A Review Paper on Design and Development of Automatic Drip Irrigation System

[1]Surekha Shingade, [2]Manali Shinde, [3]Shital Patil, [4]Prashant Yadav

[1,2,3]BE Student, [4]Assistant Professor
Department of Electronics & Telecommunication Engineering
AITRC Vita, India

Abstract: The economy being highly based on agriculture demands innovative and reliable methods of irrigation. The shortcomings of manual methods of irrigation can be rectified using automated process. This system proposes an automatic irrigation system for the agricultural lands. The proposed design also has the features of which make the system wireless with the help of GSM. This project provides better services to the farmer. The water content is constantly judged and whenever moisture level of soil gets low, the system sends signal to motors asking them to turn ON. User control that system from anywhere with the help of mobile. GSM is used for wireless communication from anywhere. As well as soil reaches its maximum upper threshold value which is decided by user, the motors automatically stop after sending the message from mobile. Solenoid valves are mostly used to control the flow of water. The solenoid valve is controlled by electrical current which is run through a valve. To control the solenoid valve Arduino kit is used. Embedded C programming language is used for controlling action. Screen filters can be used to filter out organic and inorganic debris, sand, Silt and general soil particles. The pressure reducing valve reduces the pressure of the water that goes through it, and is used to obtain a regulated and constant value at its outlet. It protects the whole installation from problems due to excess pressure .The major advantage of project include avoidance from water wastage, growth of plant to their maximum potential, less chances of error due to less labor.

Keywords: GSM Module, Arduino, Sensors, Solenoid Valves, Screen Filter.

I. INTRODUCTION

The term automation is introduced used first D.S Harder in 1936. He defined it as, automation is handling of parts progressive production processes. Since the term has been applied to wide variety of automatic machinery and automatic systems and action for human efforts of intelligence

Water security is an essential element of domestic as well as agricultural application. Irrigation plays an important role in assuring quality crop production and contributes to economic development of a country .In some countries, agriculture is considered as one of the major source of economic progress. The income of many countries depends directly on agriculture advancement. 85% of worldwide available water resources is used in agriculture and this percentage will not decrease keeping in mind the rate of population growth and hence leading to high demand of crop productions.

Irrigation in agriculture is one of the main task. It is very much important to water the crops as per their need. Very less watering or too much watering can damages the crops. In present irrigation system, a farmer cannot check the moisture level of soil. A new idea for saving each drop of water by the way to test the soil condition before supplying water to the crop field. Hence sometimes it may happen that the watering is more than the need of the crop and sometimes water doesn't reach upto the roots of the plants. This will waste the water and efforts. If water doesn't reach upto the plants roots then it will directly affect the plant growth and profit. Traditional irrigation system requires manpower. Hence, it become necessary to do something so that the irrigation will become more convenient. Automatic Drip Irrigation System is a project which is developed to automate the traditional irrigation system. It is a simple system, using Arduino to automate the irrigation and watering of crops. The system becomes more flexible by using solenoid valve which is operated on electric principle.

II. BASIC METHODOLOGY

Block Diagram:

The general block diagram as follows

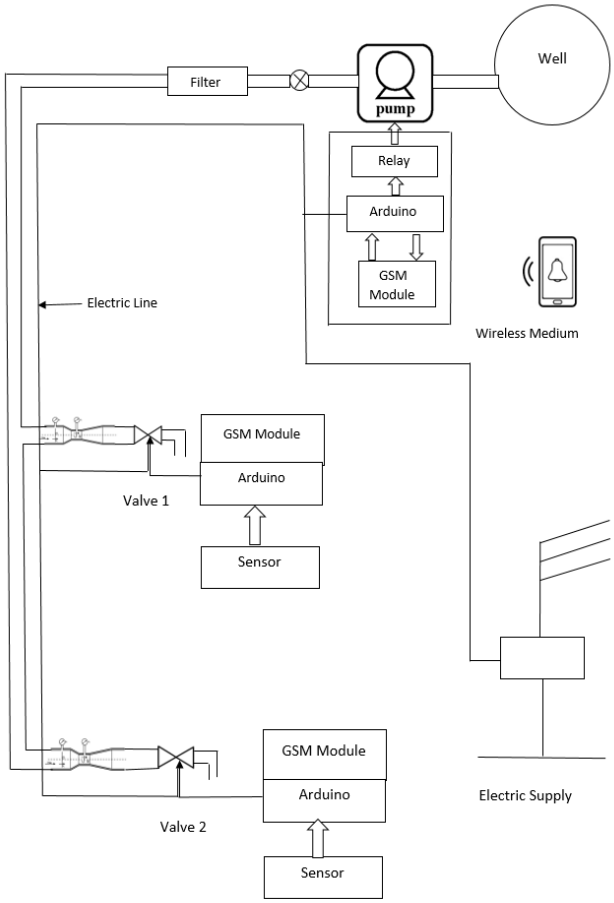

Fig: 1 Layout Diagram

This system consist of mainly Arduino, GSM module, Solenoid Valve, Humidity Sensor also Filter and Pump. In proposed system the human factor is reduced by Arduino which specially programmed to monitor any parameter changes in sensor. In our system, if we will press number 1 in our smartphone that time GSM send signal to Arduino for turning ON motor according to program burn into Arduino kit. As well as motor will turn ON that time water will flow through the pipeline and reach into the plot that we will referred as 1. Proposed system having two different plots of farm and each plot consist of different electronic kit which contain GSM module, Arduino and Sensor. In the plot 1 we will placed Humidity sensor for checking the moisture content of soil. As water sucking capacity of soil will get fulfill that time sensor send signal to Arduino for turning OFF valve and with the help of corresponding GSM module the signal send back to smartphone. In this system the soil moisture sensor having fixed threshold value which will programmed into corresponding Arduino, if actual value less than that of threshold value then motor ON as it is and sending update to user through corresponding GSM module and if actual value greater than that of fixed threshold value then also it will send message to user through GSM. As the water sucking capacity of plot 1 get fulfill we have to turn ON the valve 2 and at the same time we have to turn OFF valve 1 with the help of smartphone. Again sensor present in plot number 2 start the same operation as plot number 1.In this way user will be operate this system from anywhere by smartphone . The proposed system will use the screen filter to filter out organic and inorganic debris, sand, Silt and general soil particles. The pressure reducing valve will be reduces the pressure of the water that goes through pipeline and will use to obtain a regulated and constant value at its outlet. It protects the whole installation from problems due to excess pressure.

III. LITERATURE REVIEW

In 2001,Kyada,P.M. Proposed Study on Pressure-Discharge Relationship and Wetting Pattern Under Drip Irrigation System. It could be seen that the discharge from different drippers of all rating was increased with increase in operating pressure. The maximum co-effcient of manufacturing variations of 7.95% was obtained for 2 lph dripper rating while that was minimum of 0.86% for 20 lph dripper rating. The water application through 2 lph drippers for the 1,2,3,4 and 5 hours duration can yield wetted bulb having maximum radius of 21cm, 27cm, 36cm, 41cm, 52cm and 55cm respectively.

In 2005, C.M.Burt Proposed Selection of Irrigation Methods for Agriculture: Drip/ Micro Irrigation. Drip/Micro irrigation Refers to a Variety of Irrigation methods in which water is delivered to directly to small areas through emitters. The emission devices are spaced closely enough so that the capillary action of soil provides water to each plants root zone. Chemigation is generally required to avoid plugging due to bacterial growth and/or chemical precipitation in the laterals and emission devices. Due to use of drip irrigation system labour cost decreases but capital cost is high.

In 2009, Yandong Zhao, Jinfeng Guan, Junfu Zhang, Weilun Yin proposed study on Precision Water-saving Irrigation Automatic Control System by Plant Physiology. In this system BD-1 soil moisture sensor is used for sensing the moisture the soil. This paper describes system structure on to aspects of hardware and software design. For software designing they used multithreading technique with the help of controller. They used GSM for modernization in communication, also they control electromagnetic valve, realize the drip irrigation, sprinkler irrigation, micro-irrigation and low-pressure pipe irrigation method such as automation of irrigation mode. This system achieve purpose of highly efficient precision. Also this system gives real time detection of soil water content.
Seminar 2005.

