AUTOMATIC IRRIGATION SYSTEM USING INTERNET OF THINGS – A REVIEW

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Abstract – The automatic irrigation system using nodemcu provides an intelligent monitoring platform framework and system also provides a facility for agriculture ecosystem based on Internet of Things (IOT). . Every plant has specific need for water beyond that, there is high possibility of fungus formation resulting in decreasing yield and most importantly wastage of important primary resource, water. It is unlikely that all the farmers will possess such sensitive informa mtion. In spite of modern farming techniques being much more effective, human interventions are still inevitable in most of the cases.

Keywords: IoT, Smart Agriculture, Humidity, Temperature, Soil Moisture, etc.

I: INTRODUCTION

Smart Agriculture developing model is a real time monitoring system It monitor the soil properties like temperature, humidity, soil moisture pH, etc. It is possible to control many operations of the field remotely from anywhere, anytime by Internet of Things (IoT). In order cope with this problem and attain sustainable growth of plant science and technology must be incorporated along with traditional agricultural practices. IoT is the best solution in this scenario. It has become very popular due to its capability for monitoring environmental parameters in real time. Modern advancements in technology have enabled the use of IoT at very low cost and ease. Internet of Things(IoT) consists of spatially distributed autonomous sensor unit to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through network to a main system. The recently developed networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer application, such as industrial process monitoring and control, machine health monitoring, and so on. High altitude regions like northern part of India where temperature reaching as low as -40^0 C do not allow plantation. There are three types of setup exist today:

1. Manual setup
   This type of set-up depends heavily on human intervention which starts from visual inspection of the plant growth, manual irrigation of plants to turning ON and OFF the temperature controllers, manual spraying of the fertilizers and pesticides. This method is less accurate and unreliable because manual reading are more prone to errors, is more time consuming and hence less accurate [1].
2. Partially automated setup
   This is like hybrid version of manual and automated setup which requires only supervision by person and most of irrigational part is automated [1].
3. Fully automated setup
   This is an advanced setup equipped with sophisticated technology which is able to monitor environmental changes and able to accommodate most of climatic changes occurring inside the greenhouse. It is based on controlled loop system which can sense any minute climatic changes and accordingly the control parameters are resettled. In spite of its usefulness it is still not completely automated and very expensive [1].

II. PREVIOUS AUTOMATED IRRIGATION SYSTMES

The automatic system was tested for 136 days and save 90% compared with traditional irrigation system. Three replicas of the automated system have been used successfully in other places for 18 months. Because of its energy autonomy and low cost, the system has the potential to be useful in water limited geographically isolated area [1].

In one of the studies the automatic system based on ARM and GSM technology was used for communication. In this system automatic irrigation technique irrigated using wireless sensor network. Photovoltaic cells are used to provide efficient power supply. In this implementation upon reaching of water at certain high level, an automatic motor turning off took place with provision of notification to the farmer through GSM. Author proposed a microcontroller based automatic irrigation system. This system uses 8051 microcontroller. The system used soil moisture, temperature, and humidity sensor with solar panel. When the moisture level of the soil changes the threshold value, a microcontroller worked for controlling pump for watering. Temperature sensor was also used to checks the temperature of the surrounding area.Irrigation control system was build using Artificial Neural Network Controller in one of research work. They proposed system in which compared with ON/OFF controller of waterpump using in irrigation. On the other hand ANN based approach has resulted in better and more efficient contrl system. A prior knowledge of system is not needed and have inherent ability to adapt to the changing conditions unlike conventional methods. ANN based systems can save lot of resources like energy and water and can provide optimized results to all type of agriculture areas.Some authors used Microcontroller and soil moisture sensor and temperature sensor based irrigation system. This system uses a model to modernize the agriculture industries at a large scale with optimum investment. An irrigation model is proposed using different circuits[2].

In this paper, soil moisture content has been detected using acoustic based technique was developed. The main propose of this technique is development for measure soil moisture in real time method. The technique based on relationship between two quantities i.e. speed of sound and the degree of saturation with water in soils. This experiment found that the speed of sound decreases with the moisture content following, depending on the kind of soil[5].

This paper design a model of automatic irrigation system which is based on microcontroller and solar power was used only for source of power supply. Various sensor are placed in paddy field. Sensors sense water level continuously and give the information to farmer through cellular phone. Farmer controls the motor using cellular phone without going in paddy field. If the water level reaches at danger level, automatically motor will be off without conformation of farmer[6].

