AUTOMATIC PLANT WATERING SYSTEM USING ARDUINO

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Abstract : In the field of agriculture, use of proper method of irrigation is important because the main reason is the lack of rains and scarcity of water. The continuous extraction of water from earth is reducing the water level which lot of land is coming slowly in the zones of un-irrigated land. Another very important reason of this is unplanned use of water due to which a significant amount of water goes waste. To address these issues we propose automatic plant irrigation system. The system derives power from solar energy through photo-voltaic cells. Hence, dependency on erratic commercial power is not required. This project aims at using solar energy to operate the irrigation pump. The circuit comprises of sensor parts built using op-amp IC. Op-amps are configured here as a comparator. Two stiff copper wires are inserted in the soil to sense whether the soil is wet or dry. A microcontroller is used to control the whole system by monitoring the sensors and when sensors sense dry condition of soil, then the microcontroller will send command to relay driver IC the contacts of which are used to switch on the motor and it will switch off the motor when the soil is in wet condition. The microcontroller does the above job as it receives the signal from the sensors through the output of the comparator, and these signals operate under the control of software which is stored in ROM of the microcontroller. The condition of the pump i.e., ON/OFF is displayed on a 16X2 LCD which is interfaced to the microcontroller.

IndexTerms - **Arduino UNO, GSM, LCD, Soil Moisture Sensor, Water level Sensor Relay, Submersible water pump, Solar Panel, Battery.**

1. Introduction

By using the concept of modern irrigation system a farmer can save water up to 50%. This concept depends on two irrigation methods those are: conventional irrigation methods like overhead sprinklers, flood type feeding systems i.e. wet the lower leaves and stem of the plants.. The erosion of soil and wind is much reduced by the recent techniques when compared with overhead sprinkler systems. The soil characteristics will define the form of the dripping nature in the root zone of a plant which receives moisture.

As the method of automatic dripping will reduce huge water losses it will become a popular method by reducing the labor cost and increasing the yields. When the components are activated, all the components will read and give the output signal to the controller, and the information will be displayed to the user (farmer). The sensor readings are analog in nature so the ADC pin in the controller will convert the analog signals into digital format. Then the controller will access information and when the motors are turned On/Off it will be displayed on the LCD display.

