AUTOMATIC PLANT WATERING SYSTEM

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Abstract : Irrigation is the art of applying water to the plants/ fields to grow and to increase the quantity as well as quality of the fruits, food grains etc., Automatic irrigation system is a modern method of irrigating the vegetables, fruit fields, farms, gardens and land scraping areas as against the conventional method, which uses large number of men- hours and uncontrolled water quantity. This project work describes about "Automatic Plant Watering System" designed with arduino microcontroller. The main purpose of the project work is to apply water to the plants automatically motor to the field whose soil is dry. This is electrically controlled equipment, when the soil is found to be dry; automatically the controller moves the pumping motor to that particular plant and energizes the relay to activate the water pumping motor and supply water to the field or plants.

IndexTerms **- Arduino, Soil moisture sensor, Relay, Pumping motor.**

I. INTRODUCTION

In India agriculture is the most important occupation of the people. More than 60% of our total population depends for their subsistence on agriculture. After independence due to various development projects introduced in the field of agriculture, production of food grains has been continuously increasing. The entire Indian economy mainly depends on agriculture. Any fluctuation in agriculture income will directly affect the India's national income. In this regard, a thought is given to develop an Automatic Plant irrigation System designed with micro-controller.
For this purpose relay is used, to energizing the pumping motor to supply water to the plants. The relay is energized automatically when the soil is dry, similarly the relay can be closed automatically when the soil is in wet condition. For sensing the soil condition copper electrodes are used.

For this purpose magnetic switch and limit switches are used and they are supposed to be installed near the plants. The pumping motor arranged over the sliding channel mechanism will be moved horizontally within a specified span. This moving mechanism also carries the permanent magnet; this magnet can be positioned below the pumping motor at certain distance, thereby it moves along with pumping motor. Whenever the magnet passes over the magnetic switch, it will be activated automatically and generates active low signal for the controller, based on this information generated by the magnetic switch, microcontroller can understand the position of pumping motor. The same way at the extreme end positions of the pumping motor moving mechanism, limit switches are placed, one at the home position and the other at the second field. Magnetic switch is present at the first field. This controller unit is programmed to position the pumping motor and supply water depending up on the soil sensor information.

II. BLOCK DIAGRAM

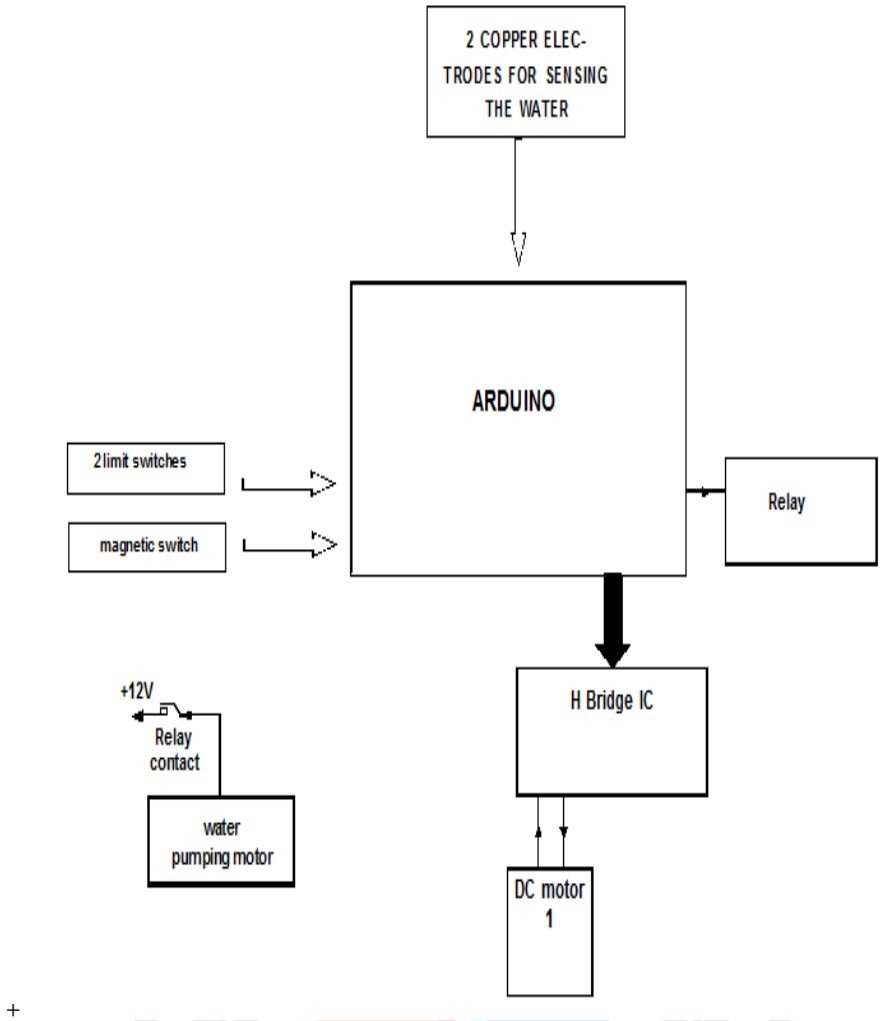

Figure 1 "Automatic Plant Watering System"

1. ARDUINO CONTROLLER

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs.

