Soil Irrigation System Using Moisture Content

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Abstract- *The main objective of the paper is to implement the irrigation system in a smart way. The soil moisture sensor placed in the soil help to find the level of moisture and thus by predicting the level, the motor get operated. In presence of rain, there is no need of running motor that can be predicted using the moisture sensor and the motor get off. The intimation of off can be known to the farmer through SMS using GSM attached to the motor. When the soil becomes dry, the motor will start to operate and water starts to flow for the crops. The application can limit the wastage of water and electricity. If manual operation the flow of excess of water may spoil crops that can be overcome, therefore the application becomes a user friend application can limit the wastage of water and electricity. If manual operation the flow of excess of water may spoil crops that can be overcome, therefore the application becomes a user friendly task for the farmers.*

Keywords: Sensor, SMS, GSM

1. INTRODUCTION

This paper requires very less human involvement once installed. The circuit is based on PIC microcontroller and also a soil moisture sensor. A properly configured soil moisture sensor can save up to 60 percent of water used in irrigation. The designed system can be used in turf grass or with small garden plants. Moisture sensor is a device that measures the moisture content of any environment. Moisture sensors typically refer to sensors that estimate volumetric water content. There are many types of moisture sensors, but the most common and low cost is the impedance based moisture sensor. Moisture sensor consists of two probes. The change of impedance between the two probes present in the sensor due to varying moisture content in the surrounding medium is calculated. This is the method by which our proposed sensor works.

2. RELATED WORKS

In existing system, the farmer needs to focus on irrigation all over time and the motor get operated in manual process. In absence of farmer will lead to wastage of water during the time of rainfall. The farmer can't know the humidity level of the soil and therefore the motor can't be operated in a respective time interval.

The Demerits of Existing System are the farmer needs to spend more time in knowing the humidity level of the soil. The motor can be operated in a manual process; therefore the absence of farmer may lead to wastage of water. Due to over flow of water may spoil the crops. The intimation of humidity level of the soil can't get by the farmer.

3. PROPOSED SYSTEM

In proposed system the soil moisture sensor fixed to the irrigation soil helps to find the level of humidity of soil. If it reached the certain level of humidity the motor get trigger and it set to off state. The intimation of off will reach the farmer through SMS with the help of the GSM module attached to the motor.

Advantages of proposed system are the level of humidity of soil can be easily found by placing soil moisture sensor. As per the need for the crop, the flow of water can be changed and thus after reaching the respective level the motor automatically stop.The intimation of motor operation (on/off) can be known by the farmer through SMS.The wastage of water and electricity can be limited.During rainy season as per the level of moisture, the motor get operated.

4. CIRCUIT DESCRIPTION

4.1. Arduino Uno

An Arduino Uno R3 made in Italy with box. In addition to all the features of the previous board, the Uno now uses an ATmega16U2 instead of the 8U2 found on the Uno (or the FTDI found on previous generations). This allows for faster transfer rates and more memory. No drivers needed for Linux or Mac (in file for Windows is needed and included in the Arduino IDE), and the ability to have the Uno show up as a keyboard, mouse, joystick, etc.

The Uno R3 also adds SDA and SCL pins next to the AREF. In addition, there are two new pins placed near the RESET pin. One is the IOREF that allow the shields to adapt to the voltage provided from the board. The other is a not connected and is reserved for future purposes. The Uno R3 works with all existing shields but can adapt to new shields which use these additional pins.

Arduino is an open-source physical computing platform based on a simple i/o board and a development environment that implements the Processing/Wiring language. Arduino can be used to develop stand-alone interactive objects or can be connected to software on your computer (e.g. Flash, Processing, Max (MSP). The open-source IDE can be downloaded for free (currently for Mac OS X, Windows, and Linux).

The Arduino Uno R3 requires the Arduino 1.0 driver's folder in order to install properly on some computers. We have tested and confirmed that the R3 can be programmed in older versions of the IDE. However, the first time using the

R3 on a new computer, you will need to have Arduino 1.0 installed on that machine. If you are interested in reading more about the changes to the IDE, check out the official Arduino 1.0 Release notes. Features are ATmega328 microcontroller,Input voltage - 7-12V,14 Digital I/O Pins (6 PWM outputs),6 Analog Inputs,32k Flash Memory,16Mhz Clock Speed
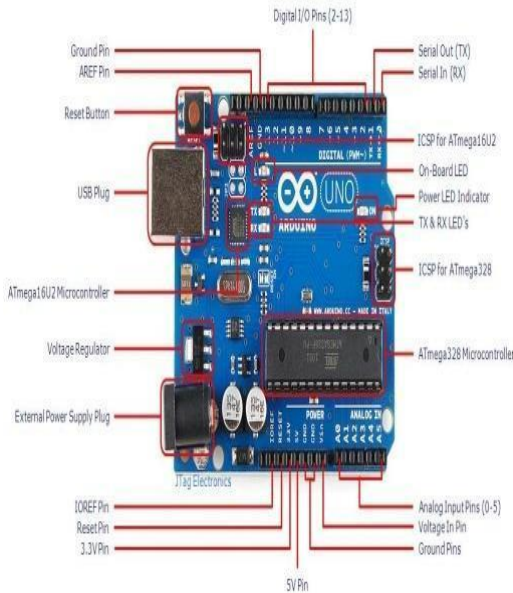

Fig. 1. Arduino Uno

4.2. GSM Module SIM 900

The SIM800 modem has a SIM800 GSM chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once user connect the SIM800 modem using the USB to RS232 connector, user need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then user can open Putty or any other terminal software and open an connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or your microcontroller user can start sending the AT commands. When user send AT commands for example: "AT " user should receive back a reply from the SIM800 modem saying "OK" or other response depending on the command send.

