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Smart Solar Irrigation System

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***Abstract:** This paper deals with the one of the various innovative ways to irrigate a field or water the plants using solar power. Irrigation is needed in the fields or farms where is less availability of water , since agriculture plays one of the most vital role in increasing or decreasing our country's economy . An improvising system is needed in order to ensure not even healthy growth of the plant's but also reduction of the amount of water wasted during such activities. So, this project signifies a Smart solar irrigation system using Arduino, this project helps in opening and closing the water supply according to the moisture level in the soil and the moisture level in soil is calculated by the help of soil moisture sensor which is one of the most important component in this project. The smart solar irrigation system will have zero electricity cost as whole project runs on solar energy beside that it is a farmer-friendly project helps in reduction of cost of the men required in the field to irrigate and most importantly reduces the amount of water wasted in irrigation of the fields.*

I. INTRODUCTION

Daily increment in the demand of energy, the constant decrease of existing fossil fuels and in the need of pollution free energy that does not harm our environment, humans have discovered various ways of producing energy resources with the help of nature like solar, wind energy etc. for the production of electrical energy and also agriculture plays one of the important in the economy the country.

Agriculture is the back-bone of the country of the for its development in the daily lives of the people and in production of food materials such as raw materials. Smart solar irrigation system provides convenient ways of irrigating with low investment as it ensures the healthy growth of plants with reduced amount of water getting wasted. Thus, Smart solar irrigation system is used for automatic irrigation, non-intervention of humans and reduced amount of water wastage.

II. LIST OF COMPONENTS REQUIRED

NAME	Quantity	Rating
Arduino Uno	1	14 digital input/output pin, 6 analog pin, 16Mhz crystal oscillator
Soil Moisture Sensor	1	8 bit, operating range -400 c
L293D Motor Driver IC	1	600-mA,4.5-36V
Submersible pump	1	3-6 v, DC
LCD	1	16×2 LCD, 16 pin 5 volt
Solar Panel	2	6V
TP4056 charging module	1	5V, 1A
Lithium-ion battery	2	3.7 V, 1200 mAh
Diode	1	1n4047(1)

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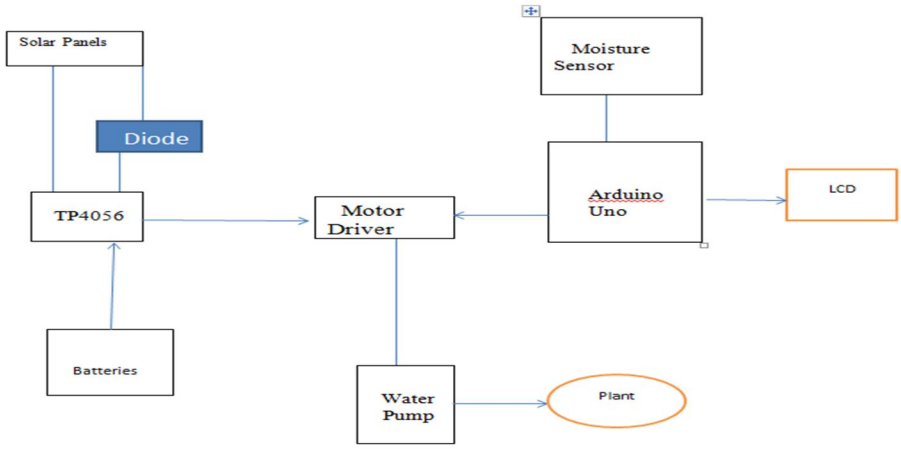
III. BLOCK DIAGRAM



IV. WORKING PRINCIPLE

The principle behind this project is in fetching the values given by the soil moisture sensor into Arduino board. Soil sensor consists of (i) a probe, which goes into the soil and act as variable resistor whose resistance changes according to the water content in soil. This sensor also consists of a(ii)Converter module that connects the probe with arduino. This module produces output voltage according to change in resistance in the probe, which by measuring we can determine moisture level. Converter module takes the output (analog pulse) of the sensor and gives the analog output which is fed to arduino input.

Aurdino is connected to many other devices like LCD via i2c module-which displays whether motor is "ON" OR "OFF", L293D motor driver module-runs on arduino high and low signal, helps in running the pump when signal is " high" and automatically turns off when signal is "low". This whole project is supplied with electricity with the two 6v solar panels that are connected in parallel and their function is to charge the 18650 li-ion batteries. Solar panel and batteries are connected to each other via of TP4056, that helps in balanced charging of the batteries.

The motor will work on following conditions-

1) Soil moisture is greater than set value of moisture.
2) Water level of tank is low.