2. "H" BRIDGE

The motor driver package L293D is interfaced with 89C51 micro controller through IN1 to IN4 of H Bridge IC (L293D). Both the enable pins (EN1 and EN2) of motor driver L293D are combined together and fed to controller.

Depending up on the command signals issued by the controller, the enable pins are activated to control all the four internal drivers of L293D respectively to drive two-geared DC motors. As we are using only one DC motor, two internal driver pins are only used. Hear H Bridge is required, because the micro controller output is not sufficient to drive the DC motor, so current drivers are required for motor rotation.

3. DC Motor

DC Motor converts the electrical energy into mechanical energy. It accepts energy in the electrical form from the DC source and converts it into mechanical energy at its output. It consists of two winding namely field winding and armature winding. The field winding is stationery and armature winding can rotate. We can connect the field winding as well as armature winding to DC supply. The field current produces the magnetic flux in the air gap between the armature and field windings and the current carrying conductor is placed in this magnetic field.

III. CIRCUIT DIAGRAM

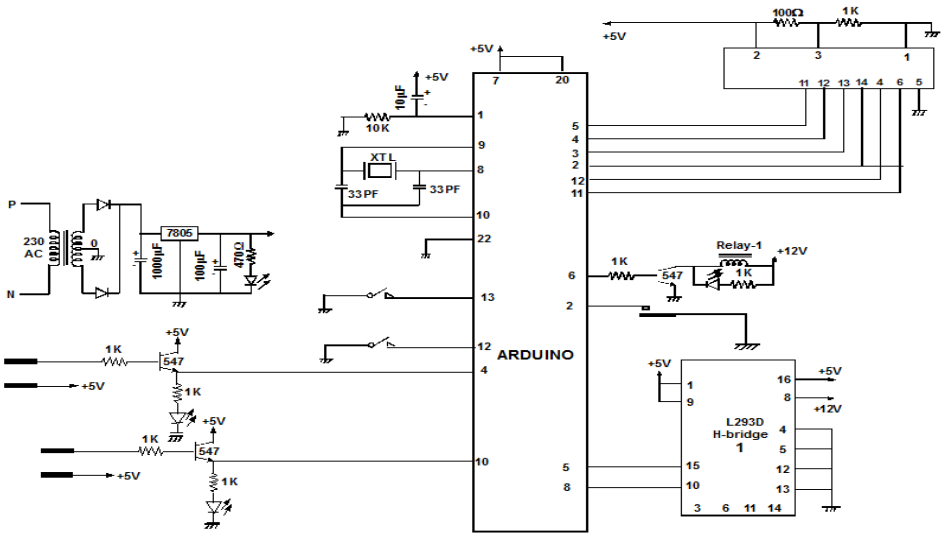

Figure 2 "Circuit Diagram"

The relays used in this project work are electromagnetic relays. The electromagnetic relay is basically a switch (or a combination of switches) operated by the magnetic force generated by a current flowing through a coil. Essentially, it consists of four parts an electromagnet comprising a coil and a magnetic circuit, a movable armature, a set of contacts, and a frame to mount all these components. However, very wide ranges of relays have been developed to meet the requirements of the industry.

This relay is nothing but a switch, which operates electromagnetically. It opens or closes a circuit when current through the coil is started or stopped. When the coil is energized armature is attracted by the electromagnet and the contacts are closed. That is how the power is applied to the signals (indicators).

Depending up on the command signals issued by the controller, the enable pins are activated to control all the four internal drivers of L293D respectively to drive two-geared DC motors. As we are using only one DC motor, two internal driver pins are only used. Hear H Bridge is required, because the micro controller output is not sufficient to drive the DC motor, so current drivers are required for motor rotation.