GPRS technique has some disadvantage viz speed, distance factor, reliability, so GPRS is not used in our project. Zigbee also have disadvantage i.e. low transmission rate. It is only use for smaller distance. Maximum papers have problem in networking and also some security issues[7].

An automatic irrigation system used for irrigate sage crop field for 136 days and save 90% water as compare to traditional irrigation system using wireless network and GPRS system . The Brutsaert's model used for measure the moisture of agricultural soils by an accurate, on site, real-time method and also derived the speed-moisture curves, the conditions for the actual validity of the curves, and the suitable sound frequency for performing the measurement, for a wide range of agricultural soils in different physical conditions [3].

For automatic irrigation systems irrigation system uses cellular phone and power source uses solar power [4]. Arm device can also be used for monitoring the irrigation system in real time and GPRS system can also be used [8]. Automatic irrigation system can be controlled using Zigbee and internet thing as discussed in this paper[9]. GPRS technique has some disadvantage viz speed, distance factor, reliability and Zigbee too also have disadvantages i.e. low transmission rate. It is only use for smaller distance. Maximum papers have problem in networking and also some security issues [10].

III: ENHANCEMENT TO AGRICULTURE PROCESS

Precision agriculture is in addition known as sensible farming, it's website-specific crop management (SSCM) perhaps affirming management construct supported perceptive, activity and responding to repose and intrafield variability in crops. the benefits of exactitude agriculture embrace hyperbolic gain and reduced environmental impact inside the first years, PA consisted within the main of map-based technologies victimization geo-statistical ways like GIS and satellite remote sensing and additionally the most application of PA was to manage chemical use device use wasn't widespread since sensors were either too expensive, too inaccurate or untouchable for the applications required. Surveys throughout the primary 2000's showed that few farmers used PA technologies and additionally the most barriers to the adoption of these ways were the dearth of technologies to influence the massive amounts of information, the dearth of scientific validation, high costs and no coaching job or technology transfer This has changed with the event and testing of paradigm PA systems, the quick development of IoT and huge information, and additionally the decreased worth of sensors.

IoT solutions in agriculture presently group A cycle of i) observance through sensors , ii) analysis and springing up with, and iii) sensible management, all connected by a wireless network connected to a cloud service. The information analytics and machine learning could also be applied to the data to help produce acquainted choices. This paper will take into consideration past feasibility studies in irrigation.

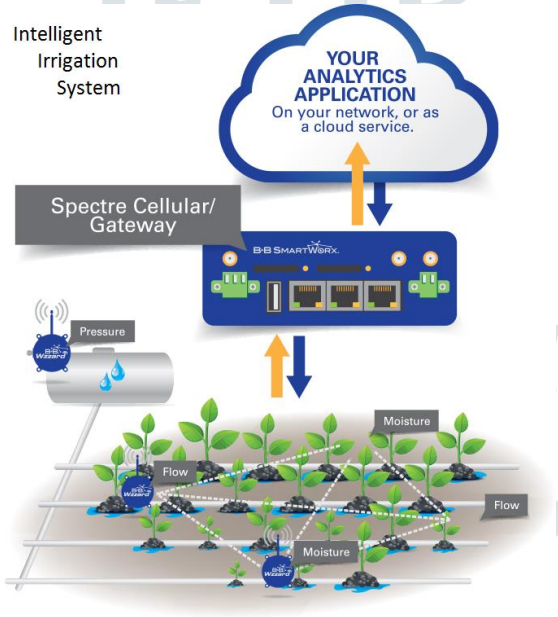

Fig.1 IOT Based Agriculture System

IV: CONCLUSION

The system was useful in monitoring the environmental conditions for any kind of plants thus providing the farmer necessary information to take precautionary measures and prevent formation of diseases that reduces the yield. Transferring the data from sensing field to the destination field may have some obstacles in between so to have proper transmission, the given system is developed using the IoT protocol which was useful in transferring the data at an places with and without any kind of obstacles in between. Use of IoT also made the system robust and the flexible one. The sensors that were used in the developed system are easy to relocate anywhere in the field as per the requirement and are précised too. The system is nothing but a step in proper growth of plants and attempt to save water. In addition, different type of parameter using for monitoring in compost production can be easily implemented. The Internet controlled duplex communication system provides a powerful decision making device concept for adaptation to several cultivation scenarios. Furthermore, the Internet link allows the supervision through mobile telecommunication devices, such as a

smartphone. Besides the monetary savings in water use, the importance of the preservation of this natural resource justify the use of this kind of irrigation systems.

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