Automatic Irrigation Control System Using GSM Module and Solar Panel

Dipanshu Soni[1], Anand Thakre[2], Dakshata Nagar[3], Ashish Shakya[4]

[1,2,3,4]*Student, Department of Electrical Engineering, Madhav Institute of Technology and Science, Gwalior, Madhya Pradesh, Indian*

---***---

Abstract- *In the past couple of years, there is rapid growth in the field of agriculture technology. The exercise of the proper method of irrigation by the automatic irrigation control system is very reasonable and proficient. This method is developed to reduce human intrusion and still ensure proper irrigation. Due to the variable atmospheric circumstances, these conditions sometimes may vary from place to place in a large farmhouse and land, which makes it very difficult to maintain the uniformity at all the places manually. It is observed that the automatic Irrigation control system, can give the facilities of maintaining uniform environmental conditions are proposed. GSM module and Solar panel with solar tracker embedded system for irrigation purposes provide an increment in saving energy consumption, time and water, money. In this Automatic irrigation control system GSM module, Solar tracker, Solar panel, Soil moisture sensor are used for providing complete automation. The mobile phone becomes an essential part of people nowadays as it serves in many ways. GSM (Global System for Mobile Communication) is used to send information regarding exact field conditions to the user. The information is get send in the form of SMS. This application makes use of Solar panels to run all the devices by stored solar energy. This system helps the farmer to improve the yields.*

Key Words:　GSM module, Soil moisture sensor, automatic irrigation, Solar panels

1. INTRODUCTION

In the fast-paced world, human beings require everything to be automated. Our lifestyle demands everything is remote controlled. Apart from a few things man has made his life automated. In the world of developing advanced everything, the life of human beings should be simpler. To make life simpler and fitting, we have made "AUTOMATIC IRRIGATION CONTROL SYSTEM USING GSM MODULE AND SOLAR PANEL". A model/project of controlling irrigation facilities to help many people. This model uses sensing arrangement technology with a microcontroller to make a smart switching device. The continuous increasing demand of food requires rapid improvement in food production technology. In our country India, where the economy is mainly based on agriculture and farmer's work and the climatic conditions are isotropic, still, we are not able to make full use of agricultural resources. The main reason is the lack of rain & scarcity of land reservoir water. Irrigation has always been

an ancient practice that has evolved through so many stages over the years. Our ancestral farmers in a bid to irrigate their farm sought for various methodologies. Manual irrigation using buckets and watering cans, flood irrigation, drip irrigation, sprinkler irrigation were and are still being used today. The existing system has several limitations; leaching off of soil nutrients, erosion thanks to flooding, loss of water from plant surfaces through evaporation, water wastage which may end in water scarcity in drought areas, and production of unhealthy crops. This problem can be rectified if we use a microcontroller-based automated irrigation control system in which the irrigation will take place only when there will be an acute requirement of water. Indian agriculture depends on the monsoons, which depends on nature and not a reliable source of water, so there's a requirement for an automatic irrigation system in the country that can provide water to the farms according to their moisture, temperature, and soil types & fertilizers. For big farmland with horticulture activity, the solution will be an automated system. Water contained within the soil is named soil moisture. And it is very important for plant growth. Water-soluble fertilizer is often also applied with none wastage by this drip irrigation system. The advantage of using wireless sensors is to regulate all related parameters for better irrigation management.

2. LITERATURE REVIEW

In this paper, the soil moisture sensor, temperature sensors placed in the root zone of the plant, and gateway unit handles the sensor information and transmit data to a web application. One algorithm was developed for measure threshold values of temperature sensor and soil moisture sensor that was programmed into a microcontroller to regulate water quantity. For power photovoltaic panel was used. Another facto like cellular-Internet interface used that allowed for data inspection and irrigation scheduling to be programmed through a web page.

The automatic system based on ARM and communication GSM technology was used. An irrigation system provides for adequate irrigation in a particular area which is real-time. Soil moisture sensor placed in the root zone in the paddy field and sense water level. GSM is an important part of this system. The system communicates using GSM. GSM operates through SMS and is a link between the ARM processor and

centralized unit. This system detects climate conditions and field conditions in real-time. This information sends to the user in the form of SMS and GSM modem is controlled with the help of a standard set of AT (Attention) commands. These commands are used to control the majority of the functions of the GSM model.

In the paper, an automatic irrigation control system using the GSM module and solar panel technique irrigated using wireless sensor network i.e. The idea was developed to improve the irrigation system and reduced the cost of irrigation water. Sensors are placed on farms and sense continuously and collect the information. This information stored at the center monitor and also passes to the data collection interface and then transmits to the wireless sensor node. Using this data system was control automatically using the web.

