Three in One Smart Agricultural Device Using Arduino

Sudhakara H M[1], Sharanamma R P[2], Vanashree[3] , Varshitha P J[4]

Senior Assistant Professor, Dept. of ECE, Alvas Institute of Engineering &Technology, Karnataka, India[1]

UG Student, Dept. of ECE, Alvas Institute of Engineering &Technology, Karnataka, India[2]

UG Student, Dept. of ECE, Alvas Institute of Engineering &Technology, Karnataka, India[3]

UG Student, Dept. of ECE, Alvas Institute of Engineering &Technology, Karnataka, India[4]

ABSTRACT: Agriculture is the backbone of Indian Economy. In today's world, as global population is growing at faster rate agriculture becomes more important to meet the needs of the human race. 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. According to statistics, agriculture uses 85% of available freshwater resources worldwide, and this percentage will continue to be dominant in water consumption because of population growth and increased food demand. The proposed system has been designed to overcome the unnecessary water flow into the agricultural lands, to control the unnecessary usage of fertilizer, to control pest and decaying of leaves using Internet of Things (IoT) and image processing. To combining all three setups such as Irrigation, Fertagation and pesticides spraying are controlled through a single device through a hand operated device.

KEYWORDS: Irrigation, Fertagation, Pesticides, IoT (Internet of Things), Image Processing, Embedded System, Image Processing.

I. INTRODUCTION

Agriculture is the foundation of Indian Economy. In this day and age, as worldwide populace is developing at quicker rate agribusiness turns out to be more essential to address the issues of mankind. It assumes indispensable job in the development of nation's economy. It additionally gives vast abundant work chances to the general population. Development in agricultural division is essential for the improvement of financial state of the nation. Shockingly, numerous ranchers still utilize the customary techniques for cultivating which results in low yielding of products and natural products, wherever mechanization had been actualized and people had been supplanted via programmed hardware, the yield has been progressed. Subsequently there is have to actualize current science and innovation in the agriculture part to build the yield. As indicated by measurements, farming uses 85% of accessible freshwater assets around the world, and this rate will keep on being predominant in water utilization on account of populace development and expanded sustenance request. Observing a natural variable isn't sufficient and finish answer for enhance the yield of the products. There are number of different variables that influence the profitability to awesome degree. These components incorporate assault of creepy crawlies and irritations which can be controlled by showering the product with appropriate bug spray and pesticides.

The fertagation framework was promoted with arrangement and dosification of compost and choosing manure infusion strategy too in the upkeep and administration of the framework. Manures infused through sprinkler water system frameworks in a procedure called fertagation are one sort of small scale water system framework. Irrigators wishing to infuse synthetics have an assortment of infusion gear from which to pick, including differential weight or clump tanks, bladder tanks, venturi gadgets, and positive uprooting pumps. The arrangement's fixation is reliant upon the infusion techniques. Compost consistency could be significantly impacted by infusion strategy and administration amid the infusion procedure. It was likewise announced that infusion rate had a more huge impact on fertagation

consistency than the impacts of injector compose. Among those techniques for infusion, venture injector and corresponding pump have great execution. The pesticide influences the sensory system of people and furthermore prompts issue in body. This model is utilized to splash the pesticide substance to the territories that can't without much of a stretch available by people. The Universal Sprayer framework is utilized to splash the fluid and also strong substance which are finished by the general spout. Multispectral camera is utilized to catch the remote detecting pictures which are utilized to recognize the green fields and in addition the edges of yield territory.The Internet of Things (IoT) is where in a cell phone can be utilized to screen the capacity of a gadget.

The Internet of Things (IoT) is worried about interconnecting imparting objects that are introduced at various areas that are perhaps inaccessible from one another. Internet of Things (IoT) is a sort of system innovation, which detects the data from various sensors and makes anything to join the Internet to trade data. The proposed framework has been intended to beat the superfluous water stream into the agricultural terrains, to control the pointless utilization of compost, to control vermin and rotting of leaves utilizing Internet of Things (IoT) and picture preparing.

II. MOTIVATION

There are such huge numbers of techniques and formulae can be found in the field of farming. Water system, Fertigation and dosification and so forth are the techniques. Since this techniques works with their very own recipes, joining all these and make one gadget is the primary undertaking in designing of the project. The pesticide influences the sensory system of people and furthermore prompts issue in body.