II. LITRATURE SURVEY

Agriculture is the mainstay for Bangladesh and the provision of water is an important factor that determines the output of the agriculture sector. Since natural water availability is prone to many aspects of nature such as rain and capacity of rain-water reservoir, irrigation or alternative supply of water becomes a critical element in agriculture. The existing irrigation mechanisms through the motor-pumps are heavily dependent on fossil fuel regarded as an offender in the carbon footprint debacle. The poor farmers find themselves with insurmountable hurdles as they are constrained by the financial cost on fuel. The profit maximization gets a major setback due to the exorbitant amount of expenditure due to fuel consumption. An innovative approach to do away with such limitation is the utilization of natural resource for irrigation purpose, an intelligent auto irrigation system which is based on the concept of harnessing the power of sun. Through the use of solar panel, sunlight is captured into the photovoltaic cells and transferred to a battery to be charged during the day. All this setting is facilitated by circuits one associated with the solar panel and the other one for detecting the presence of sunlight during the day since the system would not allow any water to flow unless it is the night time. In order to drive the pump into action, two conditions need to be fulfilled one darkness, detected by a photo resistor and the second one is the dryness of soil, to be determined by a moisture sensor, and this setting would be programmed by a platform both hardware and software with Arduino Uno. Although the charging time of the battery by solar panel would be a little lengthy, the long exposure to the sun would provide enough time
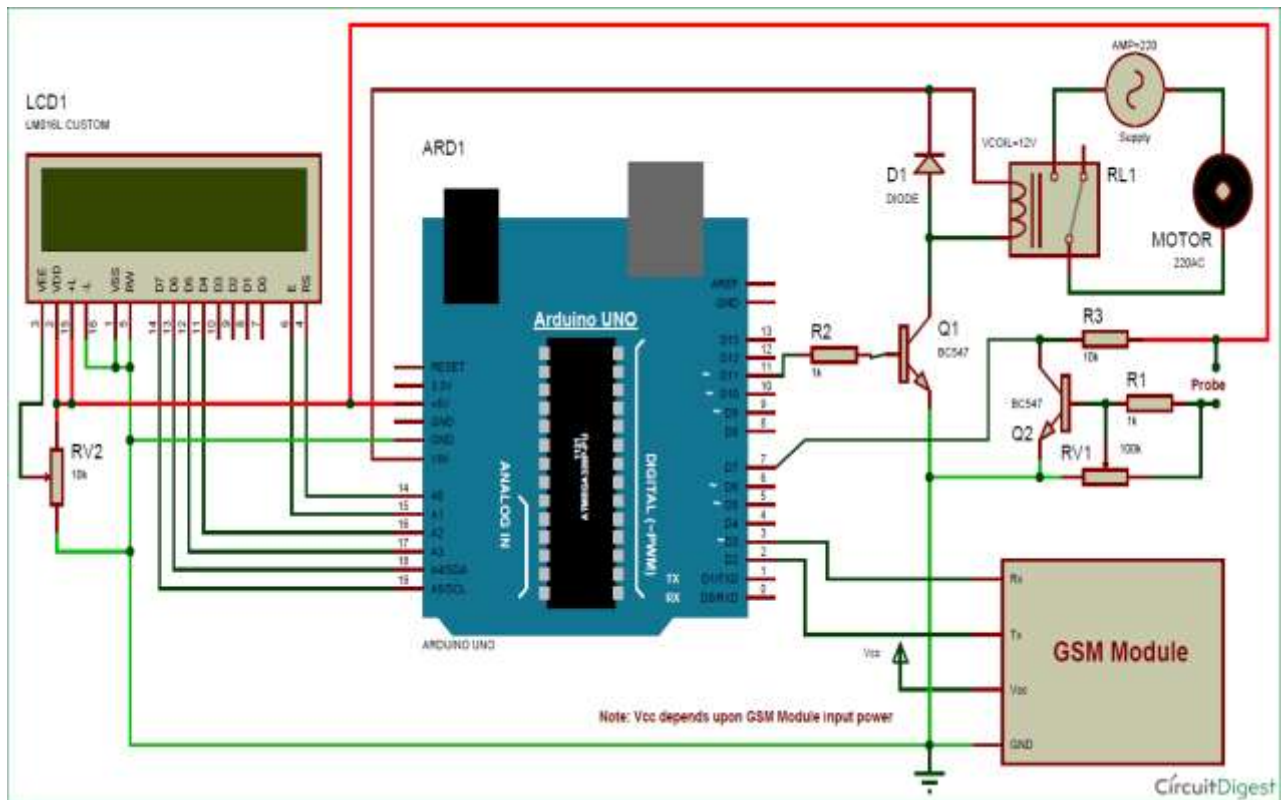
and charging volume to the battery. The battery would comfortably provide a considerable duration of power to the water pump that can supply sufficient amount of water to agricultural land of any decent size.

