

ADVANCED SOLAR TRACKING AND INTELLIGENT BATTERY MANAGEMENT SYSTEM USING MICROCONTROLLER

¹J.Venkatesan , ²K.V.Dinesh Babu, ³K.Vijaykumar , ⁴M. Sudhakaran,

^{1,2}Dept of EEE, GTEC, Vellore, India

³Asst Prof, Dept of EEE, GTEC, Vellore, India

⁴Associate Prof, Dept of EEE, GTEC, Vellore, India

Abstract:

Solar energy is becoming increasingly attractive as we grapple with global climate changes. However, while solar energy is free, non-polluting, and inexhaustible, solar panels are fixed. using low cost superiority of the high concentrator material in place of the expensive solar cell to reduce the comprehensive cost of the photovoltaic system and realize the high effective and the efficient unification of the focussing photovoltaic system. As such, they cannot take advantage of maximum sunlight as weather conditions and seasons change. A solar panel receives the most sunlight when it is perpendicular to the sun's rays, but the sunlight direction changes regularly with changing seasons and weather. Currently, most solar panels are fixed, to overcome this we designed a solar tracking electricity generation system by a microcontroller based solar panel tracking system. Solar tracking enables more energy to be generated because the solar panel is always able to maintain a perpendicular profile to the sun's rays. Development of solar panel tracking systems has been ongoing for several years now., And also in this project the electrical energy is stored in the single battery so the battery is involved in charging and discharging operation, due to this the life of the battery gets damaged.

Keywords – PV, Tracking, Rays.

1. INTRODUCTION

Renewable energy is rapidly gaining importance as an energy resource as fossil fuel prices fluctuate. The system will tend to maximize the amount of power absorbed by Photo Voltaic systems. It has been estimated that the use of a tracking system, over a fixed system, can increase the power output by 30% - 60% . The increase is significant enough to make tracking a viable proposition despite of the enhancement in system cost. It is possible to align the tracking heliostat normal to sun using electronic control by a micro controller. and the output of the photovoltaic cell is stored into the battery, here two batteries are used, a battery is charging while the another one is discharging the power to the load. so the battery life is improved, this is accomplished by microcontroller. Design requirements are: i). during the time that the sun is up, the system must follow the sun's position in the sky. ii) It should be totally automatic and simple to operate . The operator interference should be minimal and restricted to only when it is actually required.

2. EXISTING SYSTEM

In existing system , the more number of solar panels are used to make the panel perpendicular to the sun to generate more electrical energy and the single battery is used. In this system the generated electrical energy is charged and discharged to the load at the same time. Electrical energy provided for 12 hours per day. But all kind of battery's fully charged within 8 hours

DISADVANTAGES

- In this system, more number of solar panels are used, so the cost required to buy the panels are more.
- The electrical energy stored in this battery for a period of 12 hours. So remaining 4 hour energy over charging the battery by this process the life of battery reduced.
- And also the same battery is used for charging and discharging at the same time so the battery gets damaged.

3. HARDWARE DESIGN

World population is expected to double by the middle of the 21st century (Global Energy, 1998). This will consequently result in a 3-5 fold increase in world economic output by the year 2050, and a 10-15 fold increase by the year 2100. Consequently, Primary energy requirements are expected to increase by approximately three folds by the year 2050 and five folds by the year 2100. This is expected to exert tremendous pressure on primary energy supplier. Energy has an established positive correlation with economic growth. Providing adequate, affordable and clean energy is a prerequisite for eradicating poverty and improving productivity.

