



## REVIEW ARTICLE

Received on: 03-03-2014  
Accepted on: 15-03-2015  
Published on: 20-03-2015

**Deepak Dharrao, Laxman Kolape, Sanjeet Pawar, Aniket Patange**

Indira College of Engineering,  
Pune

[deepakdharrao@gmail.com](mailto:deepakdharrao@gmail.com)  
[kolape.laxman@gmail.com](mailto:kolape.laxman@gmail.com)  
[sanjeet.pawar13@yahoo.co.in](mailto:sanjeet.pawar13@yahoo.co.in)  
[patange.aniket@gmail.com](mailto:patange.aniket@gmail.com)



QR Code for Mobile  
users

Conflict of Interest: None Declared

### Automated Irrigation System using WSN

Deepak Dharrao, Laxman Kolape, Sanjeet Pawar, Aniket Patange  
Indira College of Engineering Pune.

#### ABSTRACT

The greenhouse based modern agriculture industries and technologies are the recent requirement in every part of agriculture in India. In this technology, the humidity and temperature of plants are precisely controlled using the respective sensors. Due to the variable atmospheric circumstances these conditions sometimes may vary from place to place in large farmland, which makes very difficult to maintain the uniformity at all the places in the farmland manually. It is observed that for the first time a phone-control the Irrigation system, which could give the facilities of maintaining uniform environmental conditions are proposed. Mobile phones have almost become an integral part of human life serving multiple needs of humans. This application makes use of the microcontroller and GSM feature of mobile phone as a solution for irrigation control system. GSM (Global System for Mobile Communication) is used to inform the user about the exact field condition. The information is passed onto the user in the form of SMS.

**Keywords:** GSM module, mobile, automatic irrigation, microcontroller, Temperature sensor, soil moisture sensor.

#### Cite this article as:

Deepak Dharrao, Laxman Kolape, Sanjeet Pawar, Aniket Patange, Automated Irrigation System using WSN. Asian Journal of Engineering and Technology Innovation 03 (06); 2015; 18-21.

## INTRODUCTION

Irrigation is artificial method of supplying water to plants. It is also called micro irrigation. In past few years there is a rapid growth in this system. The user communicates with the centralized unit through SMS. The centralized unit communicates with the system through SMS which will be received by the GSM with the help of the SIM card. The GSM sends this data to Microcontroller which is also continuously receives the data from sensors in some form of codes. Thus in short whenever the system receives the activation command from the subscriber it checks all the field conditions and in case water is required to maintain the moisture in the field activation command to start the motor. The motor is controlled by a simple manipulation in the internal structure of the starter. The starter coil is indirectly activated by means of a transistorized relay circuit. When the motor is started, a constant monitoring on soil moisture and water level is done & once the soil moisture is reached to sufficient level the motor is automatically turned off & a message is send to subscriber that the motor is turned off. The water level indicator indicates three levels low, medium, high and also empty tank. Shen(2007) introduced a GSM-SMS remote measurement and control system for greenhouse based on PC-based database system connected with base station. Base station is developed by using a microcontroller, GSM module, sensors and actuators. In practical operation, the central station receives and sends messages through GSM module. Criterion value of parameters to be measured in every base station is set by central station, and then in base stations parameters including the air temperature, the humidity. Indu(2013) mainly focuses on reviews in the field of remote monitoring and control, the technology used and their potential advantages. The paper proposes an innovative GSM based remote automated embedded system for irrigation. The system sets the irrigation time depending on the temperature and humidity reading from sensors and type of crop and can automatically irrigate the field when unattended. Information is exchanged between far end and designed system via SMS on GSM network. The system informs users about many conditions like status of electricity, dry running motor, increased temperature, water content in soil (moisture) via SMS on GSM network.

