

SOLAR TRACKING SYSTEM WITH AUTOMATIC PANEL COOLING MECHANISM FOR EFFICIENT POWER GENERATION

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ABSTRACT

Energy crisis is the most important issue in today's world. Conventional energy resources are not only limited but also the prime culprit for environmental pollution. Renewable energy resources are getting priorities in the whole world to lessen the dependency on conventional resources. Solar energy is rapidly gaining the focus as an important means of expanding renewable energy uses. Solar cells those convert sun's energy into electrical energy are costly and inefficient. Different mechanisms are applied to increase the efficiency of the solar cell to reduce the cost. Solar tracking system is the most appropriate technology to enhance the efficiency of the solar cells by tracking the sun. A microcontroller based design methodology of an automatic solar tracker is presented in this paper. Light dependent resistors are used as the sensors of the solar tracker. The designed tracker has precise control mechanism which will provide three ways of controlling system. A small prototype of solar tracking system is also constructed to implement the design methodology presented here. Compared for various combinations. From the results it could be depicted that tracking with only reflection and only cooling give higher power than tracking without reflection or cooling; but while tracking with reflection plus cooling the power increase is much more than any other combination.

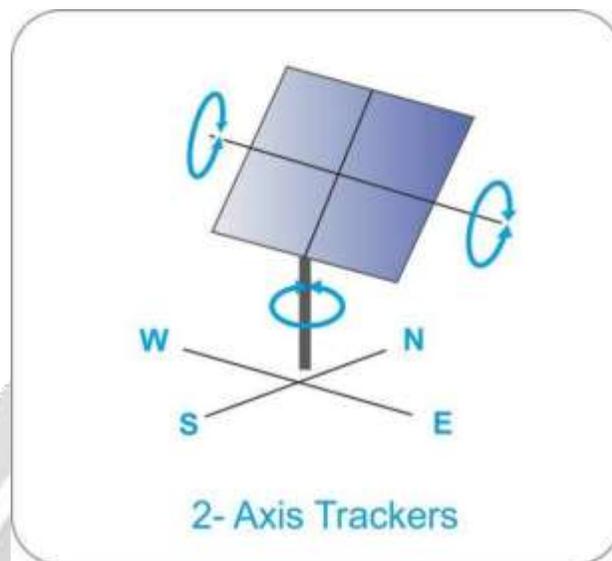
Keywords – ARM Processor, Solar panel

1. INTRODUCTION

At the present time, climate change on the world is at a delicate level. Climate change can be divided into two classes, human and natural causes. Natural causes of climate changes of ocean current, solar variations and earth orbital changes. The major part of climate changes caused by human is man-made greenhouse gases emission. Global warming can be shown through some of the natural phenomenon around the globe like the severe weather conditions. Solar energy is the energy derived from the sun in the form of solar irradiation. Solar energy is the most inexhaustible, renewable source of energy known to humanity. In order to increase the efficiency of solar energy systems, solar tracker is added at the expense of system's complexity and cost. The two basic categories of trackers are single axis and dual axis. Single axis tracker has one axis of freedom, vertical and a horizontal axis of freedom, so it able to track the position of the sun precisely.

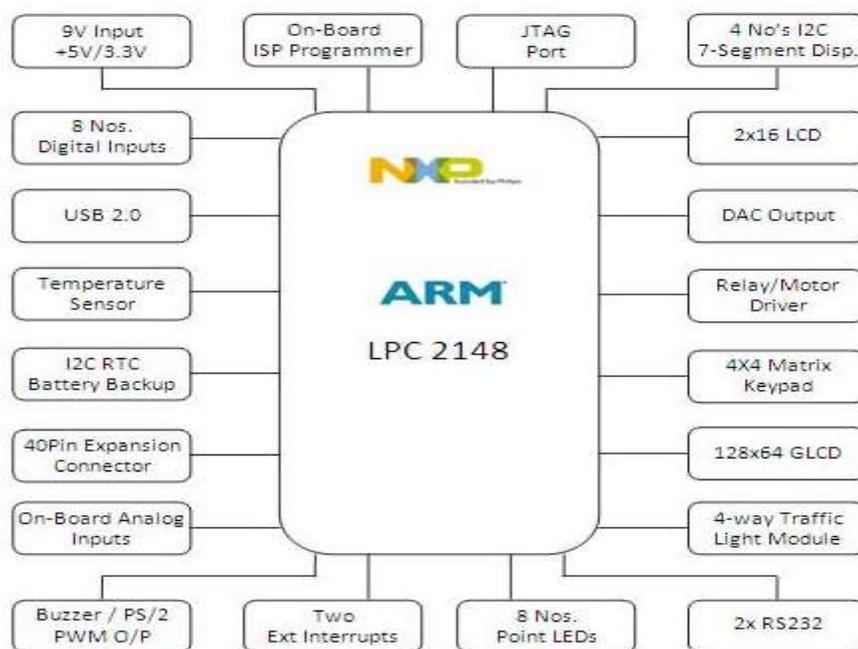
2. SOLAR TRACKING SYSTEM

Maximize the amount of energy that is capable of being produced by solar cells. Provide solar cells with more direct sunlight. Allow cells to receive more hours of sunlight. As shown in the Figure 1.1



3. PURPOSE OF ARM PROCESSOR

The ARM is a 32-bit reduced instruction set computer (RISC) instruction set architecture developed by ARM limited. It was known as the **Advanced RISC Machine**, and before that as the **Acorn RISC Machine**. The ARM architecture is the most widely used 32-bit ISA in terms of numbers produced they were originally conceived as a processor for desktop personal computers by Acorn computers, a market now dominated by the x86 family used by IBM PC compatible computers.