3. DESIGN METHODOLOGY

This project on "Automatic Irrigation System" is supposed to form an automatic irrigation mechanism that turns the pumping motor ON and OFF according to the need of water supply. In the domain of farming, the utilization of appropriate means of irrigation is significant. The continuous extraction of water from the world is reducing the water level thanks to which tons of lands are coming slowly within the zones of un-irrigated land. The advantage of employing this system is to decrease human interference and still make sure appropriate irrigation. The circuit comprises sensing arrangement parts built using op-amp IC LM358. Op-amp is configured here as a comparator. Two stiff copper wires are inserted within the soil to sense whether the soil is wet or dry. The Microcontroller is used to manage the whole system model by monitoring and supervising the sensing arrangement and when sensing arrangement senses the dry condition in the field then the microcontroller will send a command to relay driver IC the contacts of which are wont to turn on the motor and it'll cut the motor if the sensing arrangement senses the soil to be wet. The microcontroller does the above job as it receives the signal from the sensing arrangement through the output of the comparator, and these signals operate under the control of software of the system which is stored in ROM of the Microcontroller. The condition of the pump i.e., ON or OFF is displayed on a 16X2 LCD by the command processor of the microcontroller. The power supply consists of a step-down transformer, which steps down the voltage to 12V AC. This is converted to DC employing a Bridge rectifier. The ripples are removed to get the proper performance of the system by employing a capacitive filter and it's then regulated to +5V employing a transformer that is required for the operation of the microcontroller and other essential components present in the system. The figure below shows the block diagram of Microcontroller based irrigation system that proves to be a real-time feedback control system which monitors and controls all the activities of the irrigation system efficiently.

At present, the GSM module is employed for remote activities like Gate Control, Temperature Control, etc. GSM/GPRS module consists of a GSM/GPRS modem assembled with power supply circuit and communication interfaces (like RS-232, USB) for a computer. The MODEM is the soul of such modules. They generate, transmit, or decode data from a cellular network, for establishing communication between the cellular network and therefore the computer. These are manufactured for specific cellular networks (GSM/UMTS/CDMA) or specific cellular data standards (GSM/UMTS/GPRS/EDGE/HSDPA) or technology (GPS/SIM). They use serial communication to interface with the user and wish Hayes compatible AT (Attention) commands for communication with the pc (any microprocessor or microcontroller system).

Liquid/moisture sensor and precision centigrade temperature sensors

Liquid/moisture sensor and precision centigrade temperature sensors detect or sense the presence of any amount of liquid or moisture between two wire leads of the equipped leads and provide active High output as required by the system. The exposed wire which is in contact is porous; therefore it allows transmission of water vapors from the field into the sensor. These exposed areas are engineered very thinly. Hence the liquid/moisture sensor responds very rapidly to any changes in applied moisture or liquid, both when being dried (on process start-up) and when called into action if there's moisture present into a process. These are the kinds of sensors mainly used for-

•Interfacing with Microcontroller to detect liquid levels.

•Moisture detection for automatic watering of plants.

•Liquid level detection id done by putting multiple probes at each liquid level.

4. WORKING

The basic purpose of our project is by utilizing solar power to run the entire operation. The sunlight based board creates 12v of voltage which will be changed over to 5v by utilizing controller and therefore the directed voltage from the controller which isn't correct 5v it contains some air conditioning symphonies substance it is often separated by utilizing capacitor channel circuit. Solar power put away in the battery (1.58Ah move down) straightforwardly associated with pump, transfer, and solenoid valve. Those are worked at 12v and 200mA current. The power is supplied to start the sensors and circuit. Sensors provide their output to the microcontroller. Microcontroller checks for the following conditions whether the soil is in dry condition and water tank are full, if this condition is met then it sends the information to the user about the field condition through GSM module otherwise not, and Every one of the states of the land shown in LCD show. Then the user

provides the control signal to ON the motor by messaging the mobile number provided at the GSM module. As soon as the message is received, the microcontroller turns on the motor. The microcontroller is programmed to continuously evaluate the output data from the respective sensors. The motor will not be turned on in the condition when the water tank is empty and even though the soil is in dry condition. So, for this system farmer has to take care that the water tank is filled with water to perform automatic irrigation because running a motor without load will damage it. Thus, automatic and effective irrigation is often performed with the assistance of this project.

5. CONCLUSION

In this project, automatic controlling of water pump sets and SMS alert to the user has been discussed fruitfully. The overall idea is that user's cash in of the globally deployed GSM networks with its low SMS service cost to use mobile phones and straightforward SMS commands to manage their irrigation system. To demonstrate the functionality and performance of the control system using the GSM module and Solar panel, the prototype implemented and tested. Results showed that it'll be possible for users to use SMS to watch directly the conditions of their farmland, schedule the water needs for crops, automatic control of water, and set control operational conditions following the water needs of crops. This will help to minimize water and crop production costs. Further, it will help users to take advantage of the prevailing GSM networks to provide value-added services.

ACKNOWLEDGEMENT

REFERENCES

[1] 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 (Jul- Aug. 2014)

[2] Ms. Deweshvree Rane, Prof. P. R. Indurkar, Prof. D. M. Khatri "REVIEW PAPER BASED ON AUTOMATIC IRRIGATION SYSTEM BASED ON RF MODULE" IJAICT Volume 1, Issue 9, January 2015

[3] Anitha K "AUTOMATIC IRRIGATION SYSTEM" 2nd International Conference on "Innovation Trends in Science, Engineering and Management" Issue 05, November 2016