEEE Transactions on Instrumentation and Measurement, pp. 412–415, 2010

[18] Yoo, S.; Kim, J.; Kim, T.; Ahn, S.; Sung, J.; Kim, D. A2S: Automated agriculture system based on WSN. In ISCE 2007. IEEEInternational Symposium on Consumer Ele ctronics, 2007, Irving,TX, USA, 2007

[19] Arampatzis, T.; Lygeros, J.; Manesis, S. A survey of applications of wireless sensors and Wireless Sensor Networks. In 2005 IEEE International Symposium on Intelligent Control & 13th Mediterranean Conference on Control and Automation. Limassol, Cyprus, 2005, 1-2, 719-724

[20] Orazio Mirabella and Michele Brischetto, 2011. "A Hybrid Wired/Wireless Networking Infrastructure for Greenhouse Management", IEEE transactions on instrumentation and measurement, vol. 60, no. 2, pp 398-407.

[21] N. Kotamaki and S. Thessler and J. Koskiaho and A. O. Hannukkala and H. Huitu and T. Huttula and J. Havento and M. Jarvenpaa(2009). "Wireless in-situ sensor network for agriculture and water monitoring on a river basin scale in Southern Finland: evaluation from a data users perspective". Sensors 4, 9: 2862-2883. doi:10.3390/s90402862 2009.

[22] Liu, H.; Meng, Z.; Cui, S. A wireless sensor network prototype for environmental monitoring in greenhouses. International Conference on Wireless Communications, Networking and Mobile Computing (WiCom 2007), Shangai, China; 21-25 September 2007.

[23] Baker, N. ZigBee and bluetooth - Strengths and weaknesses for industrial applications. Comput. Control. Eng. 2005, 16, 20-25.

[24] IEEE, Wireless medium access control (MAC) and physical layer (PHY) specifications for lowrate wireless personal area networks (LR-WPANs). In The Institute of Electrical and Electronics Engineers Inc.: New York, NY, USA, 2003