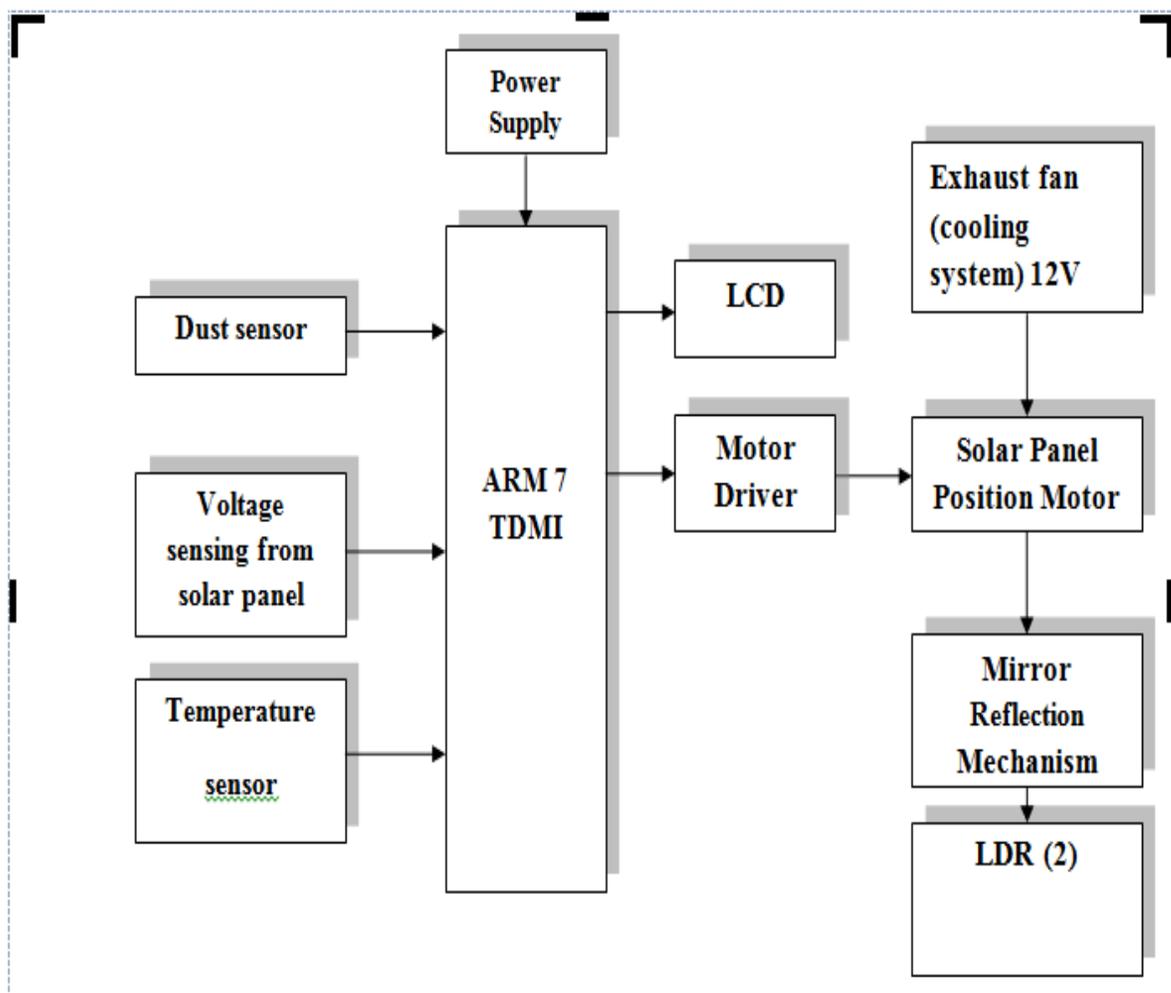


4. OBJECTIVES

- To get maximum energy from the sun by solar tracking system
- Reduce raw materials by decreasing overall size
- Installation of an effective controlling system