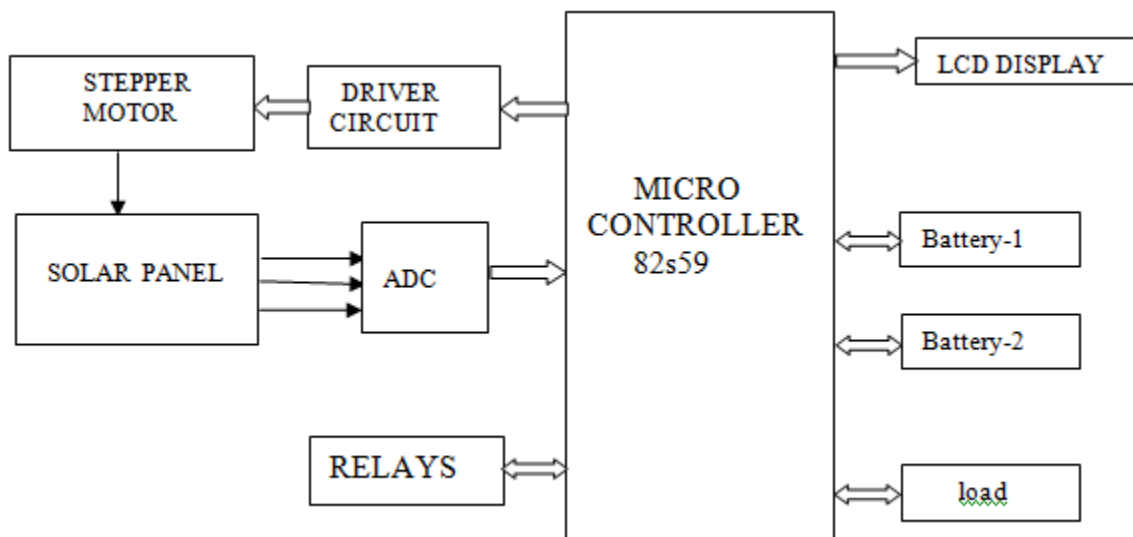


Fig.1. Block Diagram

The inevitable increase in the use of fossil fuels alongside a country's economic growth presents associated side effects of threat to the nation's energy security, as well as environmental degradation through climate change. A feasible alternative to the indiscriminate burning of fossil fuels lies in the accelerated use of renewable energy. In tropical countries, which have sunshine almost throughout the year in most parts, solar energy is one of the most viable options. World population is expected to double by the middle of the 21st century (Global Energy, 1998). This will consequently result in a 3-5 fold increase in world economic output by the year 2050, and a 10-15 fold increase by the year 2100. Consequently, Primary energy requirements are expected to increase by approximately three folds by the year 2050 and five folds by the year 2100. This is expected to exert tremendous pressure on primary energy supplier. Energy has an established positive correlation with economic growth. Providing adequate, affordable and clean energy is a prerequisite for eradicating poverty and improving productivity.

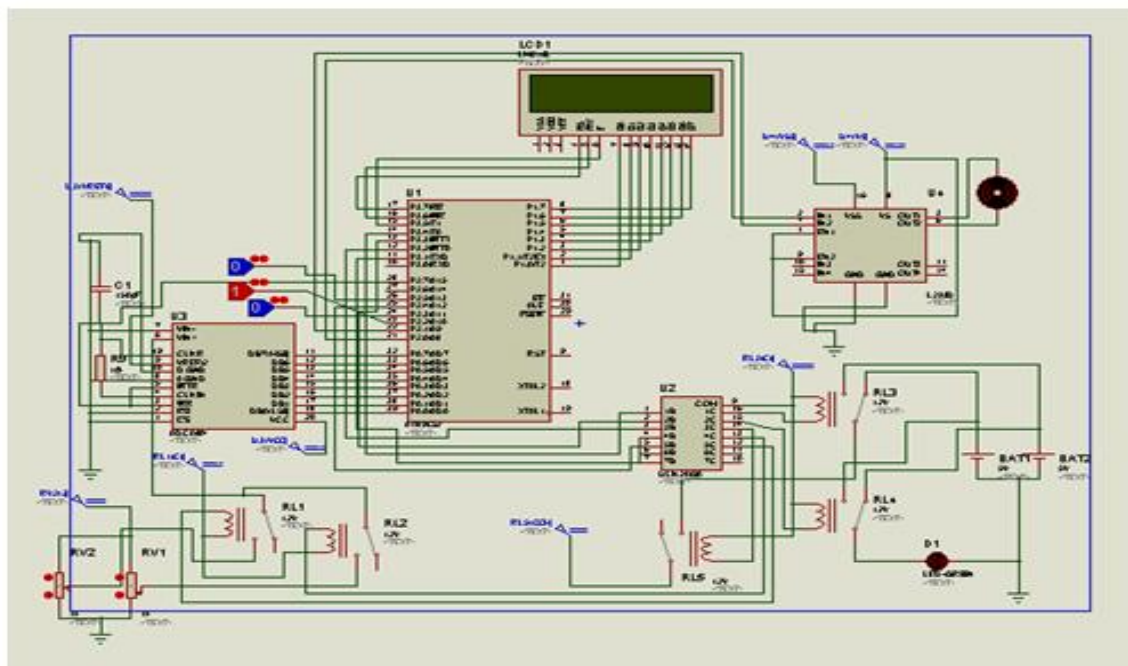


Fig.2. Hardware structure

The inevitable increase in the use of fossil fuels alongside a country's economic growth presents associated side effects of threat to the nation's energy security, as well as environmental degradation through climate change. A feasible alternative to the indiscriminate burning of fossil fuels lies in the accelerated use of renewable energy. In tropical countries, which have sunshine almost throughout the year in most parts, solar energy is one of the most viable options. There is a universal rule to find out how to use an IC. All you need is the datasheet of the IC you are working with and take a look at the timing diagram of the IC which shows how to send the data, which signal to assert and at what time the signal should be made high or low etc.