1. SYSTEM DEVELOPMENT

BLOCK DIAGRAM:
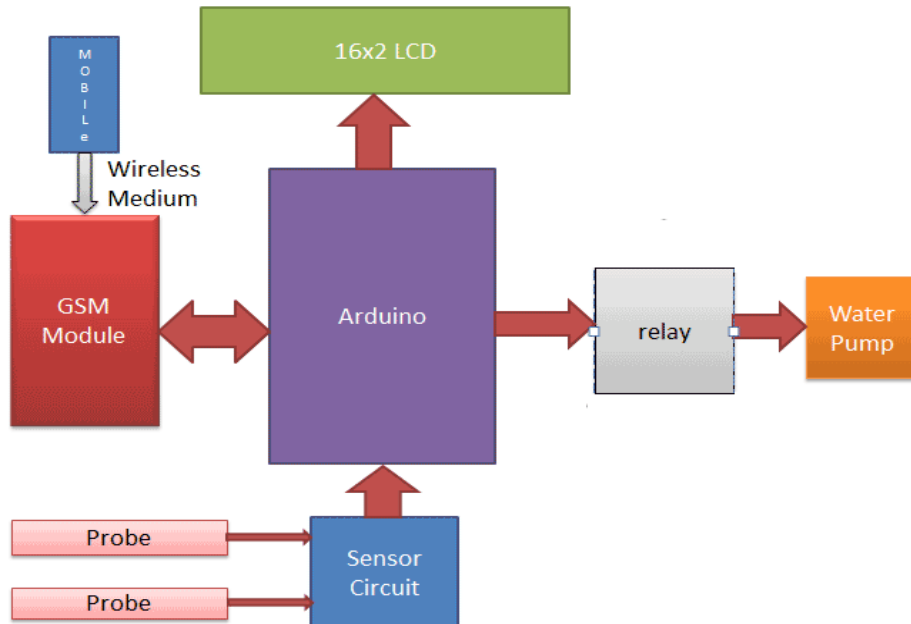
CIRCUIT DIAGRAM:

2. HARDWARE REQUIREMENT

ARDUINO

This is the main processing unit of system. It gives input from soil moisture sensor and water level sensor and commands from GSM. And give output signal to relay to turn ON or OFF the motor.

It has programmed microcontroller Atmega 328. It has input 6Volt DC power supply.
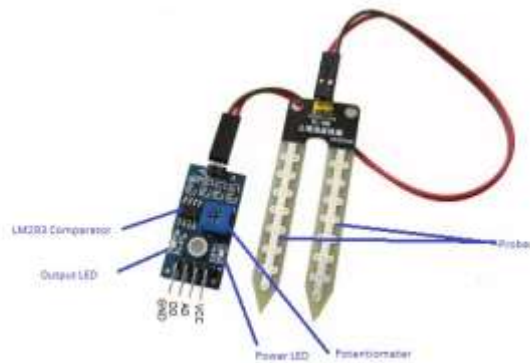
GSM MODULE

In this we inserted SIM. It sends text message to operator. It is powered by battery of 6 volt.

It is used to give information to user/operator to about status of soil moisture sensor, water level sensor and running status of motor.
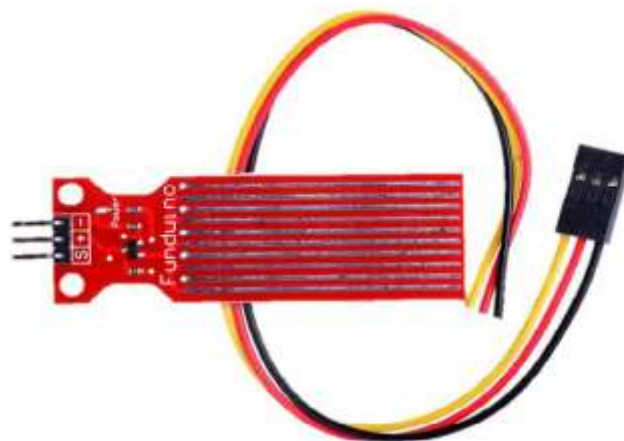
Controlling commands are received here by sending text message to SIM inserted in this.

SOIL MOISTURE SENSOR

It is used to detect moisture in the soil. If moisture is present then circuit completes and provide such signal to arduino.

WATER LEVEL SENSOR

It is used to detect level of water in tank.

RELAY

Relay is accepts command from arduino microcontroller and . And provide further command to circuit breaker.

LCD(16*2)

LCD Shows status of system works.