In 2011, Tom Gill, Brian Wahlin, John Replogle Proposed Venturi Meters Constructed with Pipe Fitting: an Under- Appriciated Option for Measuring Agriculture water. Venturi Meters constructed of pipe fittings can be a practical means of measuring flow with reliable accuracy for a range applications. Actual head loss through a venture meter is commonly quite small. Pipe Venturi meters are widely recognized as a measurement technology in piped system offering a high degree of accuracy while inposing comparatively small head loss.

In 2014, T. Veeramanikandasamy, K. Rajendran, K.Sambath, D. Sangeetha proposed Remote Monitoring and Closed Loop Control System for Social Modernization in Agricultural System using GSM and Zigbee technology. In this system they used GSM for Modernization and wireless communication. With the help of GSM user can operate the system from anywhere. They used RS232 for interfacing GSM module and microcontroller. In this system zigbee technology is used in irrigation control centre for better wireless data transmission. The main advantages of this system, one can save man power, water and power consumtption is reduced by 20% and 30% when compare to existing method. The zigbee technology having limited range of wireless data transmission, so user can't use this system for long distance this is the disadvantage of this system.

In 2015, Prof. R.R.Jadhav, Prathamesh P. Pandit, Shubham D.Pal, Vineet H. Risbud Proposed Three Phase Motor Control Using GSM. The system ensures protection of motor against overloads, overheating and phase inbalances. It also provide automated restarting if normal conditions are re-estabilished. The system proves to be great boon to farmers whose pump sets are located far away from their homes due to capability of remote control using cell phone and intimation about any abnormal conditions.

In 2015, Lala Bhaskar, Barkha Koli, Punit Kumar, Vivek Gaur Proposed Automatic Crop Irrigation System. The proposed design is an automatic system that aids the farmer irrigation process. In that proposed system farm automation includes humidity, temperature, water level of wells and uniform supply of water using water sprinkler and drip irrigation.In that system also keeps the farmer updated with all background activities through SIM900 module that sends to message registered number according to sensor output to turn ON/OFF water supply. LCD display is also notifying the farmer. This system have a low cost and easily affordable by the farmer of country. The disadvantage of this project it is only limited to farming that is at home.

In 2017, Ateeq Ur Rehman, Rao Muhammad Asif, Rizwan Tariq, Ahmed Javed proposed GSM Based Solar Automatic Irrigation System using Moisture, Temperature and Humidity Sensors. In that YL69 soil moisture sensor is used. It sense the water content of the soil. Soil moisture is a key variable in controlling the exchange of water and heat energy between the land surface and atmosphere through evaporation of plant transpiration. The main advantage of this system is that use of mini resources, the system can save lot of water and electricity hence system becomes economically favourable. User can easily known water sucking capacity of soil with the help of soil moisture sensor YL69. Cost is the main factor of any system so as solar is very costly, so it is not affordable to farmer, this is disadvantage of system.

In 2017, Kriti Taneja, Sanmeet Bhatia proposed Automatic Irrigation System using Arduino UNO. In this system soil moisture sensor is used to sense the water sucking capacity of soil or moisture level of soil. Also they used water level sensor. LCD is connected with Arduino and all the sensor to display the status of moisture content in the soil and water level in tank. The main advantages of this system, system helps in irrigation areas with low water level and leads to sustainability. This system is very volatile and low maintenance and could be adjusted according to various type of crops without much human efforts. Other than cost reduction this project helps to save vital element of life that is water. The disadvantage of this system, is that this project only limited to farming at home, user can't apply this project to bigger level of agriculture.

