Automated Plant Irrigation System using Arduino

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Abstract— Nowadays, farmer are facing lots of problems regarding unavailability of grid in rural areas. So the solar energy is the best option for farmers to water their fields and keep plants healthy. Also watering to plants must be done properly so that plant does not get overwater or the less water with the help of soil moisture sensor. Sometimes plants get extra water which will cause them to rot. And also due to less water or no water, plants get burned. So plants needed to be supply the particular amount of water neither less nor more. Keeping in mind we have design the system which will provide the water to the plants when the soil get completely dry and automatically stops the motor when soil get wet. The condition of soil will be observed by the soil moisture sensor and the plant watering will be done by the sprinkler arrangement. According to the decided area and according to the sprinklers water throwing capacity, number of sprinklers was connected. Tank level sensors are also used to avoid the wastage of water after tank is full. Temperature also displayed on the LCD display. This project uses the ATmega328 microcontroller.

Keywords: Automated Plant Irrigation System, Arduino

I. INTRODUCTION

In busy schedule of day to day life, several time people forget to water their plants and because of these plants suffer many disorders and ultimately died. Addition, the world's biggest problem in modern society is the deficiency of water resources and irregularity of the electricity, agriculture is a demanding job to consume large amounts of water as well as electricity. It is very essential to utilize the water resources and the electricity in proper way. As we all know day by day electricity demand is increasing. So, renewable sources should be used so that the problems get avoided. So in this project we are using solar energy as a main source. Automated plant irrigation system using Arduino will estimate the water requirement for existing plant and then supplies desired amount of water needed by that plant. It is minimizing the excess water use as well as keeping plants healthy. Keeping in mind we have design the system which will provide the water to the plants when the soil get completely dry and automatically stops the motor when soil get wet. The condition of soil will be observed by the soil moisture sensor and the plant watering will be done by the sprinkler arrangement. We are using other sensors also as our requirement. We are using AC pump so that even when the required amount of energy is not available in the other than summer season, the whole system will be run on the MSEB supply without any interruption as a backup plan

II. PROBLEM STATEMENT

During day to day activities, lots of people forget to water their plants and thus it becomes challenging for them to keep their plants healthy and alive. Also it is a challenge for farmers to maintain their fields and manage watering of plants during shortage of water and electricity. Overwatering to plants will result into the wastage of water as well as electricity. In many of the regions there is unavailability of electricity and also water. So, we should save both water and electricity and utilize the renewable energy source. Based on the above background, we thought that it is necessary to implement the automated system which will take care of plants considering all the different aspects of agricultural farms and helps them to grow healthy. We also believe that technology can help people in cultivating plants, not just by automation but also through digital communications. Therefore, our project aims to implement a simple system, using automatic irrigation, watering a small potted plant or crop with minimal human intervention.

III. PROPOSED IDEA

By using the renewable energy resources that is solar energy, we are operating the automated plant irrigation system. System uses a module to convert solar energy into electrical energy that can be used in two ways: either directly, as soon as it gets converted or by storing the energy into an external battery. The second module would consist of the pump which would run on the electrical energy that is stored, from the external energy source. This project uses the ATmega328 microcontroller. In this project is, by observing the condition of soil that is dry or wet with the help of soil moisture sensor, the motor will be ON/OFF. Condition will be displayed on the LCD display. Water level sensor will be used to detect the amount of water present in the tank and shows it on LCD display. By observing all the condition the pump will water the field with the help of sprinklers so the even watering to the field is done with the less human interference.
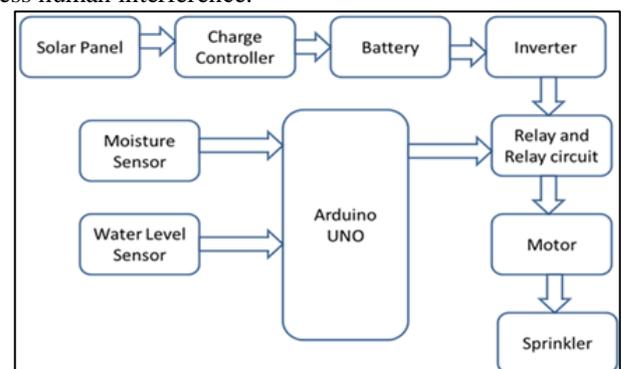

Fig. 1: Block Diagram of Automated Plant Irrigation System using Arduino

The main objective of the project:

A. Detecting Moisture Content

This will be achieved by soil moisture sensor. They are connected to an Arduino microcontroller board. Arduino

board is programmed using the IDE software. Humidity sensor senses humidity levels in the soil, and sends the signal to the Arduino to indicate that the plant needs watering.

B. Detecting Water Level

This will be achieved by water level sensor. They are connected to an Arduino microcontroller board. Arduino board is programmed using the IDE software. Water level sensor senses water levels in the tank, and sends the signal to the Arduino to start the pump.

