

Smart Irrigation System

Jyoti Shokanda

Assistant professor, School of Computer Science and Engineering,
Lovely Professional University, India.

Ekta Rani

Assistant professor, School of Computer Science and Engineering,
Lovely Professional University, India

Abstract: Nowadays, IoT(Internet of Things) is a paradigm which provide many new set of services of innovative technology and its applications are uncountable in brings the enhancement in our physical world. This paper purposes the use of technology to help in farming by monitoring the state of their plants by changing in production on various aspects of agriculture. Benefits of using this technology also considers low cost of overall procedure as well as in terms of reliability.

Keywords: *IoT, system irrigation, sensor network, Arduino, LDR sensor, farming.*

1. INTRODUCTION

In the modern era of technologies, all activities refers on computing will be beyond the territory of the conventional desktop. In the (IoT)Internet of Things pattern, all things which are everywhere will be on the network in one form or another. At present, many kinds of electronic device such as (RFID) Radio Frequency Identification and sensor technology grow to meet current task, in this information & communication system are unnoticeably deep seated in our environments. Side by side cloud computing provide us virtual environment to utilize the infrastructure in computing, which organized devices of monitoring, storage and tool to analyses with platforms virtualization for on demand client delivery.

The purpose of this study paper is on the basis of IoT technologies which is being applied to the agriculture sector. To construct such type of smart agricultural environment, IoT technology module development optimized for agriculture with the help of hardware components of sensor and routing protocols including application services[1]. Such agricultural monitoring intelligent system contributes monitoring and controlling services to maintain different kind plant developing precedence on optimal time. Beside this it can also improve the conventional method and outcomes of plantation sector. However, each hardware devices and programming involve to make this project achieved the target will be discussed such as Internet of Things (I.O.Ts), Arduino Uno with an Ethernet shield, Android application, and Micro-web server.

2. ARDUINO

Arduino is a family of open source single board microcontrollers based on the ATmega328. Arduino UNO R3 used to actualize this target. This is newest version among the Arduino UNO Board as it uses the ATmega8U2 instead of FTDI chip. The ATmega8U2 make the transfer rate faster. This family of boards was designed with the aim of making electronics far easier and accessible for the use in various types of disciplines and projects. The Arduino have digital

input/output pins 14 plus 6 analogue input, a USB connection, 16MHz crystal oscillator, an ICS P header and button to restart with a power jack. The Arduino has everything needed to support the microcontroller by connecting the USB cable as a power or powered through converters analog or digital converters by using battery to help it to start. The Arduino using wiring language programed which is same a C++ programming language on processing based IDE with modification and simplification of syntax.

3. RELATED WORK

The paper title is “Sensor based automated irrigation System with IOT” and was developed in the year around 2015 by “Karan kansara and Vishal Zaveri”. GSM based automated irrigation used to control using rain gun Irrigation System to Save water and time, discourage weeds, statistical data can be used to control disease and fungal growth[1]. “Integration and remote monitoring of wireless sensor networks in the development of smart villages” was developed in the year around 2017 by “Ray mulenga, Dr. Josephat Kalezhi”[2]. The technique used in this paper is integrating with embedded sensors, Radio frequency identifier along with GPRS. And the main objectives of this paper is to Increase the resilience of livelihoods, designing and building of irrigation systems for villages and to provide smart services and solutions particularly developing agro industries.

“A review of wireless sensors and networks applications in agriculture 2014 by “Aqeel-ur-rehman, Abuizafar”[3]. The techniques used in this paper is Dealing with Wireless sensor technology and working with different types of networks with the main objective of this paper is Development of low cost and rugged sensors and to complete frame works to develop systems from acquisition to modelling and the decision support. [4] paper title is “Smart irrigation care unit” of 2017 by “Atiffareed and Asadhussain” the techniques used in this paper is Mobile irrigation care unit equipped with wireless sensor network. The main objective of this project is Less water and electricity is consumed, help government to use the saved water and electricity for other purposes.