Motivation behind this project is to design a model is utilized to splash the pesticide substance to the territories that can't without much of a stretch available by people. The Universal Sprayer framework is utilized to splash the fluid and also strong substance which are finished by the general spout. On other hand Sprinklers additionally assumes a vital job, controlling precise speed of sprinkler is a noteworthy assignment. It very well may be controlled through IoT. Providing and controlling the amount of manure and Pesticides is likewise a noteworthy undertaking.

III. OBJECTIVES

- ❖ To grow minimal effort agro gadget for savvy farming utilizing IoT.
- ❖ Cost compelling breeze power can be the response for all our vitality needs.
- ❖ Using weight sensor we can distinguish the dampness of soil.
- ❖ To shower the manure in appropriate path without wastage of it and without human dealing with.
- ❖ Proper medications are given to plants and which need it.
- ❖ Image preparing will give an unmistakable thought regarding morphological conduct of takes off.
- ❖ Controlling this assignment utilizing hand worked gadget (phone) which will decreases time.

IV. LITERATURE SURVEY

Agriculture plays an important role in an Indian economy. It continues to be the stay of life for the majority of the Indian populations. Due to the improper maintenance, the crop becomes damaged which causes a huge loss for a farmer and hence the smart Agriculture concept was introduced. The factors include an attack of insects and pests and are to be controlled by sprinkling the proper insecticide and pesticides for the crop. Then the birds and other wild animals are stealing the crops at the harvesting stage. So, the farmers face several problems during the cultivation and harvesting stage. The solutions for all the problems are to take care of all factors and develop an integrated system which contains technologies as given below.

To design and implement a complete, reliable wireless irrigation system that has a great advantage in saving time, labor and cost. There are several attempts to use wireless the technology in building an efficient wireless irrigation system. But, these systems suffered from the lack of permanent power supply and the inability to deal with multiple sensing and related multiplexing techniques. The solar and automatic wireless technologies add a complete

hand free work for all users. The system fulfills all the farmer needs to get cheaper and better quality products. The system is based on wireless digital technology that can be used for automatic irrigation of different areas [1].

Arduino Based Automatic Irrigation System Using IoT that to save water and time. In this proposed system using various sensors like temperature, humidity, soil moisture sensors that sense the various parameters of the soil. In addition, based on soil moisture value land is automatically irrigated by ON/OFF of the motor. These sensed parameters and motor status was displayed on user android application [2].

The highlighting features of this project includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, etc. Secondly it includes smart irrigation with smart control and intelligent decision making based on accurate real time field data. Thirdly, smart warehouse management which includes temperature maintenance, humidity maintenance and theft detection in the warehouse. Controlling of all these operations will be through any remote smart device or computer connected to Internet and the operations will be performed by interfacing sensors [5].

Optimize the water consumption, and to provide a remote control and monitoring for the irrigation system. Tests were realized to prove the validity of our proposed system by using Contiki-Cooja simulator [6].

Bluetooth based system for watching cultivating parameter like temperature with the usage of microcontroller which works as a canny atmosphere station. The system gives ease remote course of action. This system is used for continuous watching agriculture recorded data. The drawback of the structure were its correspondence run limited and accessibility course of action must be required Bluetooth with android convenient for the long haul watching [16].
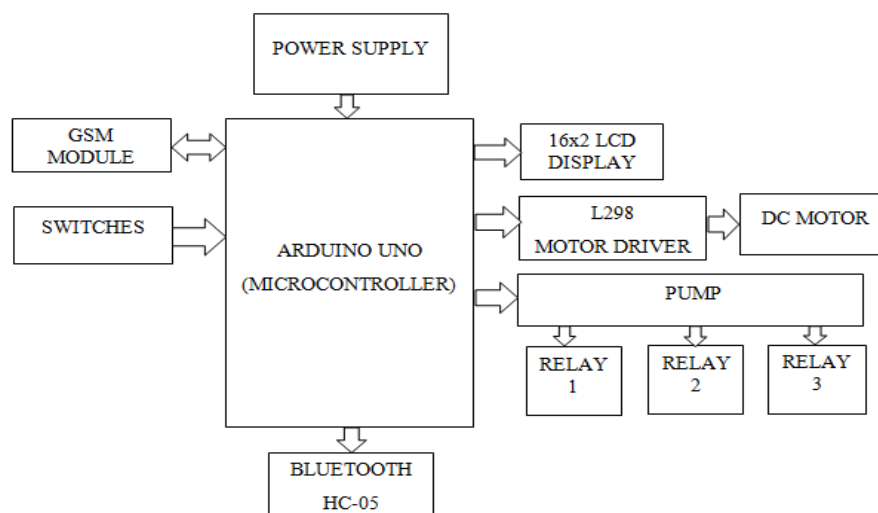
V. BLOCK DIAGRAM

