Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 5, Issue 04, April -2018

SOLAR BASED WATER PUMP CONTROL HAVING DIFFERENT TIME SLOTS

Abhimanyu Singh Khangarot[1], Ashok Kumar Sharma [2*],
Akshay Raj Singh [3] ,Bhawani Singh Rathore[4]

[1]*Student, Department of Electrical Engineering,*
Swami Keshvanand Institute of Technology Management & Gramothan, Jaipur

[2*] *Student, Department of Electrical Engineering,*
Swami Keshvanand Institute of Technology Management & Gramothan, Jaipur

[3] *Student, Department of Electrical Engineering,*
Swami Keshvanand Institute of Technology Management & Gramothan, Jaipur

[4]*Student, Department of Electrical Engineering,*
Swami Keshvanand Institute of Technology Management & Gramothan, Jaipur

Abstract -*With the increase of the need of water, we have to develop the smart water irrigation system which can help for water conservation. To have such system we need to modify the conventional methods which are been used over a long period of time. Such system should have features to make it more economical and beneficial to all water supply requirement and for the irrigation system. As keeping energy saving in mind we have solar-based energy seems to help in providing the best solution for the irrigation system. Hence we have the best optimized modification for water irrigation.*

Keywords- *Solar Based Energy, Irrigation System, smart water irrigation, conventional methods, optimized modification*

I. INTRODUCTION

To save the power and consumption of water is the main aim of our project. There are many sources of irrigation system but some problems are created by which the water is been wasted over a large quantity. As for irrigation, we don't have appropriate measurements to use the water quantity. If water for irrigation is used more over the field it would damage the agrarian plants. To save our agriculture plants we need some modern technology to resolve our time and measurement quantity of water which is to be used over the fields.

In our country, seventy percent lands are used for agriculture, if we provide a system which can help our irrigation system more beneficial we can have a better output. So we have initiated to build up a project of a solar-based irrigation system which can save the power and water uses.

Now a day's many industries are using eco-friendly techniques in our country to meet the environmental conditions. We are using a microcontroller set device which can help in providing the time slots which helps in properly timed irrigation. Due to many environmental issues, this proposed model conditions would help to save water. Therefore there is the basic need for such micro-controller based system, which could maintain the all parameters uniformly and also could keep the records of system operation more efficiently. In this project, to boost our knowledge we have used an auto-control network for the agriculture farms, which could give the expected output of maintaining uniform environmental conditions.

II. WORKING

This project is designed such as to operate a motor for a fixed time duration. When a machine is to be operated for 10-15 minutes, and we want it to switch off after the duration, it is very difficult and many times we forgot to switch it off in the decided timeline.