V. RESULT AND CONCLUSION

A. Output Readings

Soil Moisture	Motor Status	LCD Status
1023	ON	Soil is Dry Water On
1002	ON	Soil is Dry Water On
942	ON	Soil is Dry Water On
662	OFF	Soil is perfect Water Off
600	OFF	Soil is perfect Water Off
324	OFF	Soil is Wet Water Off
386	OFF	Soil is Wet Water Off

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When the power is supplied to the circuits, Soil moisture begins to work and its task is to measure moisture level in the field and give the readings in the form of analog output to the Arduino board and in turn Arduino turns "On" or "OFF" the motor by giving high low signal and based on the programming done.

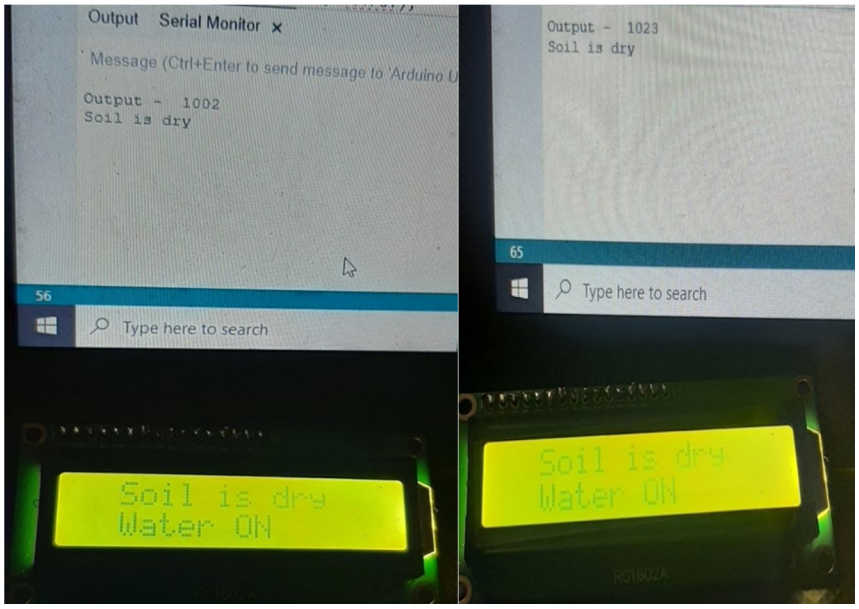
So, When the value is above 750, in this condition the motor is turned on by giving high signal and a message is displayed on the LCD screen.(LCD message shown in the above table)

When the value is between 501-749, in this condition the motor is turned Off by giving low signal and a message is displayed on the LCD screen. (LCD message shown in the above table)

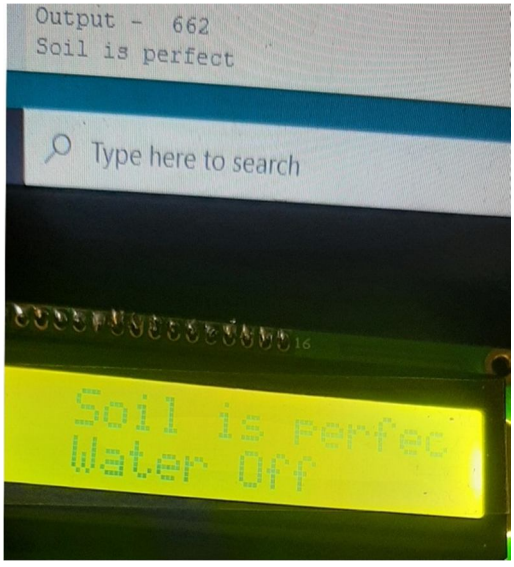
When the value is less than 500, in this condition the motor is turned Off by giving low signal and a message is displayed on the LCD screen. (LCD message shown in the above table).

1) Output Readings And Action Screenshots

Status when soil is dry



Status when soil is not too dry nor too wet



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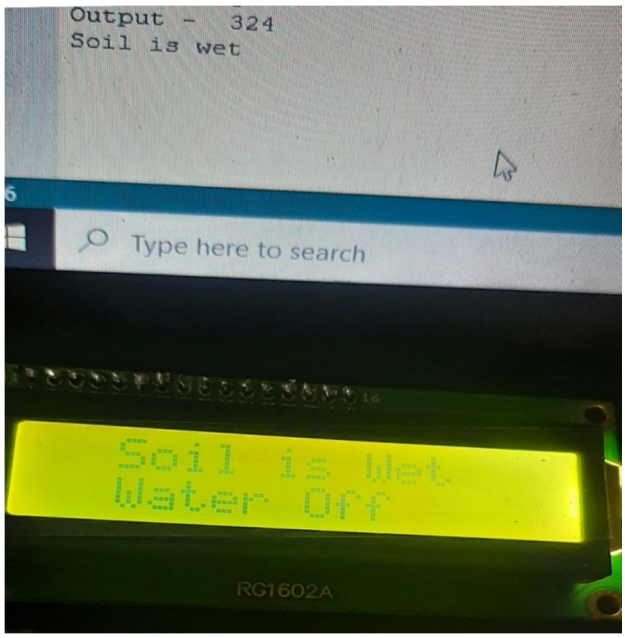
Status when soil is wet