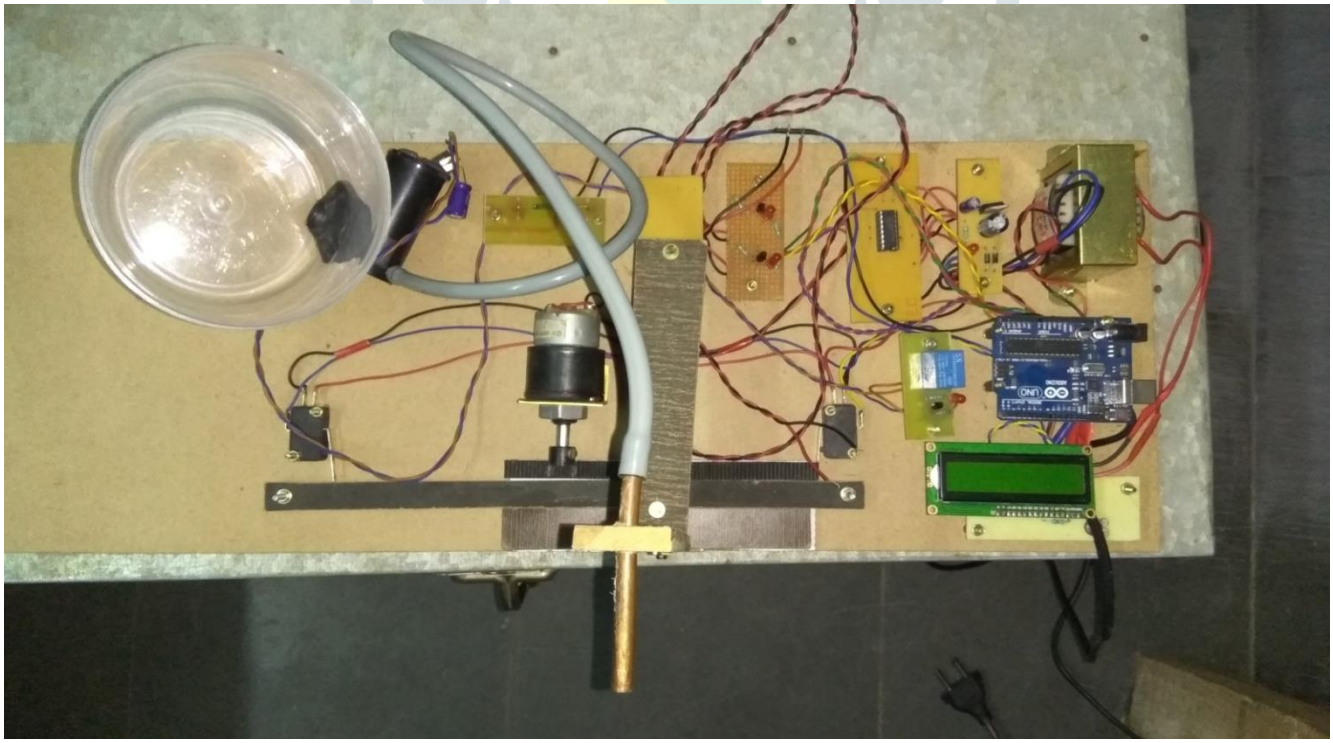

Figure 3 Prototype of kit

IV. WORKING PRINCIPLE

The main working principle behind this system is in connecting the soil moisture sensor, which was previously embedded into the plant, to the Arduino microcontroller, which is also connected to other electronic components listed. Measurement of soil moisture is done by the sensor which forwards the information and parameters regarding the soil moisture to the microcontroller, which controls the pump. If the level of soil moisture drops below a certain value, the microcontroller sends the signal to the relay module which then runs a pump and certain amount of water is delivered to the plant. Once the enough water is delivered, the pump stops doing its work. Power supply has a task to power the complete system and the recommended voltage should respect the input supply range for the microcontroller, that is, from 7V to 12V. Relay module is a simple circuit consisting of a single transistor, several resistors, diodes and a relay and it is controlled digitally by microcontroller. Since the complete system should be embedded in a small box, Arduino Uno is a perfect microcontroller for this purpose because of its dimensions and its work performance. Soil moisture module is consisting of the two parts: amplifi er circuit and probes. This module has digital and analog outputs, where digital output is set to logical 1 when the threshold is activated. The threshold is set by potentiometer. Analog output gives the real time information regarding the moisture in the plant and this output is used in the system. Water pump is connected to the relay module and it only works when the relay module gets a command from the microcontroller.

The following are the IC's and other important components used in this project work

1. Arduino Uno At mega 328 Micro-controller board
2. L293D H – Bridge IC
3. Voltage regulator
4. Relay
5. BC 547 Transistor
6. DC Motor

V. CONCLUSION

In this project work the required power supply for the entire circuitry is derived from the main source, since the circuitry to be installed at fields, and availability of conventional energy at fields may be difficult, therefore this supply can be generated using solar energy. For this purpose suitable solar panel can be utilized for charging the battery and the stored energy from the battery can be utilized to generate required power supply for the circuitry.

BIBLIOGRAPHY

1. ANITHA K, Ijeee, 2 (2016) 8. DOI: 10.17706/IJCEE.

2.SARAN A, Automatic Plant Watering and Soil Moisture Sensing, accessed 20.05. 2017. Available from http://www.instructables.com/id/Automatic-PlantWatering-and-Soil-Moisture-Sensing/ DOI: 10.3325/cmj.2016.57.392.

3. GONZALEZ R, 5 Tips For a Bountiful, Water-Saving Vegetable Garden in a Time of Drought, Treehugger, accessed 20.05.2017. Available from https://www.treehugger.com/lawn-garden/how-to-have-bountiful-water saving-garden-time-drought.html