International Journal of Research in Engineering, Science and Management
Volume-1, Issue-10, October-2018
www.ijresm.com | ISSN (Online): 2581-5782

Automatic Irrigation System on Sensing Soil Moisture Content

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***Abstract*—This paper presents the design of an automatic irrigation system using soil moisture sensor and dtmf. We developed a mobile connected system based automatic irrigation system using soil moisture sensors (FC-28). Then sensors are interfaced with ATMEGA16 microcontroller. To detect the threshold levels of moisture and control the inflow of water for optimal use of water an algorithm is developed. We have connect the dtmf with ATMEGA16 microcontroller so that power supply of device can directly off by mobile. Thus, we have an automatic irrigation system, which can be used to increase the productivity of crop by providing optimal amount of water.**

***Index Terms*—automatic irrigation; soil moisture sensors; ATMEGA16 Microcontroller DTMF mobile Application.**

I. Introduction

India is agriculture oriented country most of GDP depend on agriculture so Drip irrigation for efficient irrigation is being used by developed countries farmers. In this system water is supplied near to the root zone of the plants drip by drip, thus ample amount of water is saved and plants get adequate water simultaneously. In India, farmers manually irrigate the fields at regular intervals. This process consumes more water and sometimes crop does not get water at right place, which can decrease the productivity of crop. Deficiency of water can be risky to plants before noticeable wilting occurs. This problem can be resolved if we have a drip irrigation system in which the irrigation will happen only when the plants will have requirement of water. Due to the limited resources of water, there has been an interest in the researchers for developing an automatic irrigation system. Various irrigation system like use of canopy temperature , array of wireless sensors , regulating soil water tension with on/off strategies based on the feedback, mobile based , small embedded system device , ATMEGA16 microcontroller based system and using controllable parameter such as Temperature, soil moisture and air humidity have been proposed by the researchers. These systems are quiet useful but are money extensive, and hence not suitable for Indian farmers. In this paper we present a mobile based automatic irrigation system using a soil moisture sensor and ATMEGA16 microcontroller. The system sets the irrigation time based on the moisture reading from the sensors and irrigates the field automatically, when unattended. We have used a sensor to measure soil moisture, which is inserted at various positions near to the plants. The ATMEGA16 microcontroller receives the sensor output. We take the level of water sensed by sensors as input to decide the manual/automatic on or off of motor controlling the supply of water to plants. This system is useful for people who don't have much time for watering their plants. For automatic irrigation we use a soil moisture based on sensor input and microcontroller. The microcontroller retrieves the values from database, which is stored in ATMEGA16 that contains data sent from the sensors.

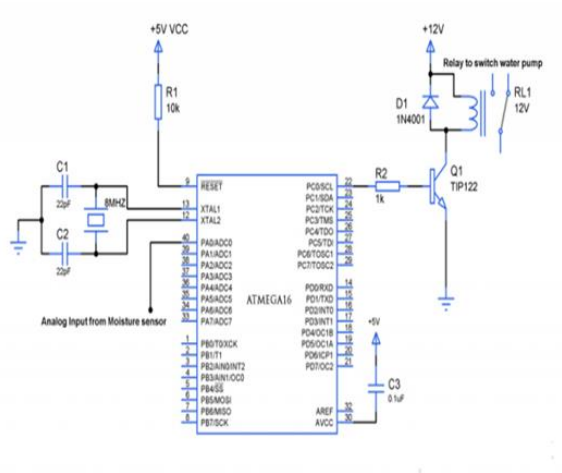

Fig. 1. DC analysis of the sensor

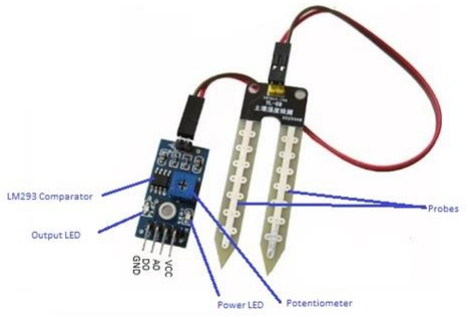

Fig. 2. Practical setup

Two rod sensor can be approximated as a RC circuit in parallel. In DC Analysis, soil resistance dominates the circuit and the capacitance comes into picture only in the absence of

moisture. Under DC biasing conditions, the drop across Resistence (this corresponds to the resistance offered by soil). The resistivity of the soil depends on many factors like its salinity, temperature, moisture level etc. It is possible to choose the distance between the two aluminum rods such that the resistance depends inversely on the moisture content of soil, and voltage drop across rods.

II. Working

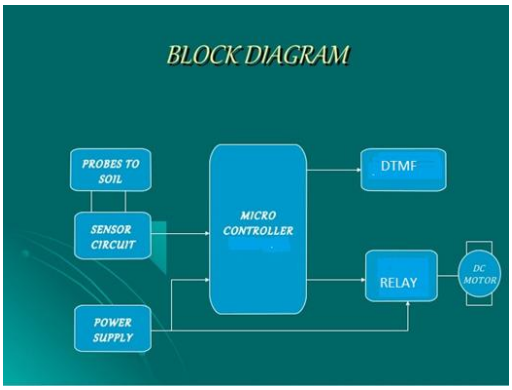

Fig. 3. Block diagram of the automatic drip irrigation system

It has three sections: sensor, microcontroller and water-pump motor circuits. The sensor circuit detects soil condition by measuring the soil voltage and comparing it with a reference voltage. A soil sensor DC motor pump is connected between the normally-open (N/O) pin and pole of the relay. If the soil is dry, i.e., the ground voltage is greater than the reference voltage, the microcontroller (ATmega16) gives a logic-1 output signal. The transistor conducts to energise relay RL1 (as its pole pin comes in contact with the N/O pin) and the motor turns on with power supply provided from the battery. When the soil is wet, i.e., soil voltage is less than the reference voltage, the logic-0 signal of the microcontroller turns the transistor, and hence the motor switches ‘off’.

III. Result

Irrigation becomes easy, accurate and practical with the same soil sample. Because of the idea above shared and can be implemented in agricultural difficulties of accurately measuring dry soil and water fields in future to promote agriculture to next level. The Volumes, volumetric water contents are not usually output from moisture sensor and level system plays major role to be determined directly.

IV. Conclusion

Automatic irrigation control system has been designed and constructed. The prototype of the system worked according to specification and quite satisfactorily. The system components are readily available, relatively affordable and they operate quite reliably. The system helps to eliminate the stress of manual irrigation and irrigation control while at the same time conserving the available water supply. Improving Irrigation efficiency can contribute greatly to reducing production costs of agricultural products, thereby making the industry to be more competitive and sustainable. The system was tested on three types of soil and from the result analysis sandy soils require less water than loamy soils and clay soils require the most water for irrigation.

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