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## SOLAR PUMP UTILIZATION FOR IRRIGATION IN AGRICULTURE

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**Abstract:** In this report the described design of a PV and soil moisture sensor based automated irrigation system is introduced. This project aims to provide a human friendly, economical and automated water pumping system which eliminates the problems of over irrigation and helps in irrigation water optimization and manage it in accordance with the availability of water. Our project not only tries to modernize the irrigation practices and ensure the optimum yield by carefully fulfilling the requirements of each field or crop specifically, but also restricts the unnecessary wastage of water.

**Keywords:** PV Panel, DC Pump, Microcontroller, Moisture Sensor.

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## INTRODUCTION

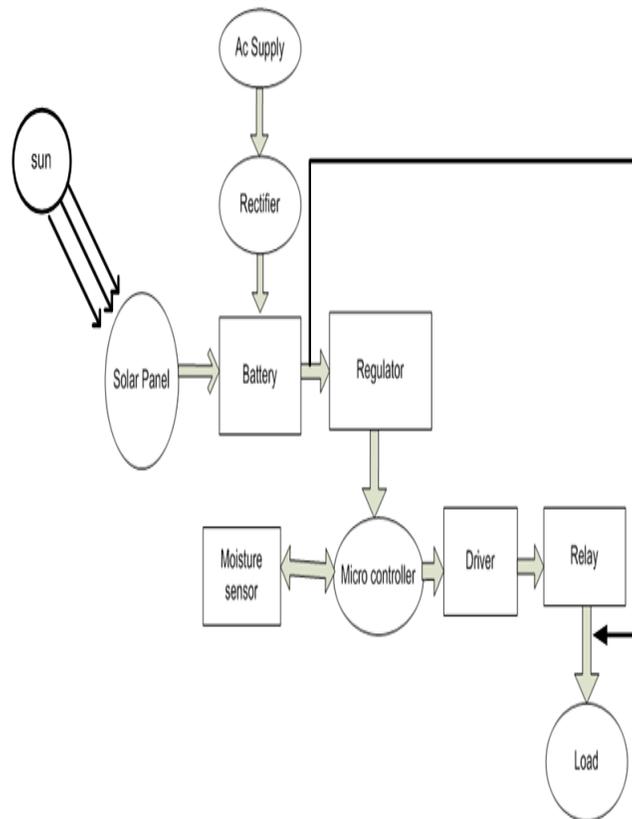
In the present days, technology has completely occupied the life style of human beings. Technology can be, and should be used in order to lead our country's surge in various spheres. This project aims at designing a PV and sensor based irrigation system, so as to introduce automation into the lives of those few whose worlds are isolated from technology. Our country is still an agrarian economy with about 60% of the population involved in the agricultural sector yet still very primitive practices are still in use. Hence there is a need for an intelligent automated irrigation system which can help in water management. This system sort out the problem of over irrigation with the help of soil moisture sensor. Furthermore, water shortage is overcome by employing protective duty, whereby the irrigation intensity is less than 100 percent.

In the project, soil moisture sensor is present at farm. When any farmer needs water for irrigation, the sensor will sense the moisture content of the soil and transfer the message to the system. The message is then decoded there, which results in identification of the farm moisture content from where the message has been sent. A return message is then to the microcontroller, which when decoded turns on the motor.

- System Structure & operation

The following figure shows the block diagram of Standalone solar pumping station for irrigation purpose. The below block diagram consists of

1. Solar Panel
2. Battery
3. Regulator
4. Microcontroller
5. Moisture Sensor
6. Driver IC
7. Relay
8. Water Pump (Load)



**Fig. 1 Block Diagram of Standalone Solar Pumping Station**

In this block diagram, we are using solar panel to produce electricity by extracting the sun rays from sun over the surface of panel giving the output of solar panel as input to battery. We are charging the battery then voltage regulator regulates the voltage that regulator voltage is used by a microcontroller driver IC takes command from microcontroller and relay operators (on/off) accordingly and hence the dc pump will their on/off. Here the moisture sensor which is drip in the soil will sense the water is available in soil or not then, if the sensor does not sense the water in the soil then microcontroller give command to driver IC which to start the dc pump. The moisture sensor sense the water in soil then the microcontroller give command to driver IC to operates relay and switch off the pump here we will apply the dc supply. The pump is dc.

- TECHNICAL CONCEPT:

Over the past several years, a significant work has been done related to soil moisture sensing. Although many projects have been accomplished prior to this work, still there is huge scope for improvement.

