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Automatic Irrigation SystemUsing Microcontroller

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Abstract —
In a country like India, the agriculture plays a very important role in the economy and development of the country. We are experiencing a growing interest in the field of agriculture using the latest Wireless technologies. It becomes a tedious job for farmers to continuously check the motor pump by walking through long distances to the field. The solution to such problems is described in our paper. This paper represents the prototype design of microcontroller based automatic irrigation system; this can be achieved by the use of soil moisture sensor, which senses the water content in the soil. This sensor output is given to a Microcontroller based control system for further data processing.

Keywords: irrigation system, microcontroller, Moisture sensors, GSM Modem.

I. INTRODUCTION

Agriculture plays a very important role in Indian economy. At present, the farmers manually control irrigation by irrigating the land at regular intervals. This process sometimes consumes more water and sometimes the water reaches late. It has been observed that maintaining the proper moisture level in soil leads to higher yield per hectare. [1]

Improving irrigation efficiency can contribute greatly to reducing production costs of vegetables, making the industry more competitive and sustainable. Through proper irrigation, average vegetable yields can be maintained (or increased) while minimizing environmental impacts caused by excess applied water and subsequent agrichemical leaching. [2]

In this paper, we provide an efficient solution for automatic control of irrigation motor with soil moisture sensor. Nowadays technology is running with time, it has completely occupied the lifestyle of human beings. Even though there is such an importance for technology in our routine life there are even people whose life styles are very far to this well-known term technology. So it is our responsibility to design few reliable systems which can be even efficiently used by them. This basic idea gave birth to the project GSM controlled soil moisture sensor. Here the automation process is done through the micro controller based technology. We have made use of one microcontroller, which is dedicated at the water pump. The microcontroller forms the heart of the device and there are also soil moisture sensors, which are meant for detecting the moisture in the soil. Also GSM modem which will operates the soil moisture sensor.

Here we are going to operate the soil moisture sensor. For this we will use GSM technology. To operate the sensor we should send a message to the GSM modem which one at the soil moisture sensor. That modem will receive the message it will send the information to the micro controller through decoder, the microcontroller will operate the sensor i.e., ON/OFF. The sensor will operate the motor according to the quantity of moisture in the soil. This process will be continued until we stop the sensor. Here we get the feedback of motor status i.e., ON/OFF in the form of message from the GSM modem present at the motor end.

The purpose of this project is to monitor and control the water flow to an irrigation system using Mobile Phone. This can be achieved by the use of soil moisture sensor, which senses the water content in the soil. This sensor output is given to a Microcontroller based control system for further data processing.

II. IRRIGATION CONTROL

With this project we show that how we use the sensor's and electronics circuit for agriculture industry also. Some time one experiment change the whole world, so it's the duty of engineers to try something different for the future science. May be we don't know which one would click and verify the concept.

In this project we show that how we use moisture sensor to control the working of pump. Two probes are used as soil moisture sensor. Working of the pump is controlled by the moisture content of the field, if the field is dry then our system automatically send a SMS to the particular person. The person after receiving the SMS would switch the pump on/off. Firstly, we sense the analogue input through the moisture sensor probe. Resistance between these two probes is continuous gathered by the ADC circuit. ADC circuit senses the analogue signal and converts it into digital signal. This signal is 8 bit wide and after sensing this signal we feed this signal into a micro controller. Microcontroller continuously senses this signal and then converts it into decimal inside the micro controller and save the record in a temporary memory. Now this data is sent to the LCD display connected to the microcontroller. Here we use 2 by 16 LCD display. LCD displays all the notes in ASCII letters. So in the controller we convert this data into ASCII code.

We connect two switches with the microcontroller to set a preset value. With this value micro controller continuously senses and compares the input value with the preset microcontroller value. When the moisture value of soil is equal to the preset value, then the circuit is off.

Now when value is compared then one bit of microcontroller is activated automatically and the pump connected to it is turned on. Output of the PNP transistor is connected to the dc motor pump control.

GSM modem SIM 300 is connected to the microcontroller TX and RX pin. When the field is dry, then the controller sends a AT command to the gsm modem. Gsm modem automatically sends a SMS to the desired person. Person's phone number is already in the program code of the microcontroller. We use MAX232 IC with controller to convert TTL code to RS232 code and, RS232 code to TTL code. In this project, the circuit sends and receives the SMS from particular phone. When the field is dry then the system sends a SMS and the person switches the pump ON/OFF if required

Complete circuit work on the 5 volt regulated power supply. So to convert 220 volt Ac into 5 volt Dc power supply we use one step down transformer with two diodes and capacitor circuit. Output of the capacitor is further converted into regulated power supply with the help of the 5 volt regulator circuit IC7805.

