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Solar water pump with smart time control for power saving application

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Abstract - *Nowadays the modern technologies are helpful in all aspects of our life. Due to this lots of development done in the field of agricultural.The solar energy converted into electrical energy by photo voltaic cells. This energy stored in batteries during the day time to run the water pump for agriculture and distribute the water to the farm. The project is designed to operate the water pump at four different time slots. It prevents the difficulties of switching the pump on/ off manually. Real time clock interfaced to Arduino then Arduino give command to the corresponding relay to start the load and another command to switch off the load is programmed by the user. A matrix keypad helps to entering different time slots. Switching the pump ON/OFF manually these difficulties can be overcome using this project. There be an inbuilt real time clock (RTC)which keeps tracking the time and thus switches ON/OFF the pump accordingly.In this project, solar panel used to charge the battery a lcd display is interfaced to the to display time.*

***Keywords*: solar panel, Matrix keypad, RTC, LCD, Arduino.**

1. INTRODUCTION

A solar power pumping system are being used for developing country instead of other forms of energy because they are extremely durable and can also economic benefits. Solar powered water pumping systems can be the most appropriate solution, where the levels of solar radiation are extremely high. Solar powered water pumping systems provide basic needs of public like provide drinking water and water for agriculture etc. without the need for any kind of fuel or maintenance.

A large scale SPPS can serve well over 240 people at a time . solar powered pumping system produce sufficient electricity directly from solar radiations to power livestock.Solar water pumps mainly used for small scale or community based agriculture fields as large scale requires large volumes of water. Which requires a solar pv array extremely large in size. It is not necessary to provide large PV array when water may be required only during some parts of the year. Thus making the system in efficient
Solar PV water pumping systems are mainly used for irrigation and drinking water purposes in India. Larger SPPS can deliver around 140,000lts of water/day from a total head of 10 meters.

2. BLOCK DIAGRAM

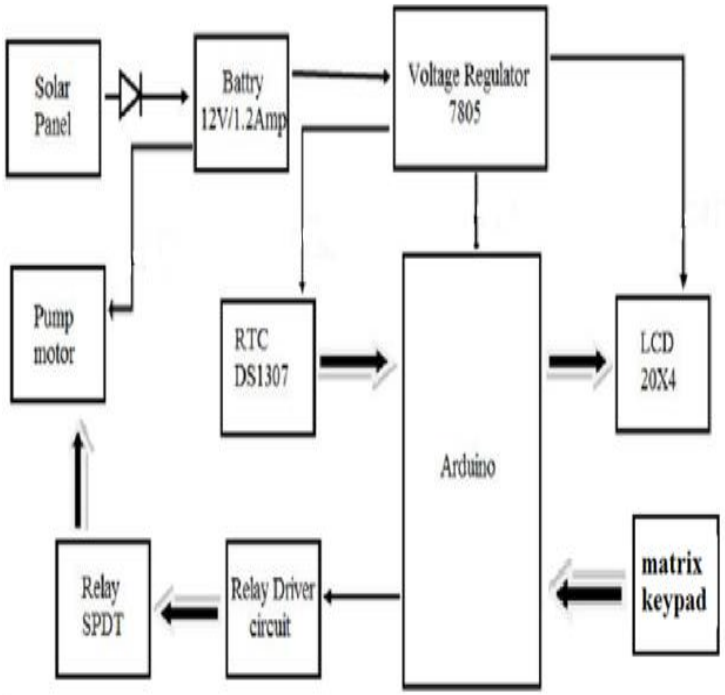

Fig -2: Block diagram of solar water pump with smart time control for power saving application.

3. IMPLEMENTATION

The working of the project can be understood by use of the flow chart and block diagram for the run of the pump in different time slot .

