



Solar Power Based Water Pumping System with Automatic Irrigation Using Wireless Technology

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ABSTRACT:

Solar energy has emerged as viable source of renewable energy over the past few decades and is now used for various applications such as emergency lighting, water heaters and industrial application. This project proposes a solar based automatic irrigation system. The main objective is to design a low cost and time based irrigation system with the help of Arduino and monitoring the security of the field by monitoring animal presence . Irrigation scheduler measures various parameters such as humidity, temperature and soil moisture. This automatic irrigation system uses alternative energy that drives water pump to pump water from bore well to a tank and therefore the outlet valve of tank is automatically regulated exploitation controller. In this irrigation system the irrigation pump controlled in two modes: Automatic mode and WIFI mode.

INTRODUCTION:

Solar energy is the most abundant source of energy in the world. Solar power is not only an answer to today's energy crisis but also an environmental friendly form of energy. Photovoltaic (PV) generation is an efficient approach for using the solar energy. Solar panels (an array of photovoltaic cells) are now extensively used for running street lights, for powering water heaters and to meet domestic loads. The cost of solar panels has been constantly decreasing which encourages its usage in various sectors. One of the applications of this technology is used in irrigation systems for farming. Solar powered irrigation system can be a suitable alternative for farmers in the present state of energy crisis in India. Today the generation is heading towards ultra technologies. Water pumping has a long history; so many methods have been developed to pump water. People have used a variety of power sources, namely human energy, animal power, hydro power, wind, solar and fuels such a diesel for small generators.

LITERATURE SURVEY

Y. P. Patil [1]: In this paper author proposed the automatic system based on ARM and for communication GSM technology is used. Automatic irrigation technique irrigated using wireless sensor network i.e. Zig-bee and internet technology. Soil moisture sensor, temperature sensors placed in root zone of plant. Soil moisture sensor sense water level and accordingly it turns OFF the motor when the water goes above the danger level and provide accurate supply to the fields. For measuring threshold values of temperature sensor and soil moisture sensor an algorithm is developed that was programmed into a Arduino to control water quantity. To provide efficient power supply Photovoltaic cells are used. If the water level reaches at danger level, automatically motor will be turned off and it will provide notification to the farmer through GSM. Irrigation system provides adequate water supply in particular area which is real time. The system was based on ARM7TDMI core and GSM. GSM is an important part as communication between various systems occurs using GSM. GSM operate through SMS and is a link between ARM processor and centralized unit. The information send to user in the form of SMS and GSM modem is controlled with the help of standard set of AT (Attention) commands. These commands are used to control majority of the functions of GSM model. The idea was developed for improve irrigation system and reduced cost of irrigation water.

Karan Kansara [2]: In this author proposed an Irrigation Control System Using Android and GSM for Efficient Use of Water and Power. Automatic microcontroller based rain gun irrigation system in which the irrigation will take place only when there will be a need of water as a result it saves a large amount of water as it is avoiding wastage of water. Android is used for mobile devices that include an operating system. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. This application makes use of the GPRS feature of mobile phone as a solution for irrigation control system. These systems covered lower range of agriculture land and not economically affordable. The system supports water management decision, used for monitoring the whole system with GSM (RS-232) module. The system continuously monitors the water level and provide accurate amount of water required to the fields. The system continuously checks the temperature and humidity of soil in order to retain the nutrient composition of the soil so that. The system uses sensors for remote monitoring and controlling devices which are controlled via SMS using a GSM using android mobile. Automated irrigation system uses valves to turn motor ON and OFF and these valves are operating using microcontroller. These valves are automatically turned OFF and ON depending upon the need of supply. When there is a intense need of supply these valves will be ON and when water reaches at danger level these will be OFF. The system provides essential nutrients and enrich plant growth. Field is equipped with wireless communication sensors that avails better facilitated sensor communication and covers wider field area. The main aim of this paper is to provide automatic irrigation to the plants which helps in saving money and water. The entire system is controlled using 8051 micro controller which is programmed as giving the interrupt signal to the sprinkler. A wireless application of drip irrigation automation supported by soil moisture sensors. The author further added that if different kinds of sensors (that is, temperature, humidity, and etc.) are involved in such irrigation in future works, it can be said that an internet based remote control of irrigation automation will be possible. Conserves electricity by reducing the usage of grid power and conserves water by reducing water losses.

Prof. Rupali S. Sawant [3]: In this author proposed a microcontroller based automatic irrigation system. In this paper 8051 microcontroller series is used. The system consists of soil moisture sensor, temperature sensor, humidity sensor and solar panel. On the input side there are three. Soil moisture sensor will check the moisture of the soil as per the crop which is to be cultivated. When the moisture level of the soil goes above or below the set value, it will direct the microcontroller whether it should pump the water or not. Humidity sensor will check the temperature of the surrounding. If the International Journal of Scientific Research and Management Studies shows that if the temperature goes above or below the set value which is needed for a crop to grow, the arduino will direct the shedding to shed the entire field thereby maintaining the temperature needed by the crop for its healthy growth. The water level sensor will check whether the water in the reservoir or tank is empty or not. Buzzers are connected at the output side to get rid of birds, animals, and mosquitoes etc. This solar panel charger has no moving parts that could wear out over time. In this SIM300 is used for transfer of data from weather station. Interfacing with PIC is done with RS-232 through D-TYPE 9 pin connector. SIS is the leading manufacturers of GSM modems for lower price.