## LITERATURE SURVEY

In paper[1] Author proposes Agricultural growth is considered necessary for development and for a country's transformation from a traditional to a modern economy and especially about India being well known for agricultural work. More than half of the workforce is related to the agriculture and its allied fields. Almost all the farmers are still depending on the traditional orthodox way of farming. It is being observe that the yield of crops, fruits have not been increasing. Even in some parts it is declining. Automation has been achieved; humans have been replaced by machines. Directly speaking, science and technology has proved its importance in those fields. Therefore there is need to grab the fruitfulness of science and technology in the field for higher yield and growth in agriculture. Most of the papers signifies the use of wireless sensors network which collects the data from different types of sensors and then send it to main server using wireless protocol. The collected data provides the information about different environmental factors which in terns helps to monitor the system. This paper provides the information related to previous work that had been done in the field of agriculture using the wireless sensor network over a period of past few years as well as the proposed system which is useful in monitoring as well as controlling the data which provides the flexibility. Smart sensors based monitoring system for agriculture have been used to increase the yield of plants by monitoring the environmental conditions (parameters) and thus providing the necessary information to the clients (farmers). The proposed system is mainly developed for the betterment of farmers. The use wireless sensor network over the wired one helps for deploying it in any type of environment for monitoring, making it flexible and robust. The use of FPGA element facilitates the system for re-configurability and re-programmability according to different environmental conditions.

In paper[2] Author propose Drip irrigation is artificial method of supplying water to the roots of the plant. It is also called micro irrigation. In past few years there is a rapid growth in this system. The user communicates with the centralized unit through SMS. The centralized unit communicates with the system through SMS which will be received by the GSM with the help of the SIM card. The GSM sends this data to ARM7 which is also continuously receives the data from sensors in some form of codes. After processing, this data is displayed on the LCD. Thus in short whenever the system receives the activation command from the subscriber it checks all the field conditions and gives a detailed feedback to the user and waits for another activation command to start the motor. The motor is controlled by a simple manipulation in the internal structure of the starter. The starter coil is indirectly activated by means of a transistorized relay circuit. When the motor is started, a constant monitoring on soil moisture and water level is done & once the soil moisture is reached to sufficient level the motor is automatically turned off & a message is send to subscriber that the motor is turned off. The water level indicator indicates three levels low, medium, high and also empty tank.

In Paper [3] author proposes As water supplies become scarce and polluted, there is a need to irrigate more efficiently in order to minimize water use and chemical leaching. Recent advances in soil water sensing make the commercial use of this technology possible to automate irrigation management for vegetable production. However, research indicates that different sensors types may not perform alike under all conditions. Reductions in water use range as high as 70% compared to farmer practices with no negative impact on crop yields. Due to the soil's natural variability, location and number of soil water sensors may be crucial and future work should include optimization of sensor placement.

In paper [4] author proposes gradually decreasing energy sources and increasing demand for energy in recent years, makes more efficient and positive use of current water resources together with global warming and drought. 75 % of the current fresh water consumption is agricultural irrigation in Turkey. Therefore, efficient water management plays an important role in irrigated agricultural cropping systems .Since the sources utilized for the purpose of producing electricity are limited and their prices gradually increase researches for new alternatives for irrigation systems become more important. Energy of pumps used for the agricultural irrigation is generally provided from electrical energy or fossil fuels. Since fossil fuels commence to annihilate besides its increasing of prices and hazards to environment alternative energy seeking efforts has become inevitable also in agricultural sector. Solar energy that is sensitive to environment, clean and requiring no maintenance is an alternative renewable energy source especially for countries like Turkey having a high amount of annual solar irradiation rate. When it is considered by means of requirement for irrigation the advantage of PV pumping systems is that water demand and increasing for sun shining are compatible