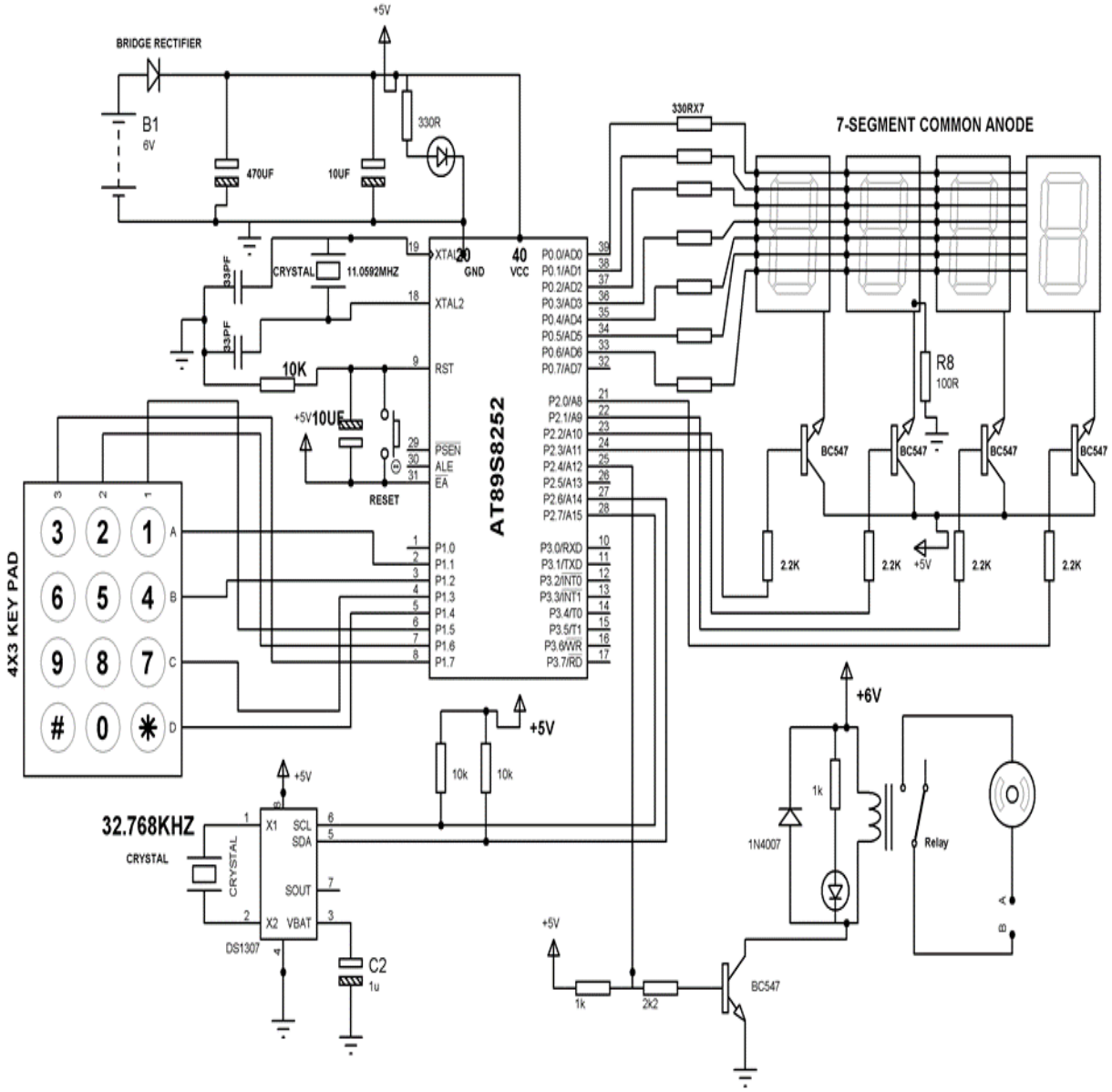
We have facilitated the function of automatic switch off after the required time duration in this project. We have used the AT89S52 MCU to perform time function. Matrix keypad is connected to one port of the microcontroller. Keypad input is used to provide four different fixed time constants.

A seven segment display is used to have time input and output display. A transistor is connected in the circuit used to drive the relay during the ON time period. Rely helps to control motor function in the system. The LED is used to indicate the ON-OFF relay function and load status. A switching diode is connected across the relay to neutralize the reverse EMF.

Photovoltaic cells are used to convert the solar energy into electrical energy. We charge the battery during the daytime after that batteries can be utilized to run water pump for agriculture. Our aim is to develop a controlled charge unit which

can have a constant output voltage and removes over-voltage condition. This proposed system consists a charging circuit, microcontroller unit with embedded real-time clock (RTC). Using the charged controlled units, the motor/pump can be operated at different time slots. Switching the pump ON/OFF manually is now becomes automatic, which resolves the major problems. Real-time clock (RTC) in controller circuit will correct and regulates the time and thus switches ON/OFF the pump accordingly. MOSFET's are also used in the charge controller circuit function as power semiconductor switches to provide ON/OFF condition of the motor. It operates in low battery or overload conditions. Thus the battery is protected from getting overcharged.

III CIRCUIT DAIGRAM



III. COMPONENTS

A. PHOTOVOLTAIC CELLS/SOLAR CELLS

Photovoltaic (PV) cells are made up of a semiconductor such as silicon, it most widely used in cells. When light strikes the cell, semiconductor absorbs some of the parts. The transfer of energy takes place in the semiconductor in this absorption process. The energy stored allows the electron to move freely. The basic cell has one or more electrons field which formed by light absorption to flow in a certain direction. Such free flow of electrons is the current, and by keeping some metal contacts on the top and bottom of the PV cell, we can use the current drawn externally. For example, the basic power used to run a calculator.