Figure 1: Block diagram of the Proposed System

- The Power supply unit consists of various signals conditioning circuitry. It is used to step down various voltages which can be used to feed to various other component of the circuit.
- Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.
- The mechanism of a switch removes or restores the conducting path in a circuit when it is operated.
- Bluetooth is a wireless technology standard for exchanging data between fixed and mobile devices over short distances using short-wavelength UHF radio waves in the industrial, scientific and medical radio bands, from 2.400 to 2.485 GHz, and building personal area networks (PANs).

- A relay is an electrically operated device. It is frequently used in automatic control circuit. To put it simply, it is an automatic switch to controlling a high-current circuit with a low-current signal.
- A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings.
- A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD.

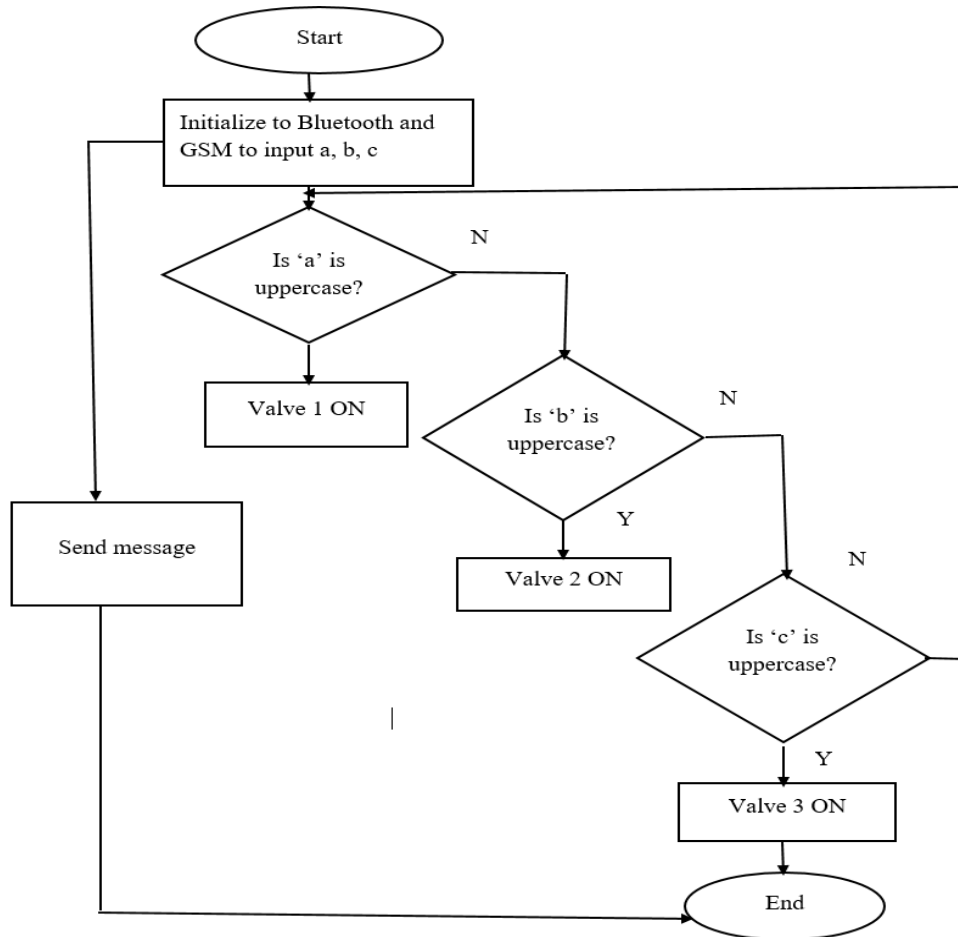## VI. FLOW CHART OF PROPOSED SYSTEM

Figure 2: Flow chart of the proposed system

The idea of proposed system is represented in flow chart as shown in figure 2. The system is mainly depends on the communication technologies i.e., Bluetooth and GSM. The code is design in such a way that, based on character status system will automatically turn ON/OFF. In the proposed project, Arduino remote Bluetooth Wi-Fi application is used. The flow chart explains that, if Bluetooth is available then it checks the character assigned for particular function. If characters are in upper case then Valves will open otherwise it remain closed. Three valves are used in this system that is spraying water, fertilizers and pesticides. If any one of the valve opened then remaining two valves are closed. The basic idea behind using GSM is that if the farmer is busy with other work then also he can look after the field in his absence some other can perform the task in the field. So, that alert message is given to farmer to perform his work properly.

