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## A REVIEW- EFFICIENT DESIGN OF WATER SAVING AUTOMATED IRRIGATION SYSTEM

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**Abstract:** This paper reviews modern irrigation technology in agriculture and also to provide proper irrigation in particular area. Soil moisture sensor temperature sensor and humidity sensor will continuously sense the information regarding the field. When the values of sensors are less than or greater than the threshold values it will take decision whether to start irrigation or not. We are using GSM technology for sending information to the farmer regarding status of field. We have used two modes for irrigation such as manual and automatic mode. In manual mode farmer will be sending message and to monitor and control the water pump .In automatic mode farmer will not be involved to control the operations of motor .It will be operating the water pump motor automatically. So, that he can monitor and control field from remote location. We are using arm processor for controlling whole project so that compatibility and speed of system increases.

**Keywords:** GSM Modem, Soil Moisture Sensor, Temperature Sensor, Humidity sensor, Wireless Sensor Network (WSN) ARM7, LPC2148 Microcontroller

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## INTRODUCTION

In India, where 60-70% economy depends on agriculture, there is a great need to modernize the conventional agricultural practices for the better productivity.

Irrigation is a scientific process of artificially supplying water to the land or soil. Traditionally in dry regions where rainfall is very less, water had to supplied to the fields either through canals or hand pumps, tube wells. But this method had severe problems such as increase in workload of farm labor and often it lead to problem such as over-irrigation or under-irrigation, and leaching of soil which affect the productivity. Hence there is a need to test the soil condition before supplying water to the fields. This mechanism would reduce  the workload of the farmer and help maintain proper soil conditions for improved and better crop production. Hence with the help of new advance  technology it was possible to design systems that eliminated the direct involvement of the farmer with respect to irrigation of their fields.

The most significant advantage of   modern drip irrigation systems is that water is supplied near the root zone of the plants drop by drop due to which a large quantity of water is saved. At the present, the farmers have been using irrigation technique through the manual control in which the farmers irrigate the land from time to time. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. This problem can be perfectly solved if automatic controller based drip irrigation system is used in which irrigation will take place only when there is intense   requirement of water. Irrigation system uses valves to turn ON or OFF automatically.

## METHODS OF IRRIGATION

There are various method for irrigating farm field for different types of crop field.

### A. Channel System

This is low cost widely used method. In this system pipes are connected with a water pump and when pump started water flow through pipe from lake, river, bore well to farming field. Here farmer is fully busy   irrigating the crop field with large number of workers.

### B. Sprinkler System

In *sprinkler* or overhead irrigation, water is piped to one or more central locations within the field and distributed by overhead high pressure sprinklers or guns. When pump started then water flow through main pipe and also flow through the perpendicular pipes. This system is very useful on the sandy soil. Less number of workers needed and waste of water is less.

### C. Drip System

In this system waterfall drop by drop at the position of the roots. Water flow through a main pipe and divided into sub pipes. Special prepared nozzles are attached to these sub pipes. In

this system waste of water is very less and No worker need for irrigating. This is most water efficient method of irrigation. It is the best technology for watering fruit plants, gardens and trees.

## D. Surface irrigation system

In *surface* (*furrow*, *flood*, or *level basin*) irrigation systems, water flow across the surface of agricultural field, in order to wet it. This is often seen in terraced rice fields. The field water efficiency of surface irrigation is typically lower than other forms of irrigation. It is also called flood irrigation.

## E. Smart Irrigation System

Above systems are generally operate by a user but a smart irrigation  is automatically control without presence of human It send information of farm field in form of messages to the farmer and change in operation of the farm field .It requires less numbers of workers and also saves water .

## II. LITERATURE SURVEY

So many authors have developed different irrigation system using various technology. Some of this are summarized follows.

This project is carried out using ARM7 and GSM. It shows the results of sensors in the agricultural field using zigbee. All these field conditions are checked and in case of extreme conditions the SMS is sent to farmer mobile number [1].The main goal of this paper is that to optimize use of water for agriculture crops. This system is composed of distributed wireless sensor network with soil moisture and temperature sensor in WSN. Gateway units are used to transfer data from sensor unit to base station, send command to actuator for irrigation control and mange data of sensor unit .This system is used for optimizing water resources for agriculture production,. The system had a distributed wireless network of soil-moisture and temperature sensors placed in the root zone of the plants. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to a web application. The system was powered by photovoltaic panels and had a duplex communication link based on a cellular-Internet interface that allowed for data inspection and irrigation scheduling to be programmed through a web page. Automated irrigation system uses only two parameters of soil like soil moisture and temperature other parameters humidity, light, air moisture, soil ph value not taken for decision making [4].In this paper project is carried out using 8051 microcontroller. Here Soil moisture sensor, temperature sensor and humidity sensors are used and according to the condition of the soil whether it is dry or wet and sends the information to microcontroller. Water level sensor senses the water level in the water source and sends the information to the microcontroller which then on and off motor. The status of motor is send to farmer using GSM. This project is used to find the exact field condition and it will give information to farmer by

101

sending sms.  [5].The paper Real-time automization of Agricultural Environment for Social Modernization of Indian Agricultural System carried out using an ARM7TDMI  microprocessor and  GSM . GSM is used to inform the user about exact field condition through a SMS on user request. The system continuously monitors the soil moisture, water level of the well, temperature, humidity, dew point, weather conditions and this information send to user in the form of SMS and GSM modem is controlled with the help of standard set of AT (Attention) commands. These commands are used to control majority of the functions of GSM model [7]. This paper describes the development of Intelligent Low Cost mobile phone based Irrigation System using UC/OS-II RTOS an ARM. Such simple models can be easily adapted for remote control applications. The system is based on ARM controller and includes GSM Modem, Water level Sensor, Humidity Sensor, Real time clock [9].Design of Ultra Low Cost Cell Phone Based Embedded System for Irrigation uses AVR ATMega32 microcontroller. It includes protection against single phasing, over current, over voltage, dry running and probable bearing faults and alerts the user through missed calls/buzzers on completion of tasks [8].