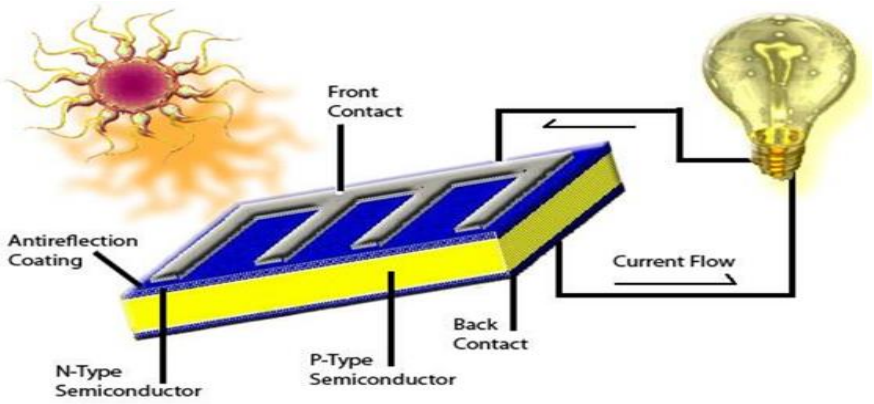


Figure 1: SOLAR PV CELL

B. BATTERY

Electrochemical cells are combined together to form a battery. It converts chemical energy into electrical energy. The battery has been the common power source in domestic use and industrial application.

Batteries are consumed one or it can be charged over a year. Miniature cells provide power to many devices. Big batteries are used as a power source in many industries.

Figure 2: BATTERY

C. MICROCONTROLLER/ AT89S52

It have the ability very low power, it has high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. We have commonly manufacture of Atmel's high-density which is non-volatile and is compatible with all standard 80C51 instruction set and pin-out. The on-chip is provided which allows the program memory to be reprogrammed in-system. Combination of versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a good microcontroller which provides flexibility and cost-reliable in embedded system.

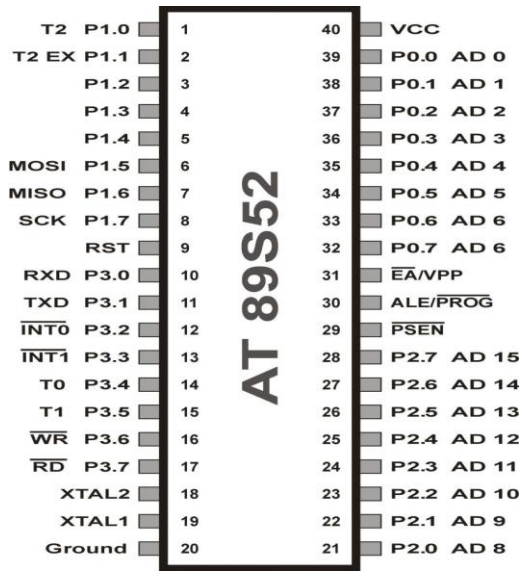


Figure 3: AT89S52 PIN DESCRIPTION

D. DS1307 RTC

It is a serial real-time clock (RTC) which consumes low power. It has full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. The bidirectional bus is used to move address and data serially. It has clock/calendar which provides seconds, minutes, hours, day, date, month, and year information.

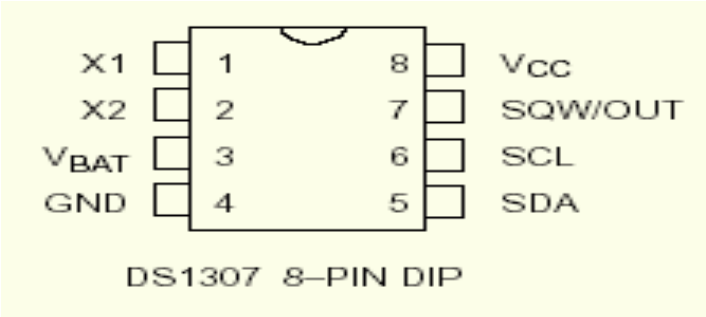


Figure 4: RTC PIN DESCRIPTION

V. APPLICATIONS AND FUTURE SCOPE

The system can have modification by adding GSM techniques, which provide us motor controlling at the remoter location. We can also find the soil condition by adding MOISTURE sensors. All such condition and information could be provided by SMS.