VII. REAL TIME MONITORING

The figure 3 shows the field setup in a real time. The system is designed in such a way that it contains three tanks with valves which is connected with pump and the sprinkler. The task performed by the system is like that it is automatically controlled by the user through an android application which is installed by the user. Here, in this system Bluetooth and GSM are used. As Bluetooth is available the user can monitor the field by clicking into some option present in the app and user can control the system. When pump and valve1 is on other two valves are closed, like this other two operations can be done vice-versa. The sprinkler will run automatically with an application. On other hand GSM is used to notify the user by sending alert notification like on which day what to be spray to the field.
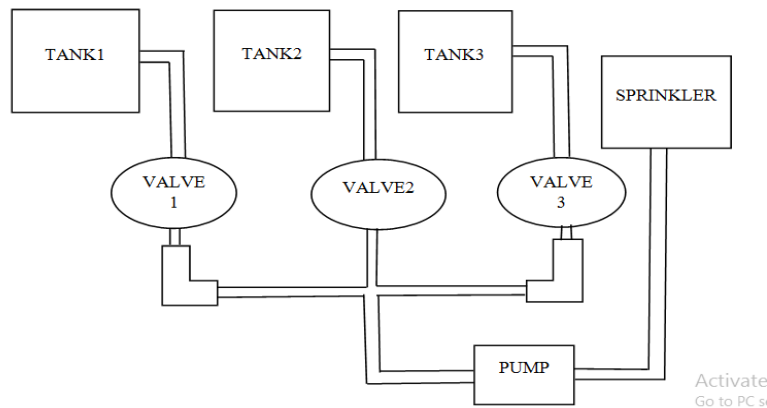

Figure 3: Real times monitoring of a system

VIII. EXPERIMENTAL RESULT

The main objective of the device is to perform a three task automatically without much human interaction with a field in automatic irrigation system. Here everything is controlled by cell phone i.e., On/Off of the pump, valves opening/closing and sprinkler rotation etc. The figures 4 show results of opening and closing of valves and sprinkler. The results will be displayed on LCD, using Bluetooth supported app which is discussed in chapter 5 using the app can control device. The working of this application is like uppercase character for ON and lowercase character for OFF of the switch. When switch1 is pressed pump and valve 1 is opened remaining two are closed similar for other two switches. On other hand rotation of the sprinkler is very important using the same application sprinkler rotation is also controlled.
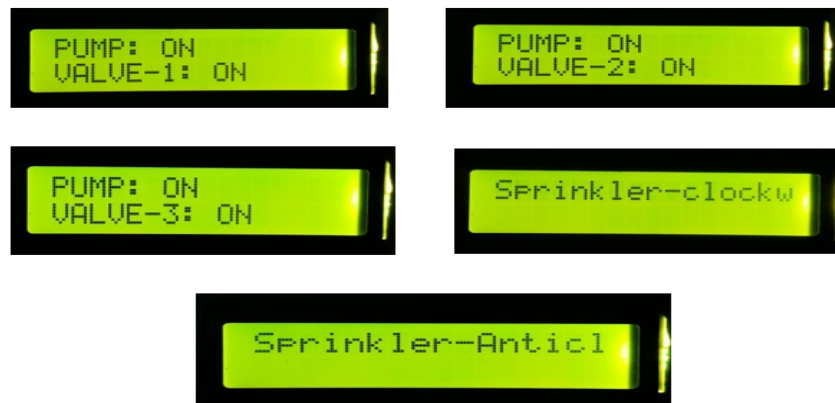

Figure 4: Showing results of each task in LCD

Figure 5: Sprinkler with DC motor

Figure 6 Message sent the user

Figure 5 Shows the DC motor attached with sprinkler to control the rotation and the app decide whether sprinkler run clockwise or anticlockwise by giving instructions.