Our project incorporates an added improvement to the existing prototypes by:

a) Proper sensing of soil moisture and

b) The previous works existing in this area mainly deal with modeling of soil moisture sensors using automated data acquisition systems. This project provides a complete automated PV system for irrigation with use of soil moisture sensors. An important benefit of the proposed model over the already existing automated systems is that it ensures long distance, fast, noiseless, eco-friendly and PV technology by which external supply does not require. In addition to this, the concept of protective duty for managing water as well as power shortage is a completely new advancement in this field. Also the system has been comprehensively designed for usage by illiterates. The farmer doesn't require to press any button in the automated system. The system will work automatic hence it is very convenient to farmer.

### **Solar panel**

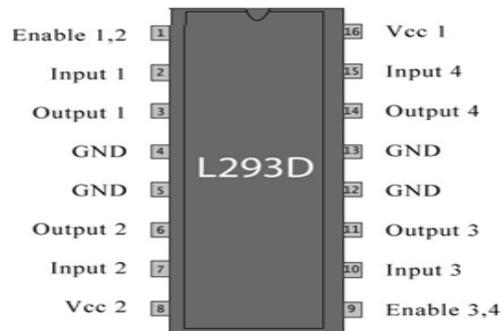
Photovoltaic cells are devices which convert the light into Electricity. The cells are wired in series, sealed between sheets of glass or plastic, & supported inside a metal frame. These frames are called as Module or Panels. PV cells are made up of thin silicon wafer a semiconducting materials When sunlight is absorbed by these materials, the solar energy knocks electrons to flow through the material to produce Electricity. This process of converting light(photons) to electricity (voltage) is called as 'photovoltaic effect'.

Mono crystalline cells are cut from large single crystals or from cylindrical blocks (ingots) of crystalline silicon. They are more efficient (12-16%).

### **Driver circuit:**

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz.

The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heatsinking The L293DD is assembled in a 20 lead surface mount which has 8 center pins connected together and used for heat sinking.



## Microcontroller

In 1981, Intel Corporation introduced an 8 bit microcontroller called 8051. This microcontroller had 128 bytes of RAM, 4K bytes of chip ROM, two timers, one serial port, and four ports all on a single chip. At the time it was also referred as "A SYSTEM ON A CHIP" The 8051 is an 8-bit processor meaning that the CPU can work only on 8 bits data at a time. Data larger than 8 bits has to be broken into 8 bits pieces to be processed by the CPU. The 8051 has a total of four I\O ports each 8 bit wide. There are many versions of 8051 with different speeds and amount of on-chip ROM and they are all compatible with the original 8051. This means that if you write a program for one it will run on any of them.

It plays an important role in this system. The required program is dumped in the Micro controller. It always takes the input from various devices present the circuit and perform operations in controlling motor

P1.0	□ 1	40	□ VCC
P1.1	□ 2	39	□ P0.0 (AD0)
P1.2	□ 3	38	□ P0.1 (AD1)
P1.3	□ 4	37	□ P0.2 (AD2)
P1.4	□ 5	36	□ P0.3 (AD3)
P1.5	□ 6	35	□ P0.4 (AD4)
P1.6	□ 7	34	□ P0.5 (AD5)
P1.7	□ 8	33	□ P0.6 (AD6)
RST	□ 9	32	□ P0.7 (AD7)
(RXD) P3.0	□ 10	31	□ $\overline{E}A/\overline{M}PP$
(TXD) P3.1	□ 11	30	□ ALE/ $\overline{P}ROG$
( $\overline{INT0}$ ) P3.2	□ 12	29	□ $\overline{P}SEN$
( $\overline{INT1}$ ) P3.3	□ 13	28	□ P2.7 (A15)
(T0) P3.4	□ 14	27	□ P2.6 (A14)
(T1) P3.5	□ 15	26	□ P2.5 (A13)
( $\overline{WR}$ ) P3.6	□ 16	25	□ P2.4 (A12)
( $\overline{RD}$ ) P3.7	□ 17	24	□ P2.3 (A11)
XTAL2	□ 18	23	□ P2.2 (A10)
XTAL1	□ 19	22	□ P2.1 (A9)
GND	□ 20	21	□ P2.0 (A8)

### DC pump

In our project we will use dc pump because supply is dc from photo voltaic panel.

### Moister sensor



**Advantages:**

- Highly sensitive
- Works according to the soil condition
- Fit and Forget system
- Low cost and reliable circuit
- Complete elimination of manpower
- Can handle heavy loads up to 7A
- System can be switched into manual mode whenever required

**Applications:**

- Roof Gardens
- Lawns
- Agriculture Lands
- Home Gardens
- Abstract Prepared By

**RESULT:**

Hence, as per requirement the pump getting switch off and switch on according to user requirement therefore, our aim is successfully fulfill as we are able to prohibit the wastage of water and the human work is reduced.

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