VI. RESULT

Thus we have built the model of solar water pump control with four different time slots for power saving applications and in which we see its working of the model/kit.

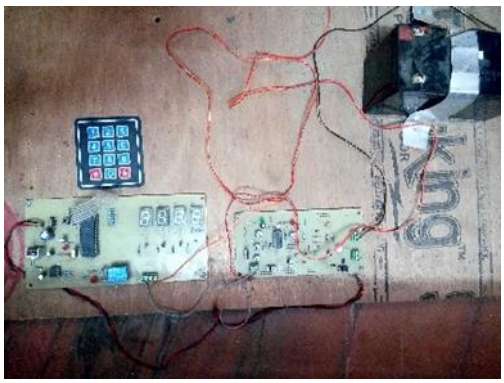


Figure 5: Solar Water Pump Control Model

VII. CONCLUSION

It can be finished that Photovoltaic frameworks are intended to supply water and water system in ranges where there is lack of power. Such modern technique could enhance the system and help us drawing water saving. Use of diesel locomotives can be minimized using solar-based energy control methods. Having conventional method could be replaced using more appropriate modification, as it makes the system more reliable, efficient and cost-effective. The user would have better agriculture motivation through the use of power saving mode. It will make an excellent development over the lands where the excess of water is been wasted. The countries all over the world will have more useful eco-friendly ways to control and balance environmental factors.

VIII. ACKNOWLEDGEMENT

I express my sincere gratitude to Mr. Abhishek Gupta, Associate Professor, Department of Electrical Engineering, SKIT, Jaipur who spared his valuable time from his busy schedule and extended his valuable guidance, expertise and vision to guide me through the preparation of this project and research paper.

REFERENCES

[1] Abdallah S., The effect of using sun tracking systems on the voltage-current characteristics and power generation of flat plate photovoltaics, Energy Conversion and Management, Vol. 45, pp. 1671-1979, 2004.
[2] Aliyu A.G. and Sambo A.S., Study of photovoltaic solar water pumping system in various climateconditions, Journal of Solar Energy, Vol.8 (1), pp. 345-354, 1989.
[3] Ghoneim A.A., Design optimization of photovoltaic powered water pumping systems. Energy Conversion and Management, Vol. 47, pp 1449-1463, 2006.
[4] Glasnovic Z. and Margeta J., Maximum area that can be economically irrigated by solar photovoltaic pumping system. Journal of Irrigation and Drainage Engineering, Vol.135(1), pp. 44-49, 2009.
[5] Hammad M.A., Characteristics of solar water pumping in Jordan. Energy, Vol. 24, pp. 85-92, 1999. pp.341-346, 2014.
[6] Khatib T., Design of photovoltaic water pumping system at minimum cost for Palestine: a review. Journal of applied sciences, Vol.10(22), pp. 2773-2784, 2010. Solar Water Pump Control with Different Time Slots (IJSRD/Conf/NCTAA/2016/046) 203
[7] Kolhe M., Joshi J.C. and Kothari D.P., Performance analysis of a directly coupled photovoltaic water-pumping system. IEEE Trans. On Energy Conv., Vol. 19, pp. 613-618, 2004. [8] Meah K., Ula S. and Barrett S., Solar photovoltaic water pumping: opportunities and challenges. Renewable and Sustainable Energy Reviews, Vol.12, pp. 1162-1175, 2008.
[9] Van Dyk E.E., Gxasheka A.R. and Meyer E.L., Monitoring current voltage characteristics and energy output of silicon photovoltaic modules. Renewable Energy, Vol. 30, pp. 399- 411, 2015. [10] Vick B.D. and Clark R.N., Effect of panel temperature on a solar-PV AC water pumping system. ASES Solar 2004: A Solar Harvest Growing Opportunities. July 11-14, 2015. Portland.