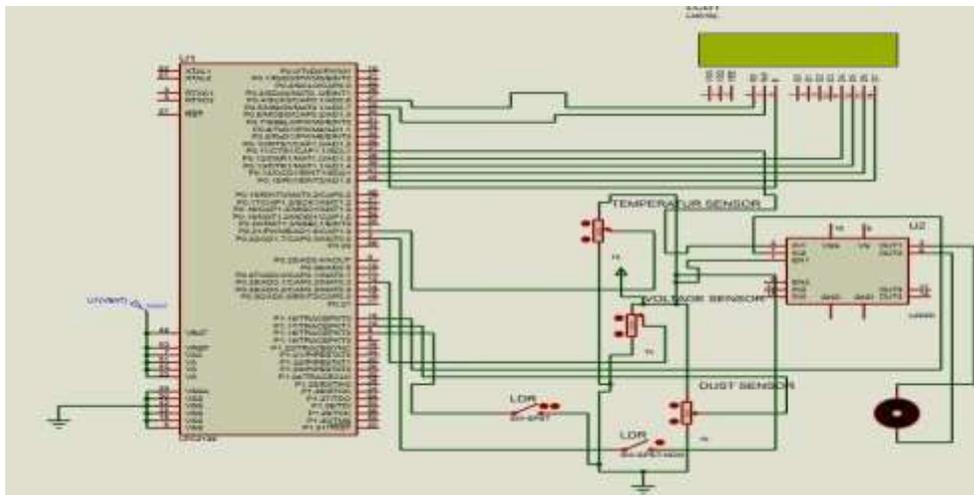
5. WORKING PRINCIPLE

This paper has proposed an automatic sun light adjusting system using solar power for the solar panel control with help of ARM 7 TDMI. The proposed system can keep solar panel direct to the sun light based on the LDR Sensors. After getting the position, the panel will follow the sun light to get maximum power by switching over to the next quadrant. When the sun sets down the solar panel will come to the reset position. This mechanism in deed extends the green power applications and is very feasible for general facilities that require no large power. Cleaning mechanism is used to remove the dust in the solar panel.



6. SIMULATION DIAGRAM

The simulation is designed in Proteus, circuit design software with simulation facility. The designed simulation is given below.



7. HARDWARE DIAGRAM

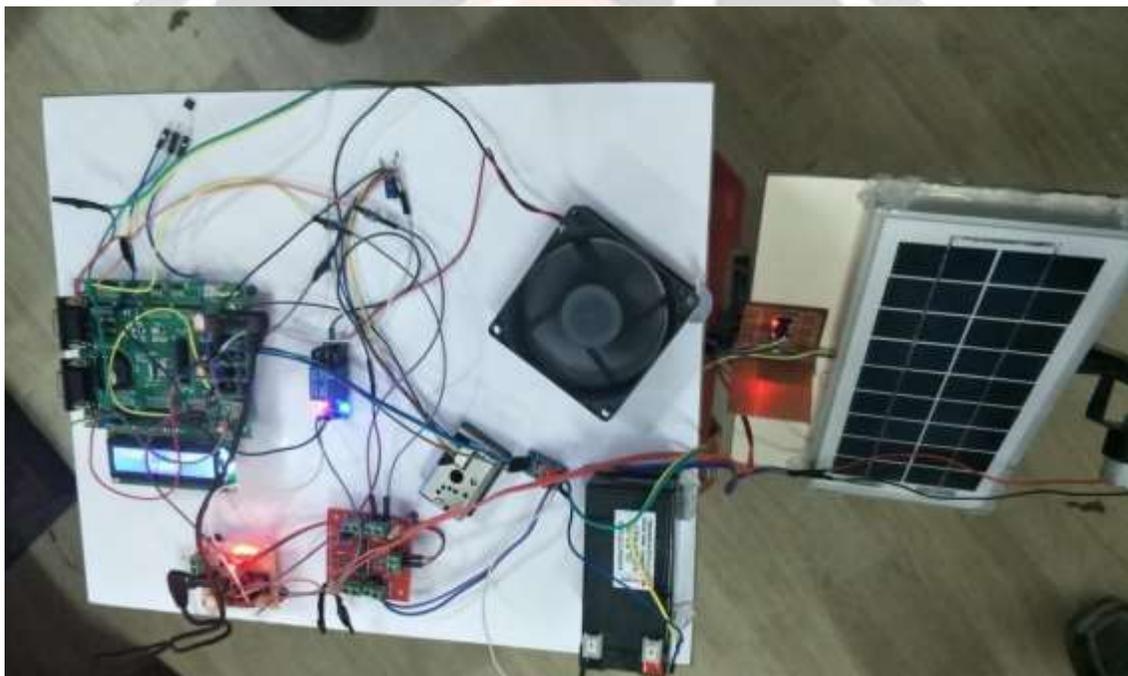


FIG-1 HARDWARE CIRCUIT

7. HARDWARE REQUIREMENTS

- LPC2148 based ARM 7 TDMI
- Driver Circuit
- 12V dc cooling fan
- Solar Panel
- Dust sensor
- LCD
- Mirror Reflection Mechanism.
- Temperature senso

8. SOFTWARE REQUIREMENTS

- Embedded C
- Keil u Vision

9. CONCLUSION

Thus an effective solution is provided which utilises the solar tracking system with automatic panel cooling mechanism for efficient power generation. This method can be implemented in all kinds of solar tracking system from which the unused energy is used as well as saving energy which can be stored with the help of batteries for other purpose needs and future use. Thus our project plays a role in conservation of energy.

10. REFERENCES

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