“An IOT based smart irrigation system using machine learning and open source technologies” techniques used in this project is IOT frame work along with the cloud centric storage. The main objectives of this project is to predict the irrigation requirements of the field and to predict the soil moisture in the field [5]. [6] “IOT based smart Agriculture” is using a Wireless sensor networks for Effective utilization of water resources and fertilizers and the detection of animals and prevention of trees. [7] Soil moisture sensor and Esp8266 nodeMCU-12E. The main objective of this project is to transform old traditional farming in to smart farming, to provide a secure, flexible, trust-able, economical system. Also IOT technology with cloud computing and LI-FI, WI-FI for Spraying fertilizers, Weeding, moisture sensing and intimating temperature variance[8]. Microcontroller and sensors, remote access, management and SMS fallback mechanism used to achieve AID the farmers and estate owners and to maintain optimum moisture level, increase farmer’s profit margins.[9] Thermal imaging and cloud of things based Automated irrigation project for farmers to meet crop water demands even in situations where there is inadequate rainfall[10]. Using sensors and automate irrigation system able to monitor the field from anywhere and reduces water wastage in the fields.[11]

In addition, this system also can control devices such switches of lights, power switches and sensors to detect temperature and other sensor that is included in order to use in the home control system. By comparing the author project and with smart agriculture monitoring system project, the monitoring system is been applied to the agriculture industry because it can be used to increase the size number

of product and also can maintain agriculture production quality. Based on the project, by using smart phone we can monitor on our fields by receiving a message of temperature and soil moisture automatically and also can control the devices implemented in the greenhouse.

4. PROPOSED WORK

Irrigation is basic step of human civilization form when man started agriculture. As the generation evolved, many other ways of irrigation developed for water supply to fields. But today's scenario is conservation of water very important. We want to implement systems by considering to preserve the nature because use of nature resources is going to degrade itday by day. Keep monitoring the parameters of the soil on the basis offlow of water and other constituents possible to control. With the help of information of through GSM like moisture and particular fields is possible with notifications on your electronic devices which calculates and compares with threshold values. Our electronics and monitor continuously that is going to reduce labor work and also cost on same.

Different components like

- a) Moisture Sensor
- b) LDR sensor
- c) Temperature & Humidity sensor to tackle different problems of a former.

Are used to complete this system to help in irrigation. To implement incorporation also done with wireless technology to make a link between microcontroller and former. Information received during emergency situations send to the worker working in fields with wireless technology to take suitable action to avoid loss inbad conditions.