4. RESULT ANALYSIS

Finally it is necessary to specify which file processor is to run. In our example, this will be tl.hex (the hex file produced from MPASM subsequent to assembling tl.asm). To attach this file to the processor, right click on the schematic part for the ARM and then left click on this part. This will bring up the edit component dialogue form which contains field for a program file/If I is not already specified as tl.hex either enter the path to the file manually or browse to location of file via the "?" button to right of the field. Once you have specified the hex file to be run hit ok to exit the dialogue form we have now attached the source file to the design and specified which code generation tool will be used. A more detailed explanation on the source code control system is available in the proteus. Proteus VSM includes a number of virtual instruments including an Oscilloscope, Logic Analyzer, Function Generator, Pattern Generator, Counter Timer and Virtual Terminal as well as simple voltmeters and ammeters. In addition, we provide

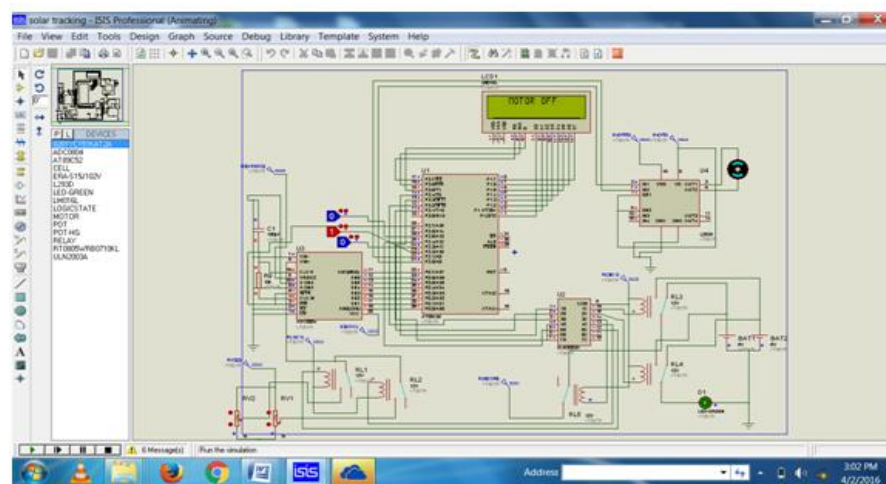


Fig.3. Simulation Result

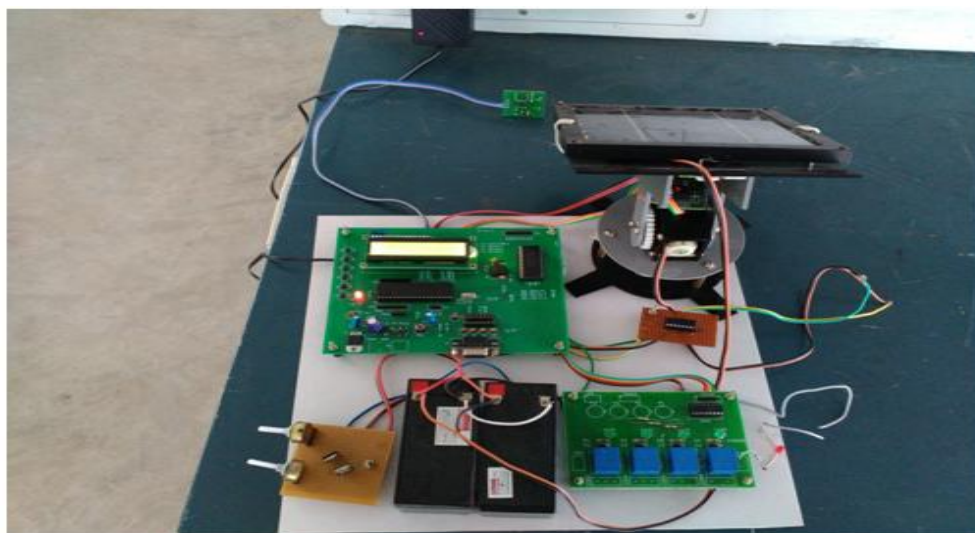


Fig.4.Construction and Hardware

dedicated Master/Slave/Monitor mode protocol analyzers for SPI and I2C - simply wire them onto the serial lines and monitor or interact with the data live during simulation. A truly invaluable (and inexpensive!) way is to get your communication software right prior to hardware prototyping. Should you wish to take detailed measurements on graphs, or perform other analysis types such as frequency, distortion, noise or sweep analyses of analogue circuits, you can purchase the Advanced Simulation Option. This option also includes Conformance Analysis - a unique and powerful tool for Software Quality Assurance.

CONCLUSION

In this paper, the automatic hybrid solar tracking system which is an efficient system, can be utilized anywhere such as house-hold purpose, in offices, even in various industrial applications. Today`s world is facing acute energy crisis. It is necessary to find new resources of energy and also need to improve the efficiency of power generation from other renewable energy sources to possible extent. and also the generated energy is stored in the battery efficiently by the switching process, so the battery life is improved.

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