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DESIGN AND DEVELOPMENT OF SOLAR IRRIGATION SYSTEM

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ABSTRACT:

India is the country of villages and farmers. More than 51% people in India are depended on the farming and other associated processing. Being associated with large number of people and dependency of nation on this sector makes it most important sector for India. The problems associated with farmers are uneven distribution of rain in country, situations like flood and drought due to lack of rain has occurred in the countries at a time in different regions. On the other hand the available water is not used effectively by the farmers in lack of awareness. To overcome this situation, we have developed an automatic irrigation system suitable for Indian farmers. This system detects the moisture level of the soil using sensors and according to this level the water supply of crop is controlled. To reduce the cost for running of this setup, we have proposed the use of solar energy for irrigation of farm.

KEYWORDS: Irrigation**,** Automatic Irrigation System, Moisture Detection, Solar Irrigation System, etc.

INTRODUCTION:

Water is most important thing needed for cultivation of any crop. Without water it is impossible to cultivate the crop. The extraction of water through wells continuously results in drought. The water level of the wells in India is going down every year. This situation is very dangerous and we need to improve upon it anyhow. Many farmers are facing the issues with unavailability of water for crop cultivation. In lack of rain or if the rain is delayed by few days still farmers have to face the serious consequences in terms of loss of money.

We have developed the irrigation system based on solar energy and automatic working with use of sensors. This will help in improving upon wastage of water due to improper planning and control of water flow for different types of soil and crops. Microcontroller has made it possible to implement the irrigation effectively by controlling the moisture level of soil.

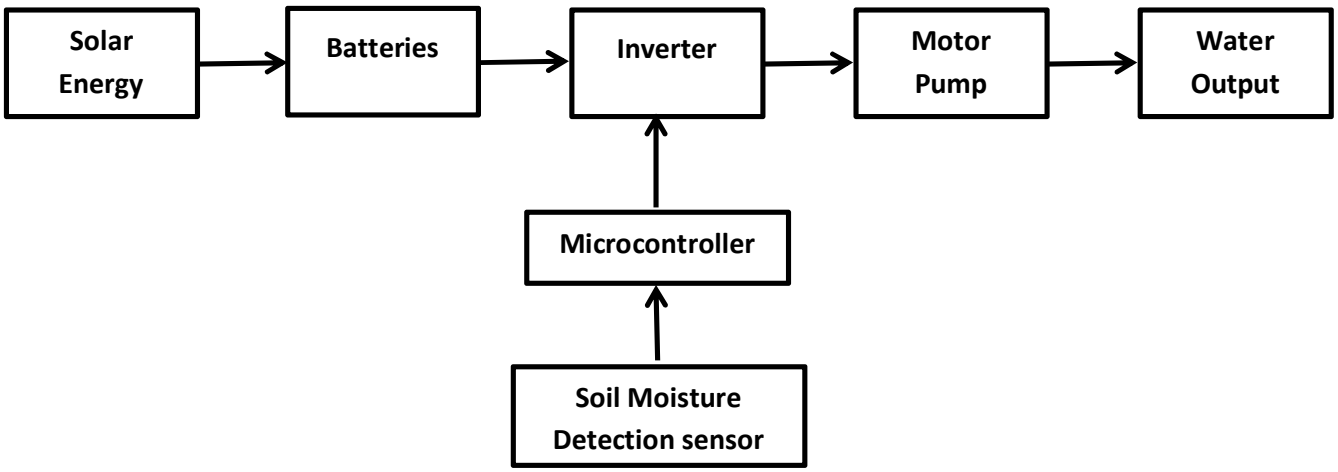


Fig.1: Block diagram of Solar based automatic irrigation system

The block diagram explains the basic working of system in detail. Solar energy is used as one of the most popular source for electricity generation. The energy generated is stored in batteries. Output of the batteries is controlled through microcontroller and inverter control techniques. This output is controlled on the basis of moisture level of the soil to make this system work automatic. The moisture detection sensors are used to identify the moisture of soil in different areas.

Conventionally most of Indian farmers are still visiting the farm to turn on the pumps. Automation in farming is not that popular mostly because lack of budget. The proposed automation solution will be helpful for saving the money on cost of electricity as the pump is solar powered.

OBJECTIVES:

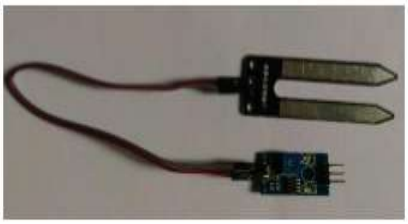
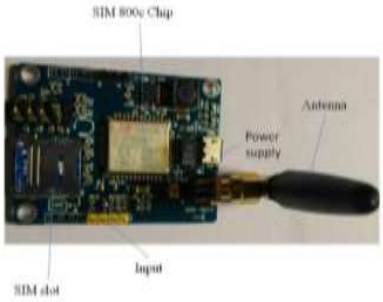
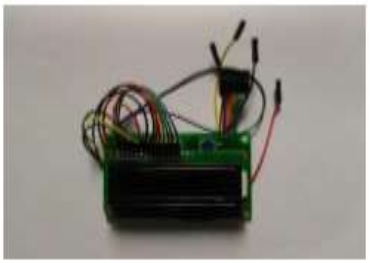
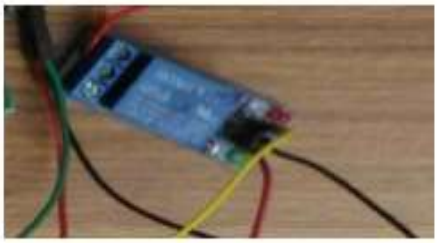
The work is carried out to fulfil following objectives:

- Designing a solar based irrigation system for Indian farmers.
- Implementing the soil moisture detection in the system to use the water effectively.
- Developing a hardware of cost effective solution for irrigation

SYSTEM REQUIREMENT:

Table.1: Details of main components

Sr. No.	Component	Specifications	Picture of Components
1	**Solar Panel**	12V, 10W each	
2	**Battery**	12V	

3	**Microcontroller**	W78E052	
4	**Soil Moisture Sensor**	LM393, 5V	
5	**GSM Module**	SIM800c, 5V	
6	**LCD Display**	16×2	
7	**Relay Driver**	5V	

8	**Pump**	12V Dc 18W Motor	
9	**Solar Charge Controller**	16 to 20V, 0°C to 50°C	

COST OF THE COMPONENTS PURCHASED:

Table.1: Cost of Main Components

Sr.no	Part	Quantity	Prize
1	Solar panel	1	3000
2	Moisture sensor	1	800
3	Float sensor	1	150
4	GSM module	1	900
5	Pump	1	2200
6	Microcontroller (Arduino)	1	1000
7	Tank and frame	1	1000
8	Solar charge controller	1	900
9	Relay Driver	1	150
	Total Cost in Rs.		10100/-

SYSTEM DESIGN:

The complete hardware for the system is connected following way as shown in figure below.

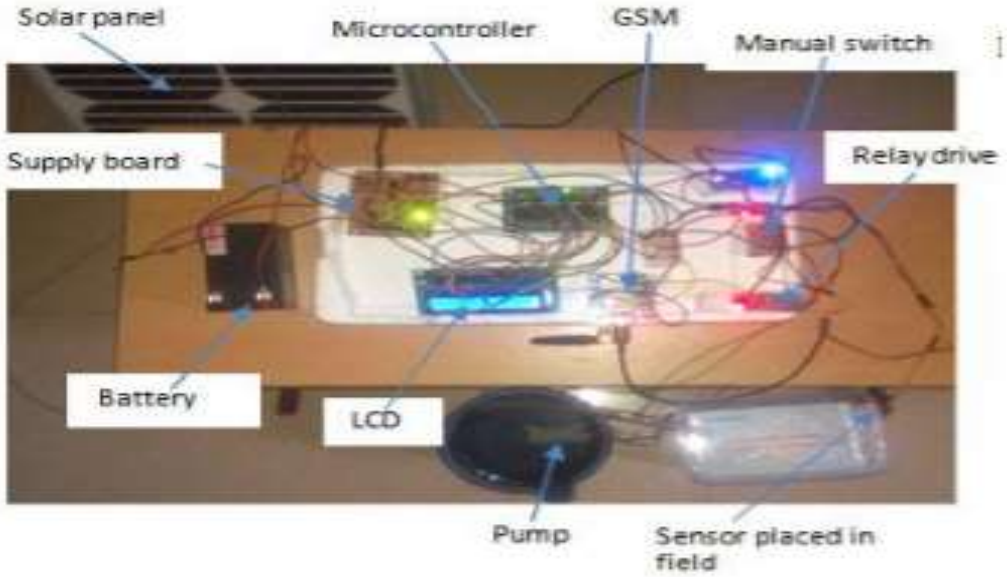


Fig.2: Prototype of Automatic Irrigation system

Components are selected for making this prototype with consideration of cost and performance. We want this project to be cost effective so that farmers can purchase it without any hesitation. The components are placed such as the available space is utilized effectively. The system must be user friendly so that the farmers can use it easily. Various checkups are carried out to make sure that the system will operate properly after installation. The assembly is further has arrangement for future expansion of work so that any future technology can be used with present system. Dimensions of the components are selected in order to keep the weight minimum. Arrangement is provided to expand the scope of work in future.

FUTURE SCOPE:

In coming future the system can be developed with addition of some useful feature such as rain sensor which gives idea about the amount of rain fallen over the farm surface. Rain water harvesting with implementation of automation can be very effective solution to overcome the problems associated with water availability and level of water in earth surface. Use of sensors with for controlling farming operations can be advantageous.

CONCLUSION:

Farmers in India can cultivate their crop with increase per hector cultivation in good technology is used in farming. The technology availability is one challenge on the other hand we need to think of reduction in cost of proposed technology for the farm. We have developed the solution for automatic irrigation system which not only helps in reduction of irrigation cost by reducing electricity bill but also useful for saving the water. The moisture level of the soil is tested against the standard value and depending upon the need water supply is provided by the pump. The components used for system development and the other design details of the system are discussed in this paper by us.

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