This figure 6 shows the task performed in GSM. Here GSM is used to give the notification or alert message to user that what should be spray on next day or when it required, by pressing a switch manually alert message is send to user so that he should not forget to spray pesticides, water or fertilizer in his absence. This is the main concept behind using GSM module.

REFERENCES

[1].   Bishnu Deo Kumar, Prachi Srivastava, Reetika Agrawal, Vanya Tiwari, "Microcontroller based automatic plant irrigation system", International Research Journal of Engineering and Technology, Volume: 04 Issue: 05 | May -2017.
[2].   Pavan kumarNaik, Arun Kumbi, Vishwanath Hiregoudar, Chaitra N K , Pavitra H K , Sushma B S, Sushmita J H , Praveen Kuntanahal, "Arduino Based Automatic Irrigation System Using IoT " , International Journal of Scientific Research in Computer Science, Engineering and Information Technology © 2017 IJSRCSEIT Volume: 2 Issue : 3 | ISSN : 2456-3307.
[3].   M. K. Al Enazi, A. A. Alomar, K. I. Alinzi, A. M. Alsaeed, "Arduino Based Automatic Irrigation System Using IoT ",Advanced electrical and electronics engineering and scientific journal   Volume1-NO 1- January 2017.
[4].   Saurabh Suman, Shanu Kumar, Ratnajeet Sarkar, Gautam Ghosh, "Solar Powered Automatic Irrigation System on Sensing Moisture Content Using Arduino and GSM" IJARECE Volume: 6 Issue: 6 June 2017.
[5].   Nikesh Gondchawar, Prof. Dr. R. S. Kawitkar, "IoT based Smart Agriculture" ,International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 6, June 2016.
[6].   Benahmed Khelifa and Douli Amel, Bouzekri Amel, Chabane Mohamed, Benahmed Tarek," Smart Irrigation Using Internet of Things",The Fourth International Conference on Future Generation Communication Technologies (FGCT 2015).
[7].   Joaquin Gutierrez, 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.
[8].   Izzatdin Abdul Aziz, Mohd Hilmi Hasan, Mohd Jimmy Ismail, Mazlina Mehat, Nazleeni Samih Haron, -Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS) ‖, 2008.
[9].   Mr.K.Kirubakaran, Selvi Ramalingam, S.Meerabai, V. Preethi, "Surveillance and Steering of Agricultural Field using Zigbee", International Journal on Recent and Innovation Trends in Computing and Communication, vol 2, pp. 668 – 672, 2014.
[10].   T. L. Robinson and W. C. Stiles, "Fertigation effects on apple tree growth, cropping, and dry matter partitioning," New York Fruit Quarterly, Horticultural Society of N.Y, vol. 12, 2004.
[11].   G.S. Campbell, Introduction to Environmental Biophysics. Springer, New York. 1986.
[12].   S. Meivel M.E, Dr. R. Maguteeswaran Ph.D, N. Gandhiraj B.E,G. Srinivasan "Quadcopter UAV Based Fertilizer and Pesticide Spraying System",International Academic Research Journal of Engineering Sciences Vol. no.1 issue no 1, February 2016, Page No.8-12.
[13].   Saiful Farhan M. Samsuri, Robiah Ahmad, Mohamed Hussein Department of Applied Mechanics, Faculty of Mechanical Engineering UniversitiTeknologi Malaysia. "Development of Nutrient Solution Mixing Process on Time-based Drip Fertigation System", Fourth Asia International Conference on Mathematical/Analytical Modelling and Computer Simulation.2010.