System components

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves.

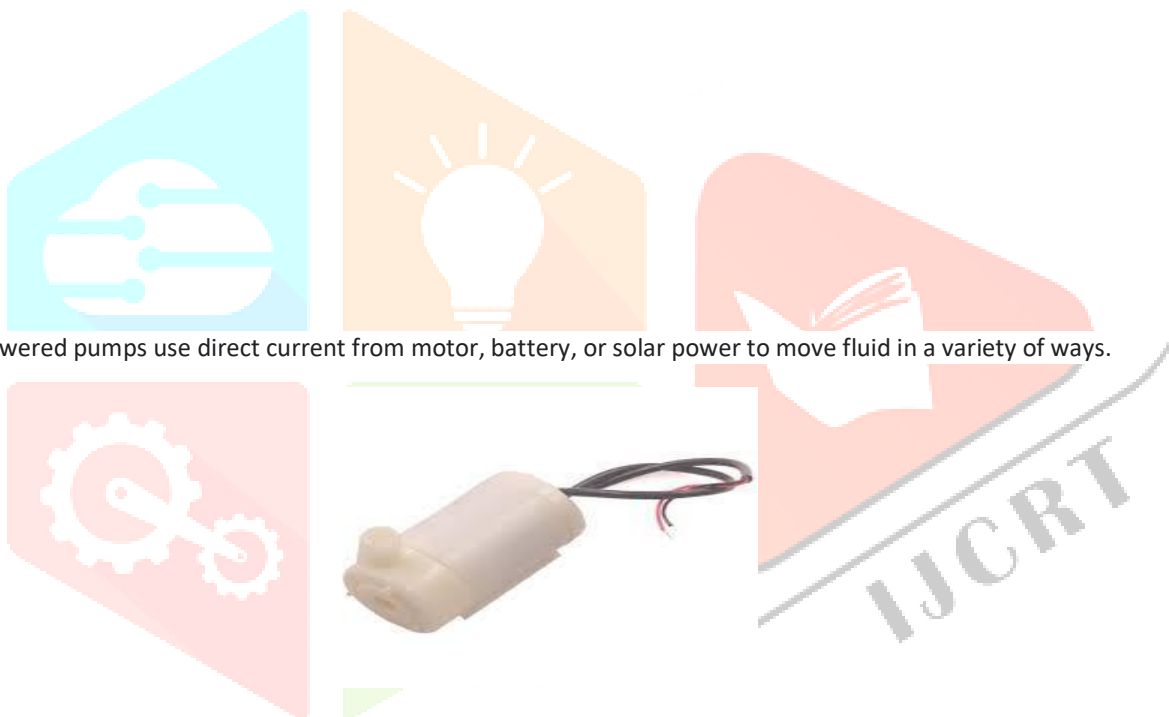


Figure 1. Ultra sonic

Infrared sensors are used to sense characteristics in its surroundings by emitting and/or detecting infrared radiation and are capable of measuring the heat being emitted by an object and detecting motion



Figure 2. IR sensor



DC powered pumps use direct current from motor, battery, or solar power to move fluid in a variety of ways.

Figure 3. DC water pump

A device used for converting electrical energy into acoustical signal energy



Figure 4. Speaker

GSM stands for Global System for Mobile Communication . It is a digital transmitting and receiving device used for open air in cellular mobiles.



Figure 5. GSM Sim900

A resistive soil moisture sensor works by using the relationship between electrical resistance and water content to gauge the moisture levels of the soil. ... When the water content in the soil is low, it has poorer electrical conductivity.

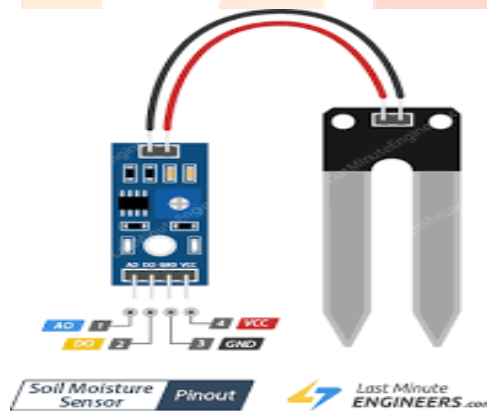


Figure 6. Soil moisture

Arduino is an open-source advancement stage or improvement board, comprises a microcontroller. With the assistance of Arduino and different sensors one can configuration ventures.



Figure 7. Arduino

A solar cell panel, solar electric panel, photo-voltaic (PV) module or just solar panel is an assembly of [photo-voltaic](#) cells mounted in a framework for installation.



