ARDUINO BASED AUTOMATED PLANT IRRIGATION SYSTEM

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ABSTRACT

Whenever we go out of town for few days, we always used to worry about our plants as they need water on regular basis. So here we are making Automatic Plant Irrigation System using Arduino, which automatically provides water to your plants. In this project we are using GSM module. A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the view of the mobile phone network, they are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network. It is helps us to know about soil moisture and provide water to plants automatically if moisture level is low.

Key words: Irrigation, Arduino UNO, GSM module sensors, plant irrigation system.

I. INTRODUCTION

In the Plant Watering System, Soil Moisture Sensor checks the moisture level in the soil and if moisture level is low then Arduino switches on a water pump to provide water to the plant. Water pump gets automatically off when system finds enough moisture in the soil. Whenever system switched on or off the pump, a message is sent to the user via GSM module, updating the status of water pump and soil moisture. This system is very useful in Farms, gardens, home etc. This system is completely automated and there is no need for any human intervention. The following components are used in Arduino plant watering system.

Required Components for Arduino Plant Watering System Project

Arduino UNO, GSM Module, Transistor BC547 (2), Connecting Wires, 16x2 LCD (optional), Power supply 12V 1A, Relay 12V, Water cooler pump, Soil Moisture Sensor, Resistors (1k, 10k), Variable Resister (10k, 100k), Terminal connector, Voltage Regulator IC LM317

GSM MODULE

The TTL SIM800 GSM module is used in the plant irrigation system. The SIM800 is a complete Quad-band GSM/GPRS Module which can be embedded easily by customer or hobbyist. SIM900 GSM Module provides an industry-standard interface; the SIM800 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data with low power consumption. The design of this SIM800 GSM Module is slim and compact.

Quad - band GSM/GPRS module in small size.

GPRS Enabled

TTL Output

BLOCK DIAGRAM OF ARDUINO BASED AUTOMATED PLANT IRRIGATION SYSTEM:

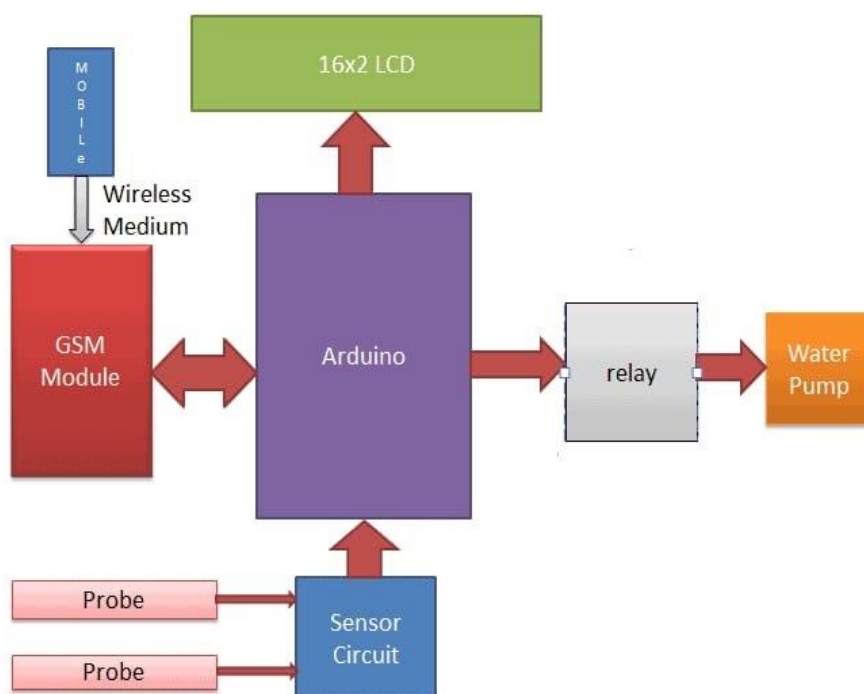The Block diagram of Arduino based Automated Plant Irrigation System shown in Fig 1.1

Fig 1.1 Block Diagram

In the Plant Irrigation System, we have used a Homemade Soil Moisture Sensor Probe to sense the soil moisture level. To make probe, we have cut and etched a Copper clad Board according to the Picture shown below. One side of the probe is directly connected to VCC and another probe terminal goes to the base of BC547 transistor. A potentiometer is connected to the base of the transistor to adjust the sensitivity of the sensor.