In 2017,Prateek Jain, Prakash Kumar, D.K. palwalia Proposed Irrigation Management System with Micro-controller Application. The proposed system is based on micro-controller based automation based automation for optimizing utilization of water resources and reducing labour cost in agriculture applications. System consist of Arduino platform and functional components like moisture sensor and motor load. A moisture sensor detects the humidity level of soil. Soil moisture and temperature predetermined range is set particularly for specific plants requirements, and according to that system is being operated.The system is not intimate the current status of field.

In 2017, R. Nandhini, Poovizhi, Priyanka Joshe, R. Ranjitha Proposed Arduino Based Smart Irrigation System Using IOT. The main objective of this smart irrigation system is to make it more innovative, user friendly, time saving and more efficient than the existing system. If the sensed value goes beyond the threshold values set in program, the pump will be connected to driver circuit which helps to switch the voltage. The farmer will be intimated about the current field condition through GSM module. By using

this system, the farmer can access the details about the condition of the field anywhere at any time. The system is not used for number of plots.

IV. Conclusion

The use of proposed method would allow us to save the excess water which may be wasted during manual methods. In proposed system the real time updated information is gathering from sensors node about the crop field which is transmitted wirelessly through GSM. With the help of solenoid valve and corresponding Arduino system becomes affordable to farmers. The proposed system can save lot of water, human efforts and electricity with the use of minimum resources, hence it will become economically favorable.

References

[1]Kriti Tanija , Sanmeet Bhatia ;"Automatic Irrigation System Using Arduino UNO"IEEE International Conference on Intelligent Computing and Control Systems ICICCS 2017.

[2]Ateeq Ur Rehman , Rao Mohammad Ashif , Rizwan Tariq and Ahmed Javed; "GSM Based Solar Automatic Irrigation System Using Moisture, Temperature and Humidity
Sensors". 2017 International Conference on Engineering Technology and Technopreneurship(ICE2T).

[3] Saurabha Suman, Shanu Kumar, Ratanjeet Sankar, Gautam Ghosh ; "Solar Powered Automatic Irrigation System on Sencing Moisture Content Using Arduino and GSM". 2017.

[4]R.Nandhini , S.Poovizhi , Priyanka Jose , R.Ranjitha , Dr.s.Anila ; "Arduino Based Smart Irrigation System Using IOT". 3rd National Conference Intelligent Information and Computing Technologies IICT 2017.

[5]T. Veeramanikandasamy , K Sambath , K Rajendran, D Sangeetha ; "Remote Monitoring and Closed Loop Control system for social Modernization in Agriculture System using GSM and Zigbee Technology". 2014 International Conference on Advances in Electrical Engineering(ICAEE).

[6]Tom Gill , Brian Wahlin , John Replogle ; "Venturi Meter Construction with Pipe Fitting: An Under-Appreciated Option for Measuring Agricultural Water".RECLAMATION Managing Water in the West 2011.

[7]Marcus N. Allhands; "Removing Solid with Automatic Self Cleaning Filters". The 15th Annual Produced Water seminar 2005.

[8]C.M.Burt , M.ASCE ;"Selection of Irrigation Methods for Agriculture : Drip Irrigation". Praposed in 1998.

[9]Kyada,P.M.,2Munjapara; "Study on Pressure-Discharge Relationship and Wetting Pattern Under Drip Irrigation System"2001.

[10]C.M.Burt; "Selection of Irrigation Methods for Agriculture:Drip/Micro Irrigation"2005.

[11]Tom Gill, Brian Wahlin, John Replogle; "Venturi Meter Construction with Pipe Fitting: An Under-Appreciated Option for Measuring Agricultural Water"2011.

[12]Prof.R.R.Jadhav, Prathmesh P Pandit, Shubham D. Pal, Vineet H.Risbud "Three Phase Motor Control Using GSM"2015.

[13]Prateek Jain, Prakash Kumar, D.K.Palwalia "Irrigation Management Syatem with Microcontroller Application"2017.

[14]R.Nandhini, S.Poovizhi, Priyansh Jose, R.Ranjitha, Dr.S.Anila"2017.

.

.