4.2.1. Connecting with GSM

The SIM800 requires huge power, so use a 12V DC 2 to 3 Amps adapter, any wrong adapter might cause damage also to the modem. On the board there are Tx (D) and Rx (D) pins, near the 5V and GND pins, don't ever connect anything to them or send any command to them, they are not the TTL pins for serial communication, they are for upgrading the firmware, and if user connect them to the microcontroller or computer, the firmware will get damaged and the module will stop working.

Fig.2. **GSM Module SIM 900**

4.3. Driver Shield

Arduino compatible motor Driver shield is a full-featured product that it can be used to drive 4 DC motors or two 4-wire stepper and two 5V 'hobby' servos. It drives the DC motor and stepper with the L293D, and it drive the servo with Adriano's pin9 and pin10.Features:2 x L293D Motor Control Chips,Total of 4 H-Bridges for controlling 4 DC motors or 2 Stepper motors,2 x Server ports for controlling RC Hobby Servos,The logic control voltage Vss: 4.5~5.5V,Motor Supply Voltage: 4.5 ~ 12V,Reduced control pins needed through 8-stage serial shift registers,Drive part of the operating current Io: 1.2A (0.6A per bridge),External power connection via a screw-terminal block,Screw-Terminal blocks for connection to motors.
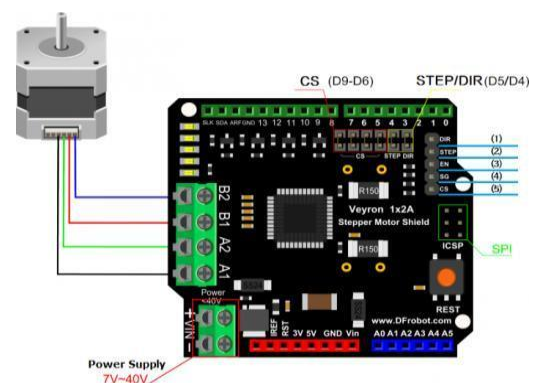

Fig. 3 Driver Shield

4.4. Soil Moisture Detection Sensor

It is a simple and easy moisture sensor that can be used for the detection of soil moisture. The module outputs a high level, when soil moisture is deficit, the output is low level. Using the sensor produces a watering device automatically, let you don't choose and employ persons to manage the plants in the garden.

4.4.1. Soil Moisture Sensor Features:

- The working voltage of 3.3 V to 5 V.

- Simple digital output, g v directly by single chip microcomputer.

- The sensitivity is adjustable using digital potentiometer (blue).

- A fixed bolt hole, convenient installation.

- The power indicator light (red) and digital switch output indicator light (green).

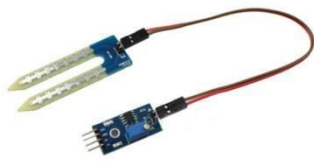- The comparator uses the LM393 chips, work stability.

Fig 4. Soil Moisture Detection Sensor
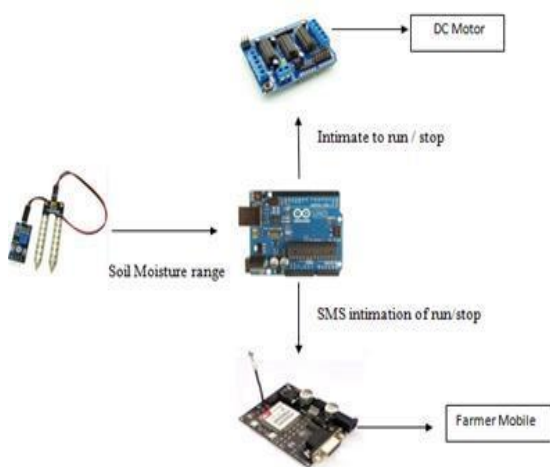
5. Circuit Diagram

Fig 4. Soil Moisture Detection Sensor

6. CONCLUSION

The sensor value is recorded by the arduino with the help of code which is written in C language using arduino software. When the specified voltage exceeds its limit, the motor water supply is stopped. The sensor value is less than 300 for a dry soil. It is greater than 300 for normal irrigation. If the moisture content increases 700, excess water is used. The information is sent to the motor to stop the supply of water in this case. All this is done with the use of program on the arduino software .In future it can be further extended by analyzing water parameters like temperature, pH and turbidity and also soil parameters like porosity, density, degree of saturation for environmental studies in an efficient manner. We can also acknowledge the user of irrigation about the moisture content used by him with the use of GSM interfaced alert system on mobile.

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