Fig 2: Circuit Diagram

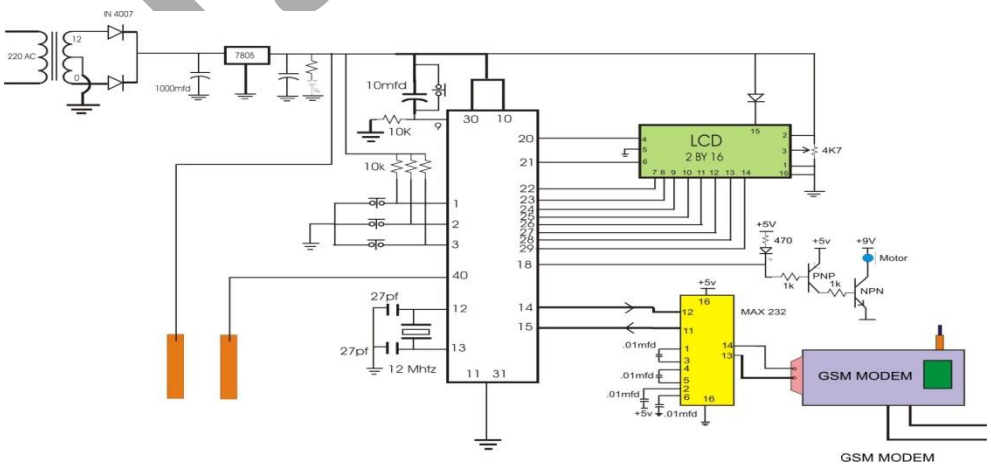


Fig 1: Block Diagram of Automatic Irrigation System using Microcontroller

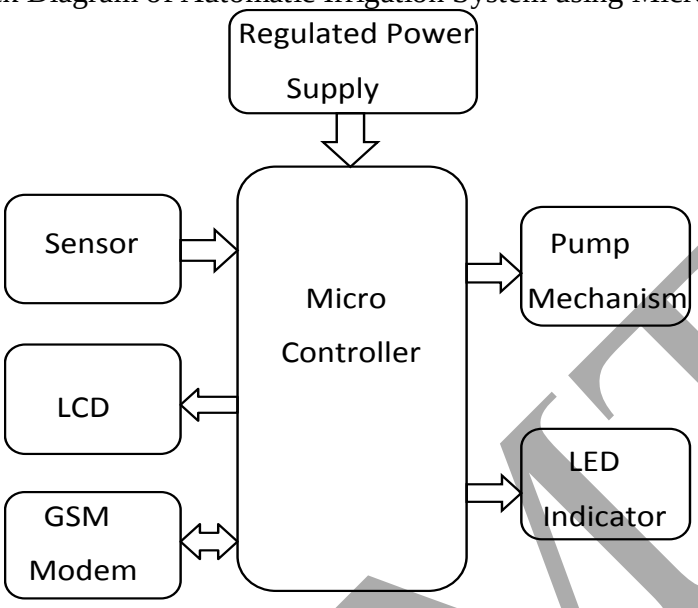
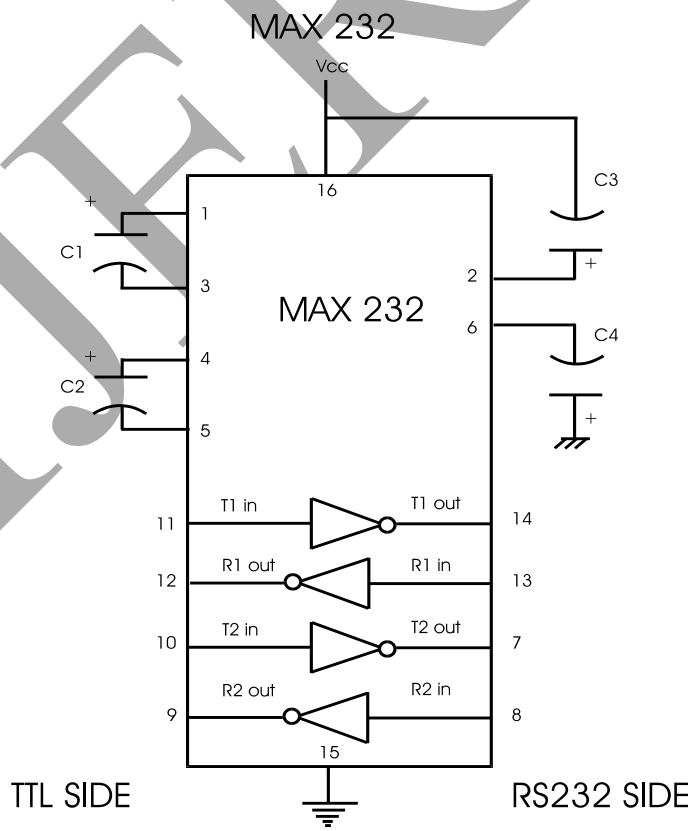


Fig 3: MAX232



III. Conclusion

It can be seen that the combination of hardware and software provides a irrigation controller that can be implemented at relatively low cost and which is extremely user friendly because it requires little user intervention. The soil moisture is checked and maintained automatically. This minimizes the wastage of water and maintaining the proper moisture level the crop yield is increased.

IV. Acknowledgment

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