C. Automatic Watering to the Plant

With observation of all the conditions, Arduino will start the sprinkler watering system

IV. HARDWARE REQUIREMENT

A. ArduinoUno

Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input / output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, ICSP plug, and a reset button. It contains everything needed to support the microcontroller; simply use the USB cable or power it with an AC-to-DC adapter or battery is connected to a computer begins.
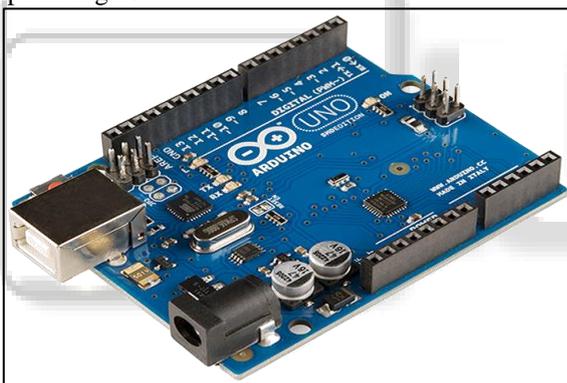

Fig. 2: Arduino Uno

B. Moisture Sensor

Soil moisture sensor measures the water content present in the soil. Soil moisture probe consists of a plurality of soil moisture sensors. Soil moisture sensor technology, commonly used are:
- Frequency domain sensor, such as a capacitive sensor.
- Neutron moisture meter, characteristic of the use of water in the neutron moderator.
- Soil resistivity. In this particular project, we will use the soil moisture sensors which can be inserted into soil to measure the soil moisture content.
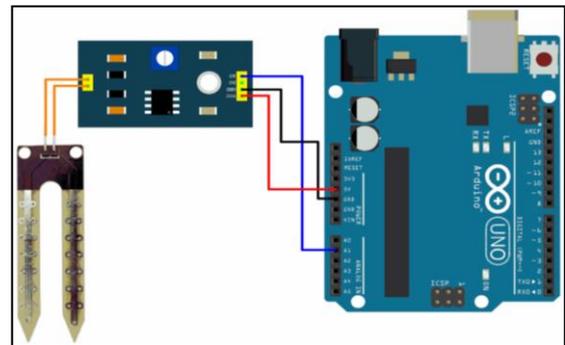

Fig. 3: Interfacing of Soil Moisture Sensor with Arduino UNO

C. Water Level Sensor

Water level sensors are used to detect the level of water in the tank. Sensors will be fixed for the particular levels with the programming in the arduino IDE software. We can specify the levels as per requirements.

D. LCD 16*2

LCD modules are very commonly used in most projects, the reason is that its less price, availability and programmer friendly. This display is used in the project to show the conditions of the sensor so that the operator get to know the exactly what's happening.
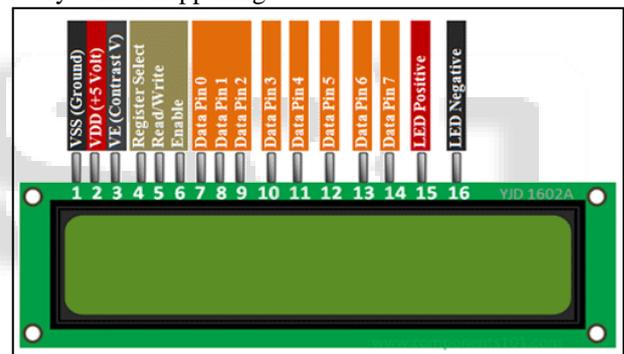

Fig. 4: 16*2 LCD Module Pin Out

E. Solar Panel

Photovoltaic modules use light energy (photons) from the Sun to generate electricity through the photovoltaic effect. In this project, we are using solar energy and converting it with the help of solar panel and other assembly. There are three types of solar panels: monocrystalline, polycrystalline and thin film amorphous solar panel. Monocrystalline solar panel are the most efficient than other two. In this project, we are using polycrystalline solar panel.
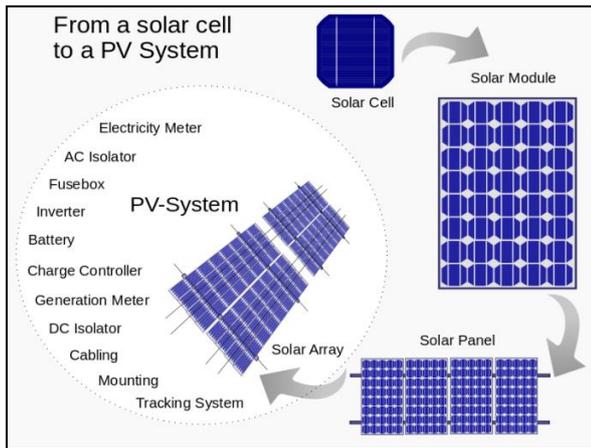
Fig. 5: From Solar Cell to PV System

F. Relay Module

Relay is an electrically operated logical switch. Many relays for switching solenoid mechanism mechanically operated, but can also be used for other principles of operation. Relays are widely used in early computers to telephones and perform logical operations.

V. SOFTWARE REQUIREMENT

A. Arduino IDE Tool

Arduino open-source environment, you can easily write code and upload it to the 110 board. It runs on Windows, Mac OS X and Linux. Environment is written in Java, and according to the processing, A VC-GCC, as well as other open source software.

VI. CONCLUSION

From this project, we can control the water flow from the sprinkler according to moisture content of the soil. According to soil moisture, water pumping motor turned on or off through the relay automatically. This saves water for the future use, while the water level can be obtained in a preferred aspect of the plant, and will result in increasing productivity of crops. Sprinkler system is the best way to water the plant and will water the land in the equal amount which will avoid the wastage of water. Water level controllers will helps to identify the water present in the tank to the operater. All that conditions will be displayed on the LCD Display. The project is very useful in the major as well as minor agricultural regions and minimize the efforts. This system will work without human interference. So, the accuracy of the system will be maximum.

ACKNOWLEDGMENT

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