



# **An Intelligent and Automated Drip Irrigation System Using Sensors Network Control System**

Prashant S. Patil<sup>1</sup>, Shubham R. Alai<sup>2</sup>, Ashish C. Malpure<sup>3</sup>, Prashant L. Patil<sup>4</sup>

Graduate Student, Department of Computer Engineering, Pimpri Chichwad College of Engineering, Pune, India<sup>1</sup>

Graduate Student, Department of Computer Engineering, Pimpri Chichwad College of Engineering, Pune, India<sup>2</sup>

Graduate Student, Department of Computer Engineering, Pimpri Chichwad College of Engineering, Pune, India<sup>3</sup>

Graduate Student, Department of Computer Engineering, Pimpri Chichwad College of Engineering, Pune, India<sup>4</sup>

**ABSTRACT:** India is an agricultural country, and hence a lot of water is required for farming. Water should be used in a proper way. We propose a microcontroller based system for automatic drip irrigation.. We make use of the various sensors like soil moisture sensor, water flow meter to keep a check on the amount of water used. By this project we can control the moisture content of the soil in the cultivating field. The water flow will be monitored and based on the data available, analysis and prediction will be done. This will help the user to use water wisely in future.

**KEYWORDS:** Drip Irrigation, Soil Moisture Sensor, Water Moisture Sensor, Automatic Irrigation.

## **I. INTRODUCTION**

India is an agricultural country where 60-70% economy depends on agriculture, the modernization the conventional agricultural practices for the better productivity is must. Day by day water is getting depleted due to unplanned use of water. And hence, the ground water level is decreasing. Lack of rains and scarcity of land water also results in decrement in quantity of water on earth.

In drip irrigation system the drips are placed near the surface of the ground where the water reaches to the root zone of the crop. The objective of the system is to a) Water resources b) Handles the system automatically c) Detects the level of water d) Based on the data available, analysis and prediction will be done e) Builds such system which enhances crop productivity.

### **1.1 Proposed Scheme**

In our proposed scheme, the sensors transmit the data to the server through microcontroller after the time interval of 1 hour. There are predefined values stored in the database for the particular crops. These values will be compared to the values from the sensors. If the values from the sensors are below the predefined values then the microcontroller will trigger the pump to water the plants. While crops are being watered, the values from the sensors will be monitored after the interval of 1 minute. The values will be monitored till the values are matched or above the threshold values in the database. If the values are matched or are above the threshold values in the database then the microcontroller will trigger the pump to stop watering the plants. The amount of water flow will be monitored during watering the fields and the reading will be stored in the database. The user will be notified during each slot of watering the plants.

### **1.2 Our Contribution**

Predefined values are stored for particular crops in the database so that the values receiving from the sensors will be compared. Accordingly the watering to the fields will be done.



# International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Issue 12, December 2014

When the values from the water flow meter are received at the server, the values are stored in the database and analysis is done. Based on the analysis prediction will be done. The analysis and prediction will help the user to use water wisely.

## II. LITERATURE SURVEY

### 2.1 The design of intelligent drip irrigation network control system

#### 2.1.1 Modular Design

Through modular design, the system builds hierarchical management structure to meet different application requirements. It can monitor the changes of soil humidity and feedback the sensor signals by wireless sensor network. From the modular design, system can be composed of various drip irrigation networks based on different application.

#### 2.1.2 Data Analysis System

According to different environment, a full range of data analysis system can be established so as to reasonably distribute agriculture resources.

### 2.2 Control of Irrigation Automatically By Using Wireless Sensor Network.

In present drip irrigation system water is provided to root zone of plants drop by drop which results in saving of huge amount of water. The objective of the system is to a) Saves water resources b) Handles the system manually and automatically c) Detects the level of water d) Builds such system which enhances crop productivity e) Learns selection methods of irrigation based on different parameter.

#### 2.2.1 Present irrigation system

Surface irrigation is also referred as flood irrigation which implies that the water distribution is uncontrolled and therefore it is inherently inefficient.

### 2.3 Automatic Irrigation Control by using wireless sensor networks

The purpose of this paper is to provide more facility in agriculture field by using Zigbee. The output of the sensors is recorded and generated by microcontroller. If the moisture content of soil is high then valve unit remains closed and if it is dry, then valve unit remained open. The indicator indicates whether the soil is dry or having moisture content. Microcontroller controls the operation of motor. Microcontroller sends this data to computer through Zigbee.

### 2.4 Design of embedded systems for the automation of drip irrigation

In this paper the design of a Microcontroller based drip irrigation mechanism is proposed, which is a real time feedback control system for monitoring and controlling all the activities of drip irrigation system. In most of the systems Zigbee technology is used.

Low power uses, allows longer life. Zigbee chip vendors typically sell integrated radios and microcontrollers with between 60 kb and 256 kb flash memory. Zigbee network layer natively supports both star and tree network and generic mesh network. Zigbee operates in industrial, scientific and medical and radio bands: 915 MHz in USA and Australia and 2.4 GHz in most jurisdictions worldwide. Zigbee technique is one of the new techniques in drip irrigation. This is a modernize technique which is used over a large agriculture land. Zigbee is one new technology that is used in agriculture sector.