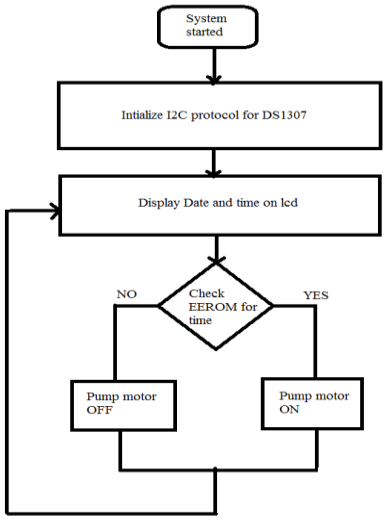

Fig -3: flow chart of solar water pump with smart time control for power saving application

There are three main components used in our project.

1. RTC
2. Matrix keypad
3. LCD

For working of solar water pump, power supply is main priority using Arduino we prepaid the power supply. Now for mechanical structure we used wooden block which shape triangular.

For converting solar energy into electrical energy we used solar panel. We can be converting solar energy through solar panel by using the solar cells and we can store supply in to the battery by connecting one diode between the solar panel and battery.

We have provided the facility of automatic switch off after the required time durations. This is archived or carried out using Arduino. A LCD is connected to Arduino to display the status of the pump.

Arduino gives command to the corresponding relay to turn on the load. We have done our programming in C language in Arduino software. We can display the real time and date using RTC.

Motor starts to run and then after completing the time entered by the Metrix keypad, relay turns off and motor is stop to run.

Solar panel absorb the sunlight as a source of energy to generate electricity. Solar panel gives electrical energy to battery for storage purpose.

A battery is a device which collect the electrical energy from the solar panel and stored it in chemical form.

This project provides the facility of automatic switch off after the required time duration. This is achieved by using arduino micro controller.

A LCD is connected to the arduino to display the status of the pump.

This project consists of real time clock is interface with to a arduino while the set time equals to the real time, then arduino gives command to the corresponding relay to turn on the load, and then another command to switch off as programmed by the user.

A Matrix keypad helps entering different time slots. a LCD display is interfaced to arduino to Display time.

A solar powered pump is a pump running on electricity generated by photovoltaic panels or the radiated thermal energy available from collected sunlight as opposed to grid electricity or diesel run water pumps.

This proposed system has an inbuilt real time clock (RTC) to keep tracking the time and thus to switch on/off the pump accordingly.

This project consisting of a real time clock (RTC) is interfaced to a Arduino and display the date and time on LCD. While set time equals to real time then Arduino gives command relay to turn on the load.

Arduino read the programme and when set time by the programmer is equal to the real time then pump motor on and set time then pump motor ON and set time not equal to real time then pump motor off it will be not start.

4. RESULTS

We have demonstrated this project by built a prototype model of solar powered pumping system. We have used DC motors and connected it to the relay driver circuit. A relay is used for switching operation.

By running this prototype model we got results as water supplied to the farm , garden. When set time is eqal to real time. The status of the pump can be known by using LCD display. The supply of water is completed by using submurcible pump.

Fig -4: Prototype model of solar water pump with smart time control for power saving application

We have used real time clock [RTC]. which have display real time and real date on LCD by interfacing with the arduino. We have set the time for running of the pump.

Arduino compare this set time with the real time which is display on LCD. After that, whenever set time is equal to real time arduino gives command to corresponding relay to turn on the load.

Generally relays mostly are used for protection, but here we have used for switching purpose. So by using relay, DC motor is operate and supply of water from tank or reservoir to the farm is to be done.

The solar panel is used to covert the solar energy into electrical energy and stored supply in to the battery in chemical form. One diode is connected between solar panel and battery.

The diode is uni-directional device so current can flow only in one direction, so reverse current cannot flow. This is the reason behind that providing one diode between solar panel and battery.

5. CONCLUSIONS

Our solar water pump with smart time control project provide the unique features like it provide zero maintenance. Long useful life, no fuel requirement, no contamination and comparatively easier installation etc compared to the diesel power pumping system. Solar water pump with smart timing control provides different time slots for pump working. It also reduces the human efforts. One advantage of this system is produces water when it's needed most this system makes a batter way to develop in area where grid electricity is unavailable and alternative sources do not provide sufficient energy.

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