### III. PROPOSED SYSTEM

 In this proposed system, soil moisture sensor, temperature and humidity sensor will continuously sense the data and sends to ARM microcontroller. The information regarding soil moisture, temperature and humidity received by the microcontroller is displayed on LCD display in the farm. When the data received from the sensors is minimum or maximum of the threshold value it will take particular actions depending on the value. The water level sensor senses the level of the water. When the water level is low it will send the message to the farmer that the water level is low using GSM in the form of SMS. Then the farmer sends message (AT commands) to ON the motor. When the water reaches the maximum then motor will turn off automatically.
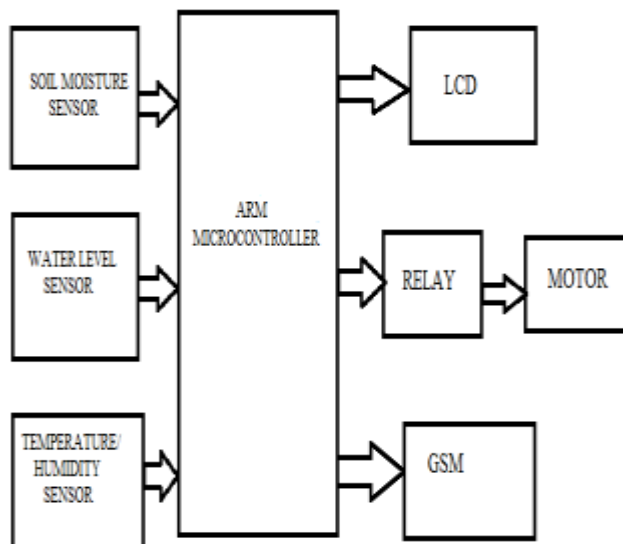
**Figure1. Basic block diagram**

**ALGORITHM**

 The proposed system undergoes following steps.

**Step 1:** Start the process.

**Step 2:** Initialize power is supplied to GSM

**Step 3:** Check the moisture level (less than or more than).

**Step 4:** If the moisture level will be more than threshold value, no need to irrigation

**Step 5:** If moisture level is less than threshold value, start irrigation

**Step 6:** Initialization of pump

**Step 7:** After the process completed, it moves to original state.

**Step 8:** Stop the process.

**GSM MODEM**

The GSM SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. GSM (Global System for Mobile) / GPRS (General Packet Radio Service) works on frequencies 850 MHZ, 900 MHZ, 1800 MHZ and 1900 MHZ. It is very compact in size and easy to use as plug in GSM Modem. The baud rate can be configurable from 9600- 115200 bps through AT (Attention) commands With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design. The GSM/GPRS Modem is having internal

TCP/IP stack to enable you to connect with internet via GPRS.  The modem can be interfaced with a Microcontroller using USART (Universal Synchronous Asynchronous Receiver and Transmitter) feature (serial communication).
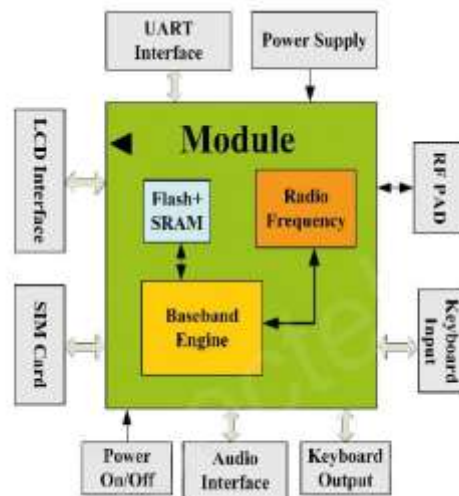
**Figure 2.GSM Modem SIM 900 architecture**

## ARM MICROCONTROLLER

LPC2148 is the widely used IC from ARM-7 family. The LPC2148 microcontrollers are based on a 32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace high speed flash memory upto 512 kB. It has 128-bit wide memory interface and unique accelerator architecture which enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. This board is powered by USB port and does not need external power supply. Due to their tiny size and low power consumption, LPC2148 are ideal for applications where miniaturization is a key requirement. Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input.. The ARM architecture design is based on principles of Reduced Instruction Set Computer (RISC), and the instruction set and related instruction decode mechanism of processor are mostly similar than those of micro programmed Complex Instruction Set Computers (CISC) processors. This architecture provides a simplicity results with a high instruction throughput.

## IV. CONCLUSION

In this paper we presented a summarized approach of various different types irrigation systems. The proposed system  is carried out using ARM7TDMI core with the help of GSM technologies to ensure a faithful irrigation of the farm field. These systems were all remotely

controlled by GSM and exchange information via SMS. The soil moisture, humidity and temperature value periodically sensed using high quality accurate sensor and those values are passed on to the controller to provide required amount of water. The functionality of GSM increases the efficiency of the automated irrigation Thus we conclude that, by using the proposed technique, one can save manpower and water. The Labor cost also reduces.

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