Arduino is used for controlling whole the process of this Automatic Plant Watering System. The output of soil sensor circuit is directly connected to digital pin D7 of Arduino. A LED is used at the

sensor circuit, this LED's ON state indicates the presence of moisture in the soil and OFF state indicates the absence of moisture in the soil.

GSM module is used for sending SMS to the user. Here we have used TTL SIM800 GSM module, which gives and takes TTL logic directly (user may use any GSM module). A LM317 Voltage regulator is used to power the SIM800 GSM module. LM317 is very sensitive to voltage rating and it is recommended to read its datasheet before use. Its operating voltage rating is 3.8v to 4.2v (please prefer 3.8v to operate it). The Circuit Diagram of Power Supply given to the TTL SIM800 GSM Module shown in Fig. 1.2
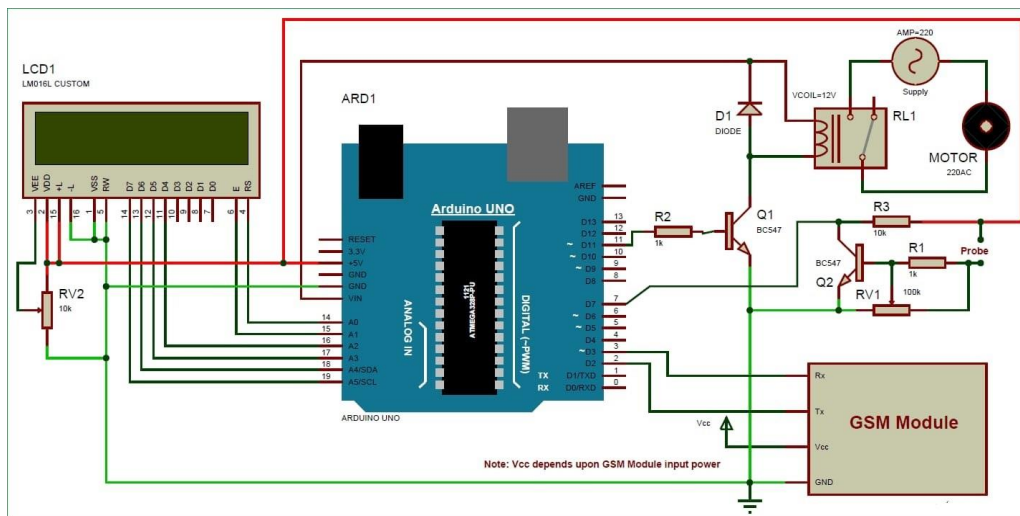

Fig 1.2 Circuit Diagram

If user wants to use SIM900 TTL Module then he should use 5V and if the user wants to use SIM900 Module then apply 12v in the DC Jack slot of the board. A 12V Relay is used to control the 220VAC small water pump. The relay is driven by a BC547 Transistor which is further connected to digital pin 11 of Arduino. An optional LCD is also used for displaying status and messages. Control pins of LCD, RS and EN are connected to pin 14 and 15 of Arduino and data pins of LCD D4-D7 are directly connected at pin 16, 17, 18 and 19 of Arduino. LCD is used in 4-bit mode and driven by Arduino's inbuilt LCD library. Below is the circuit diagram of this Irrigation System with Arduino and soil moisture sensor.

WORKING EXPLANATION

Working of the Automatic Plant Irrigation System is quite simple. First of all, it is a Completely Automated System and there is no need of manpower to control the system. Arduino is used for controlling the whole process and GSM module is used for sending alert messages to user's Mobile phone. If moisture is present in soil, then there is conduction between the two probes of Soil Moisture

sensor and due to this conduction, transistor Q2 remains in triggered/on state and Arduino Pin D7 remains Low. When Arduino reads LOW signal at D7, then it sends SMS to user about "Soil Moisture is Normal. Motor turned OFF" and water pump remains in Off state. Now if there is no Moisture in soil then Transistor Q2 becomes Off and Pin D7 becomes High. Then Arduino reads the Pin D7 and turns on the water motor and also sends message to user about "Low Soil Moisture detected. Motor turned ON". Motor will automatically turn off when there is sufficient moisture in the soil.

RESULTS AND DISCUSSION

In the automated Plant Watering System, Soil Moisture Sensor checks the moisture level in the soil and if moisture level is low then Arduino switches on a water pump to provide water to the plant. Water pump gets automatically off when system finds enough moisture in the soil. Whenever system switched On or off the pump, a message is sent to the user via GSM module, updating the status of water pump and soil moisture. This system is very useful in Farms, gardens, home etc. This system is completely automated and there is no need for any human intervention.

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