[14]. Sanjay Kumawat, Mayur Bhamare, Apurva Nagare , Ashwini Kapadnis "Sensor Based Automatic Irrigation System and Soil pH Detection using Image Processing", International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 04 | Apr - 2017.

[15]. Pavankumar Naik, Arun Kumbi, Vishwanath Hiregoudar, Chaitra N K , Pavitra H K , Sushma B S, Sushmita J H , Praveen Kuntanahal "Arduino Based Automatic Irrigation System Using IoT", International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Volume 2, May-June-2017.

[16]. Prosanjeet.J.Sarkar, Satyanarayana Changala "A survey on IOT based Digital Agriculture Monitoring System and their impact on optimal Utilization of Resources", IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2778-2834,p-ISSN:2278-8735.Volume 11,Issue 1, Ver.11(Jan-Feb.2016),PP 01-04.

[17]. Lalit P. Saxena and Leisa J. Armstrong, "A survey of image processing techniques for agriculture", Proceedings of AFITA 2014 - Copyright ASICTA Inc.

[18]. Arpit Narechania, "AN ANDROID-ARDUINO SYSTEM TO ASSIST FARMERS IN AGRICULTURAL OPERATIONS", Proceedings of IRF International Conference, 17th May-2015, New Delhi, India, ISBN: 978-93-85465-15-4.

[19]. Gaurav Kumar, "Research paper on water irrigation by using wireless sensor network", International Journal of Scientific Research Engineering & Technology (IJSRET) ISSN: Ò278â•fi0882ÐEERET-2014 Conference Proceeding, 3-4 November, 2014.

[20]. Mrs.Latha, "Image Processing in Agriculture", international journal of innovative research in electrical, electronics, instrumentation and control engineering Vol. 2, Issue 6, June 2014.

[21]. Dr K. Prakash, Dr P. Saravanamoorthi, Mr R. Sathishkumar, Dr M. Parimala, "A Study of Image Processing in Agriculture", Int. J. Advanced Networking and Applications Volume: 09 Issue: 01 Pages: 3311-3315 (2017) ISSN: 0975-0290.

[22] Janwale Asaram Pandurng and Santosh S. Lomte, "Digital Image Processing Applications in Agriculture", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 3, March 2015.

[23] A Fakhri, A Nasir, M Nordin ,A Rahman and A Rasid Mamat, "A Study of Image Processing in Agriculture Application under High Performance Computing Environment", International Journal of Computer Science and Telecommunications [Volume 3, Issue 8, August 2012].

[24]. Dr M Suchithra, Asuwini T, Charumathi M C, Ritu N Lal-"Sensor Data validation", "International Journal of Pure and Applied Mathematics",Volume 119 No. 12 2018, 14327-14335.

[25]. Keerthana B1, Nivetha P1,Boomika M1, Mathivatahni M1, Niranjanaa2," Literature Review on IOT Based Smart Security and Monitoring Devices for Agriculture", International Journal on Future Revolution in Computer Science & Communication Engineering ISSN: 2454-4248 Volume: 4 Issue: 2 342 – 345.

[26]. R.Nandhini1, S.Poovizhi2, Priyanka Jose3, R.Ranjitha4, Dr.S.Anila5," ARDUINO BASED SMART IRRIGATION SYSTEM USING IOT",3rd National Conference on Intelligent Information and Computing Technologies, IICT '17.

[27]. S. Rajeswari, K. Suthendran, K. Rajakumar, A Smart Agricultural Model by Integrating   IoT, Mobile and Cloud-based Big Data Analytics", International Journal of Pure and Applied Mathematics Volume 118 No. 8 2018, 365-370 ISSN: 1311-8080 ISSN: 1314-3395.

[28]. Ms Shwetha P.S, "Survey on Automated Irrigation Systems Using Wireless Sensor Networks", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 04 | Apr-2016 p-ISSN: 2395-0072.

[29]. K. Abhinayalalitha, P. Ramadoss, "Arduino based Agricultural Monitoring System in Mobile Application", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 05 | May -2017 p-ISSN: 2395-0072.

[30]. Agraj Aher, Janhavi Kasar, Palasha Ahuja , Varsha Jadhav, Smart Agriculture using Clustering and IOT, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 03 | Mar-2018 p-ISSN: 2395-0072.