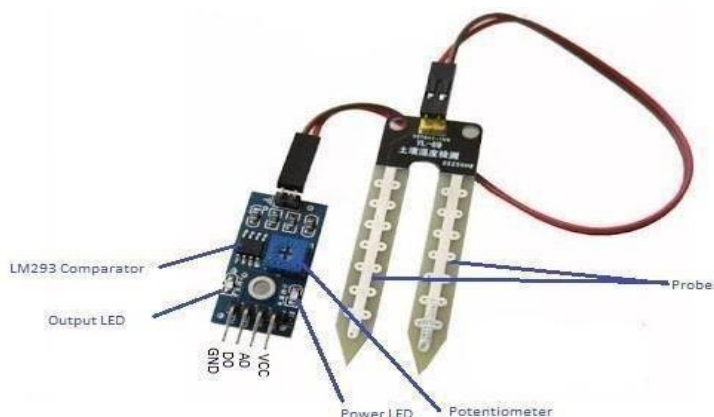


Figure 1: Moisture Sensor

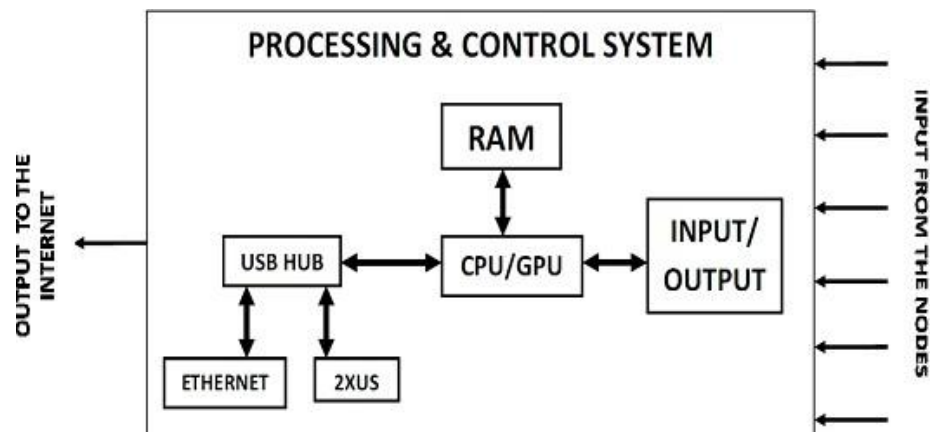


Figure 3: Basic Block Diagram



Figure 2: LDR sensor

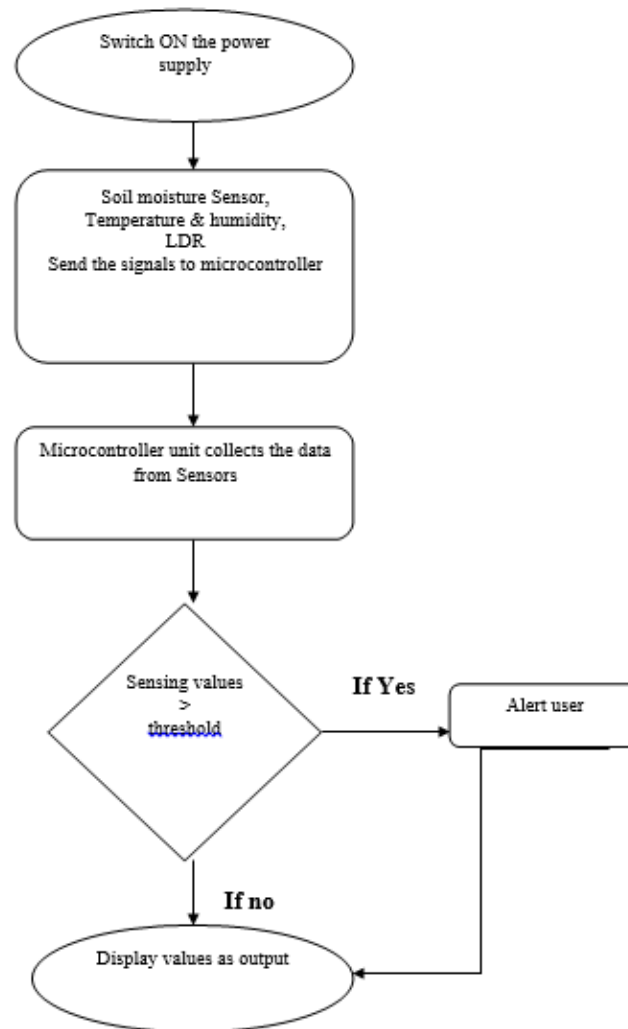


Figure 4 system development life cycle of system irrigation

5. RESULTS

In starting power is given to system shown in fig 2, all the sensors and lights in ON state. These are ready to work in the farm. By dumping the software into the kit can work properly. We can read the current state values of moisture, humidity & temperature and air quality anywhere from the world using the web application.