Figure 8. Solar panel

BLOCK DIAGRAM

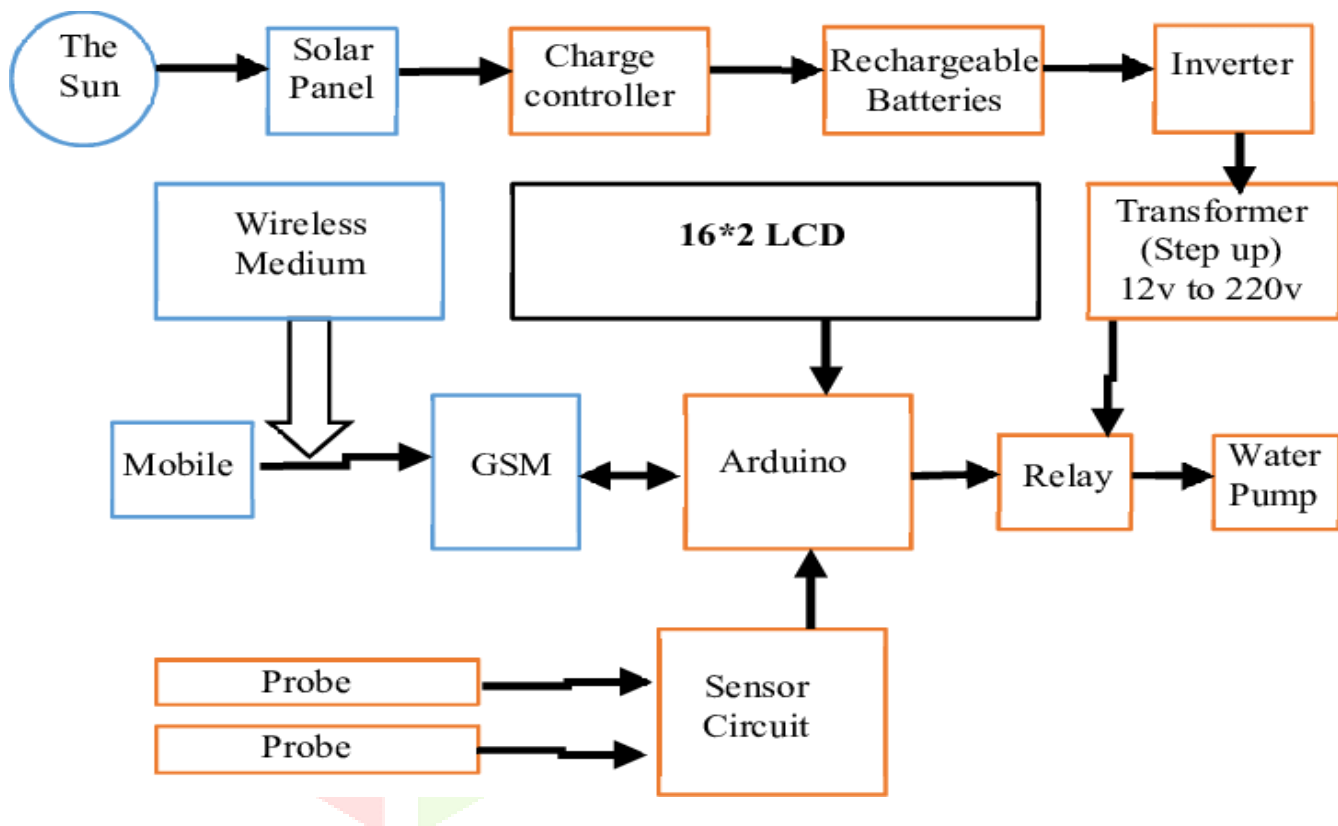


Figure 9. Block diagram

ADVANTAGES

1. It helps in saving Energy.
2. There is no fuel cost - as it uses available free sun light.
3. No electricity required.
4. Can be operated lifelong.
5. It works everywhere.
6. It is also useful for clean, drinking water sanitation and also irrigation.
7. The dependence on rain is reduced.
8. It creates wealth for farmers by increasing no of crops.
9. It maintains the security of the field

APPLICATIONS

1. Agriculture livestock watering / crop irrigation, home gardens and drip irrigation systems.
2. Domestic portable water for remote homes, campgrounds.
3. Pond water management and water transfer.
4. Water supply for villages in developing world.
5. Equivalent voltage this is given to a sensing circuit which has a reference voltage that can be adjusted by the farmer for setting different moisture levels for different crops.

CONCLUSION

In this project, the design and implementation of a smart irrigation system, powered by solar energy was presented. The design uses an automatic irrigation system that can be used to water the field by the type of food crop being grown. The problem of crop vandalization by wild animals and fire has become a major social problem in current time. It requires urgent attention as no effective solution exists till date for this problem. Thus this project carries a great social relevance as it aims to address this problem. This project will help farmers in protecting their orchards and fields and save them from significant financial losses and will save them from the unproductive efforts that they endure for the protection their fields

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