SUBMERSSIBLE WATER PUMP

It is used to lift water from water pump. And give to various plants via pipe. According to our need we can use various types of pumps.
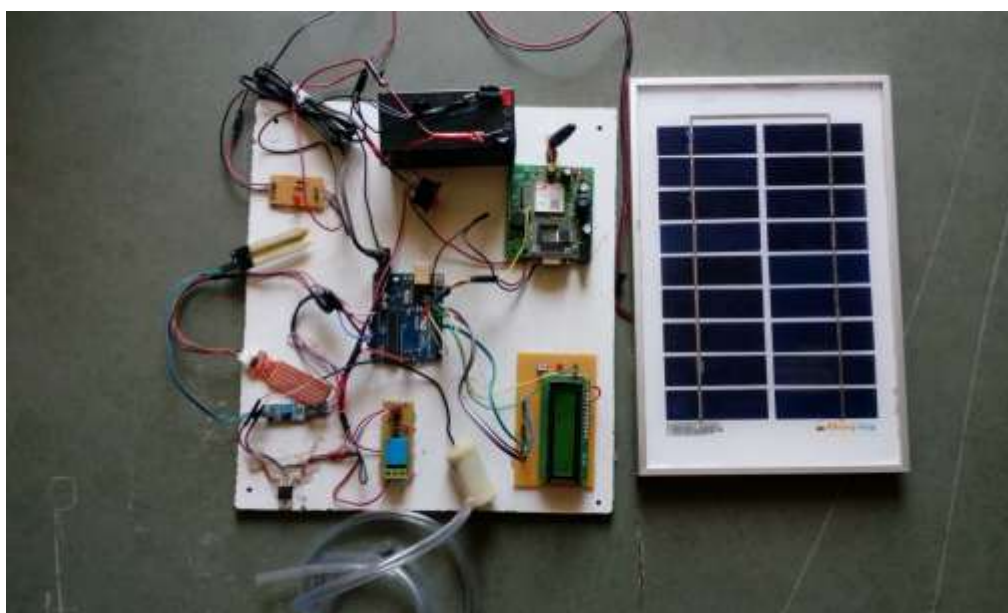

3.   SOFTWARE REQUIREMENT

ARDUINO UNO Software is required to programme. Atmega 328 microcontroller.

4.   HARDWARDE AND RESULTS

HARDWARE

WORKING

Initially system is started then, soil moisture sensor and water level sensor checks parameters. And gives command to arduino, then various possibilities occurs as given in result table. Arduino decides whether to pump has to be Start or not. And gives further commands to relay. It uses circuit breaker to open or close pump's circuit. And motor will ON or OFF.

RESULTS

MONITIRING

When we run hardware, an arduino will check following necessary conditions, and proceed for further opeartions. Different possibilities are:

1. If moisture level is low and water level is high then motor is 0N.
2. If moisture level is low as well as water level is also low then motor is OFF.
3. If moisture level is high and water level is also high then motor is OFF.
4. If moisture level is high and water level is low then motor is OFF
    When above operations are running, you will be inform by sending SMS on your registered mobile number.

If water level is high and moisture motor will OFF

If water level is high, and moisture level is low then level is high then motor will OFF

If water level is low and moisture then motor will OFF

If water level is low, and moisture level is low level is high then motor will OFF

SOIL MOISTURE IS LOW

NO WATER IN TANK MOTOR OFF

WATER LEVEL IS LOW MOISTURE LEVEL IS HIGH MOTOR OFF

CONTROLLING

When you have to start water pump manually, you need to send SMS on mobile number which SIM is inserted in GSM.

To Start water pump manually,

Send SMS 'START' on pump's

mobile number.

To Stop water pump manually,

Send SMS 'STOP' on pump's

mobile number.

START
to
<Mobile no>

STOP
to
< Mobile no >

5. COCLUSION

By implementing this idea, we can improve the traditional way of agriculture irrigation system in different region of India. In the present era, the farmers use irrigation technique through the manual control, in which the farmers irrigate the land at regular intervals .This process seems to consume more water and results in water wastage. Moreover in dry areas where there is inadequate rainfall, irrigation becomes difficult. Hence we require an automatic system that will precisely monitor and control the water requirements in the field. Installing Smart irrigation system saves time and ensures judicious usage of water. Moreover this architecture uses microcontroller which promises an increase in system life by reducing power consumption.

6. REFERENCES

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