Figure 6 ON State

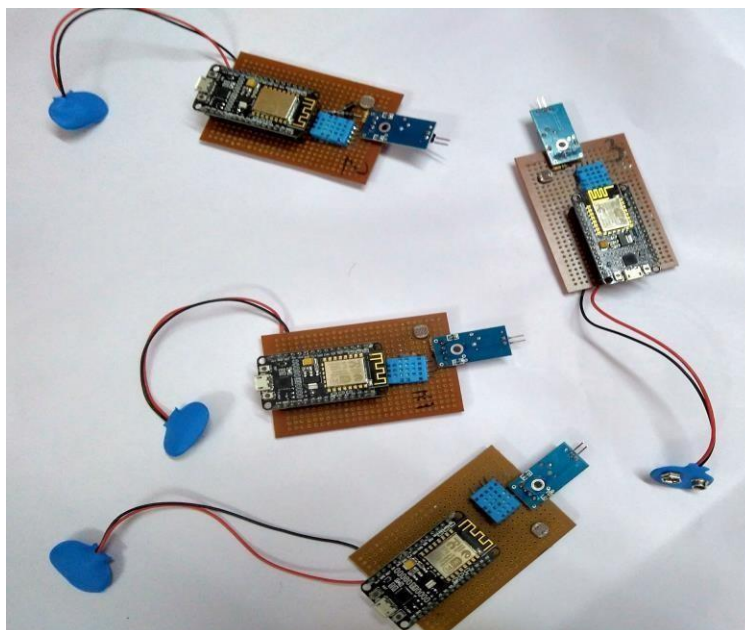


Figure 5OFF state

6. APPLICATIONS

- **Precision Farming:** This is also known by precision agriculture, this method used to make control and accurate rise in livestock of crops. This farm management approach, is basically use of IT technology such as sensors, robotics, control systems and autonomous vehicles, automated hardware and on various rate technology.
- **Agricultural Drones:** With time technology change, and today agriculture is one of the major industries to incorporate drones. To enhance practices of agriculture drones contributes large role. For irrigation, crop plantation, spraying and monitoring to analyses the soil and crop health assessment both ground based plus aerial drones are used for agriculture.
- **Livestock Monitoring:** Wireless IoT applications are utilize by owners of fields to get locations of fields, and to improve health of their cattle. Information gathered from these use of technologies help the farmers to make separate herd for sick animals to make sure that their other animals prevented from spreading diseases. Most of parameters are going to sense by IoT sensor technology so it reduces their labor charges.
- **Smart Greenhouses:** This is methodology to enhance the growth of crops, vegetables, fruits. Reduction in loss of production, use of less energy by identifying growth, less labor cost are benefits by using such systems instead of using conventional methods. A greenhouse system can be possible to design with use of IoT, this design monitors in addition to control the climate, eliminating the need of manual intervention.
- **Environmental Study:** Controlled Environment Agriculture (CEA) is as monitoring unit which is designed with the state-of-art specifications of hardware components and sensors of multiple aspects. This proposed system will be used in to practice in Hydroponics circumstances and has potential to other applications for green house agriculture and vertical farming.

7. CONCLUSION

Thus our works creates realization about the computerization in agricultural field. The manual interference can be reduced in irrigating the plants and the completed data about the agricultural field we can get on app on our phones too. This technology will helps the farmers in plantation to keep monitoring and recording to manage the plantation of fruit plants and other different plants to improve quality and increase productivity on various agriculture sites. Using this technology one of benefits which it is considering is less cost and stable system compared to the other system that used such as GSM module which is expensive. From comparison, many techniques for specific monitoring from inside and outside fields by using a Wireless Sensor Network (WSN), wireless CCTV, Android Smartphone based on wireless network and these system possible to employ at office place, home, public, agriculture environment and other specific places.

8. FUTURE SCOPE

This work is optimal by enabling a Webscraper which predicts the need of water and weather environment for fields. First information gathered and from this data we can predict there is

possibility of rain in our area or region then we can take such steps to save our crops, less water is given to the plants before that particular time. In this system, a GSM component is added to make sure that farmer can control everything by getting data on smart phones. To estimate the amount of water, a meter is installed for irrigation to fields and also to calculate the cost for particular task. Flow of water should not be same thus we are using a solenoid valve to keep changing the flow of water of different kind of plants

9. REFERENCES

- [1] Kansara, K., Zaveri, V., Shah, S., Delwadkar, S., & Jani, K. (2015). Sensor based automated irrigation system with IOT: a technical review. *International Journal of Computer Science and Information Technologies*, 6(6), 5331-5333.
- [2] Mulenga, R., Kalezhi, J., & Musonda, S. K. (2017). Integration and Remote Monitoring of Wireless Sensor Networks in the Development of SMART Villages. *Zambia ICT Journal*, 1(1), 30-34.
- [3] Abbasi, A. Z., Islam, N., & Shaikh, Z. A. (2014). A review of wireless sensors and networks' applications in agriculture. *Computer Standards & Interfaces*, 36(2), 263-270.
- [4] Fareed, A., Ullah, M. G., Hussain, A., Zaidi, M., & Baig, M. (2017, November). Smart irrigation care unit. In *2017 First International Conference on Latest trends in Electrical Engineering and Computing Technologies (INTELLECT)* (pp. 1-5). IEEE.
- [5] Goap, A., Sharma, D., Shukla, A. K., & Krishna, C. R. (2018). An IoT based smart irrigation management system using Machine learning and open source technologies. *Computers and electronics in agriculture*, 155, 41-49.
- [6] Gondchawar, N., & Kawitkar, R. S. (2016). IoT based smart agriculture. *International Journal of advanced research in Computer and Communication Engineering*, 5(6), 838-842.
- [7] Kodali, R. K., & Sarjerao, B. S. (2017, July). A low cost smart irrigation system using MQTT protocol. In *2017 IEEE Region 10 Symposium (TENSYP)* (pp. 1-5). IEEE.
- [8] Mekala, M. S., & Viswanathan, P. (2017, February). A novel technology for smart agriculture based on IoT with cloud computing. In *2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC)* (pp. 75-82). IEEE.
- [9] Ahmed, S., Shekhawat, A. S., Kumar, S. G., Nair, M. K., & Kumar, B. P. (2016, July). Intelligence: an IoT based framework for smarter irrigation. In *National Conference on Product Design (NCPD)*.
- [10] Roopaei, M., Rad, P., & Choo, K. K. R. (2017). Cloud of things in smart agriculture: Intelligent irrigation monitoring by thermal imaging. *IEEE Cloud computing*, 4(1), 10-15.
- [11] Rajalakshmi, P., & Mahalakshmi, S. D. (2016, January). IOT based crop-field monitoring and irrigation automation. In *2016 10th International Conference on Intelligent Systems and Control (ISCO)* (pp. 1-6). IEEE.