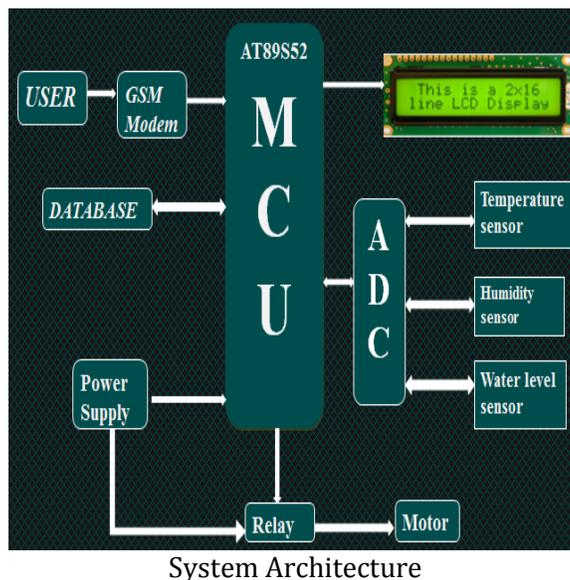
In paper [5] author proposes WIRELESS sensor network (WSN) is now used in broad area of applications such as industrial monitoring, healthcare application, home automation and traffic control. The implementation of wireless sensor network does not only concentrate on the applications mentioned. Farmers can take advantage of the advancement of technology. Intelligent farming is now implemented to monitor the status of the field environment. The parameters that are monitored in the greenhouse are temperature, relative humidity, light intensity and others that have effect on the quality of produce. One factor that affects the quality of crops is the content of water in the soil, also called soil moisture. It is a major component of the soil relative to plant growth. If the soil moisture is optimum for plant growth, plants can readily absorb water. Irrigation schedule is needed to meet the increasing demand of food. Soil moisture can be categorized based on the volumetric water content. This will determine the saturation level of the soil .

#### **SYSTEM DESIGN**

The Main Components of Project are as follows:

- Microcontroller
- Power Supply
- Database
- DC Motors
- Sensors

This project is developed based on EMBEDDED and GSM Technology. Initially user selects the crop by providing the crop name to the microcontroller through GSM modem. When a field is in the dry condition, the sensing logic senses the state of the field and guides it to the microcontroller. It in response makes the motor on. As the moisture content in soil required for different crops varies. To determine the moisture and the need for watering we maintain a database providing moisture for the respective crop selected by the user while using the system. The temperature of the environment is displayed on LCD display and also messaged to the user on mobile. Whenever the event of turning motor ON/OFF occurs as in case of less moisture in soil then necessary the notification is sent to the customer about the water provided in the field. Thus automated irrigation is done through our mobiles using GSM technology.



## CONCLUSION

The automated irrigation system implemented was found to be feasible and cost effective for optimizing water resources for agricultural production. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability. The automated irrigation system developed proves that the use of water can be diminished for a given amount of fresh biomass production. The use of solar power in this irrigation system is pertinent and significantly important for organic crops and other agricultural products that are geographically isolated, where the investment in electric power supply would be expensive. The irrigation system can be adjusted to a variety of specific crop needs and requires minimum maintenance. The modular configuration of the automated irrigation system allows it to be scaled up for larger greenhouses or open fields. In addition, other applications such as temperature 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 smart phone. 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.

## REFERENCES

1. Swarup S. Mathurkar, D. S. Chaudhari, International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-2, Issue-4, March, 2013.
2. Pavithra D. S 1, M. S .Srinath 2 "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) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 11, Issue 4 Ver. I (Jul- Aug. 2014), PP 49-55 [www.iosrjournals.org](http://www.iosrjournals.org).
3. Rafael Muñoz-Carpena and Michael D. Dukes2 "Automatic Irrigation Based on Soil Moisture for Vegetable Crops" Department of Agricultural and Biological Engineering, UF/IFAS Extension reviewed April 2014.
4. Mahir DURSUN and Semih OZDEN "Application of Solar Powered Automatic Water Pumping in Turkey" International Journal of Computer and Electrical Engineering, Vol.4, No.2, April 2012.
5. Wen-Yaw Chung1, Jocelyn F. Villaverde1,2, Janine Tan1 "Wireless Sensor Network Based Soil Moisture Monitoring System Design" Position Papers of the 2013 Federated Conference on Computer Science and Information Systems.