But there are few drawbacks of the Zigbee technique. Zigbee is a short range communication module. Due to this problem there is less accuracy of data transfer. If we want to increase the communication range then the cost increases.

#### 2.4.1 System Features

The following are the functions the system should provide properly.

2.4.1.1 Collecting the proper data from the sensors.

2.4.1.2 Collecting the amount of water level in the well.

2.4.1.3 To keep a check on the amount of water flow.

2.4.1.4 Monitoring the system.

2.4.1.5 Analysis and prediction depending upon the data available.

# International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Issue 12, December 2014

## III. SYSTEM ARCHITECTURE

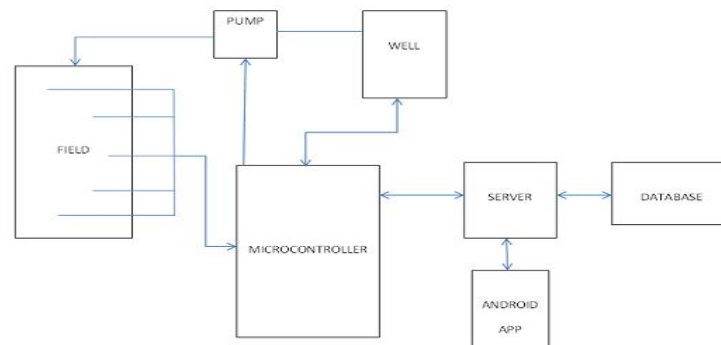


Fig.3.1 System Architecture

The readings from the sensors which are in analog form are sent to the microcontroller through ADC. The microcontroller will send the data to the server. The server will compare the data with the threshold values from the database. The database has the upper and lower threshold values per crop stored in the database. If the values from the sensor is less than or equal to the threshold values, then the microcontroller will trigger the pump to water the field. The moisture level in the soil will be monitored after a time interval of 5 minutes. If the values from the sensors are matched or are above the threshold values then the microcontroller will trigger the pump to stop watering the crops. And the moisture level in the soil will again be monitored and compared after a time interval of 1 hour.

Once the server request the microcontroller for watering the crops, the microcontroller will first check the water level in the well. If sufficient water is available in the well then the microcontroller will trigger the pump to water the crops else the microcontroller will return notification which will be sent to the user via server.

## IV. CONCLUSION

An automated drip irrigation system making efficient use of microcontroller and available resources is proposed. In future, other important soil features namely soil pH, soil electrical conductivity; temperature will also be incorporated in the system.

## REFERENCES

- [1] Yaohua Chan ,The Design of Intelligent Drip Irrigation Network Control System, College of Mechanical and Electric Engineering Guangzhou Guangdong, China 978-1-4244-7255-0/11 2011 IEEE.
- [2] Awati J.S., Patil V.S. , Automatic Irrigation Control by using wireless sensor networks, Journal of Exclusive Management Science , Volume 1, Issue 6 ,ISSN 2277 – 5684, 2012
- [3] K.Prathyusha, M. ChaitanyaSuman , Design Of Embedded Systems For The Automation Of Drip Irrigation, International Journal of Application or Innovation in Engineering and Management (IJAEM), Volume 1, Issue 2, ISSN 2319 – 4847, 2012.
- [4] Mr.Dnyaneshwar Natha Wavhal, Prof.Manish Giri , Intelligent Drip Irrigation System, International Journal of Engineering Sciences and Research Technology, Scientific Journal Impact Factor: 3.449 (ISRA), ISSN: 2277-965, 2014.
- [5] Sanjukumar,R., V. Krishnaiah , Advance Technique for Soil Moisture Content Based Automatic Motor Pumping for Agriculture Land Purpose, International Journal of VLSI and Embedded Systems-IJVES, Volume 04, Article 09149, ISSN: 2249 – 6556, 2013.
- [6] N.Priyanka, Aravind , Modern Indian Agricultural System Using GSM [IJESAT] , International Journal Of Engineering Science and Advanced Technology, ISSN: 2250–3676, Volume-2, Issue-5, 2012.
- [7] Pavithra D. S, M. S .Srinath, GSM based Automatic Irrigation Control System for Efficient Use of Resources and Crop Planning by Using an Android Mobile, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), Volume 11, Issue 4 Ver. I, e-ISSN: 2278-1684, p-ISSN: 2320-334X, 2014.
- [8] Shiraz Pasha B.R., Dr. B Yogesha, Microcontroller Based Automated Irrigation System ,The International Journal Of Engineering And Science (IJES), Volume 3, Issue 7,ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805, 2014.
- [9] D.KotaiahSwamy, G.Rajesh, M.Jaya Krishna Pooja, A.RamaKrishna, Microcontroller Based Drip Irrigation System, International Journal of Emerging Science and Engineering (IJESE), Volume-1, Issue-6, ISSN: 2319–6378, April 2013.