VI. CONCLUSION

This Smart Solar Irrigation System project is capable of doing its task conveniently and cost effective for optimizing water resources . This project ease the work of cultivation where the electricity supply is not up to date by proving free electricity through solar panels and also to the places with water scarcity by using adequate amount of water. It proves that the unnecessary waste of water can be reduced. I conclude that this project is simple to implement and its manufacture can be advantageous for Agriculture sector as well as industry purpose. It provides low cost solution to cultivate lands and reduce dependency of electricity.

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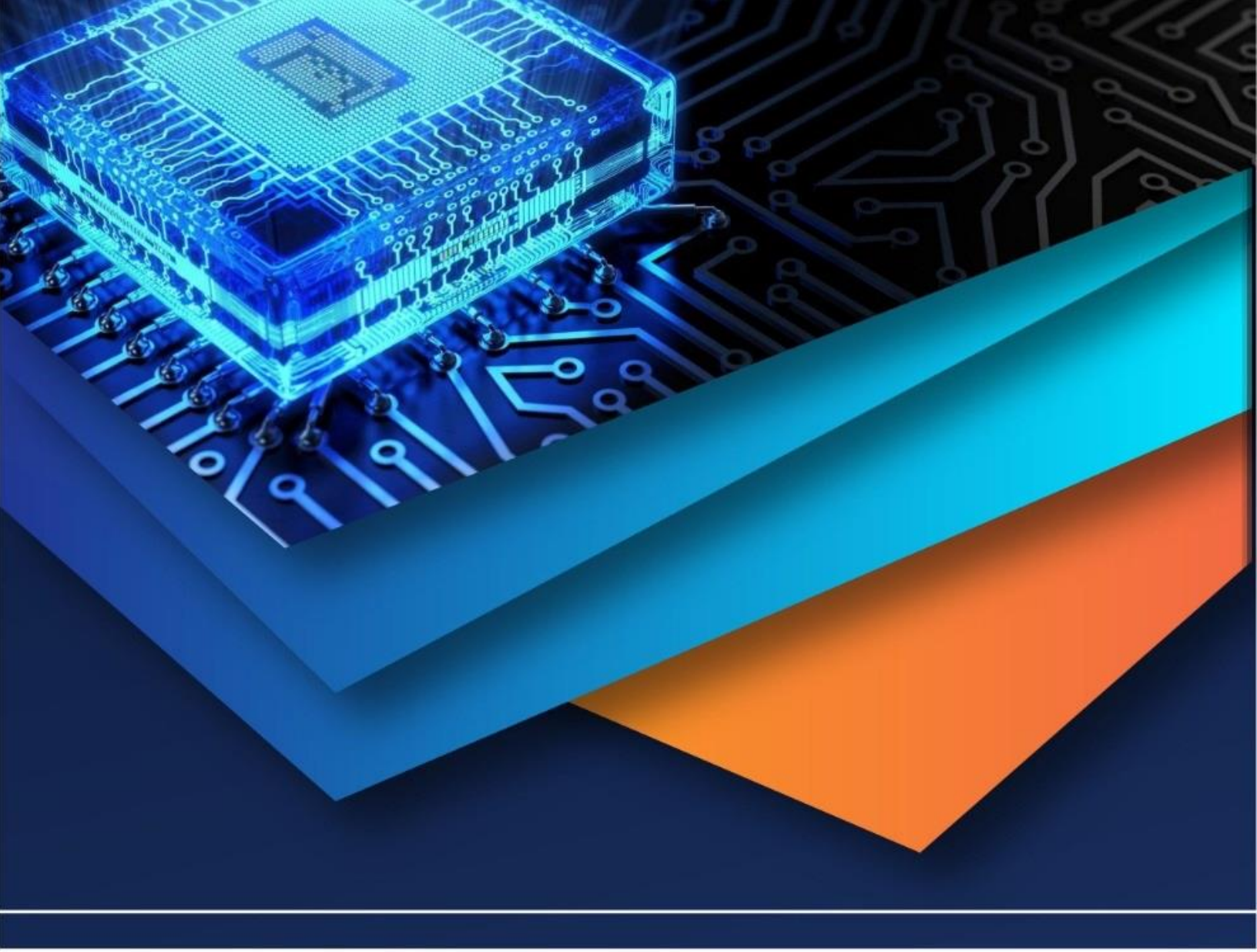

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