



ISSN: 0975-766X
 CODEN: IJPTFI
 Research Article

Available Online through
www.ijptonline.com

SOLAR TRACKING DEVICE USING AT89C51 MICROCONTROLLER

Jeevagan Vivekanandan, S.Prem Kumar

Department of ECE, Saveetha School of Engineering, Saveetha University, Chennai, Tamil Nadu.
 Saveetha School of Engineering, Saveetha University, Chennai, Tamil Nadu, India.

Email: jeevagan.vivekanandan@gmail.com

Received on: 25.09.2016

Accepted on: 15.10.2016

Abstract:

This paper manages a microcontroller based SOLAR PANEL board following framework. Sunlight based following empowers more vitality to be created in light of the fact that the sun powered board is constantly capable to keep up an opposite profile to the sun's beams. Advancement of sun based board following frameworks has been continuous for quite a while now. As the sun moves over the sky amid the day, it is favorable to have the sun oriented boards track the area of the sun, such that the boards are dependably opposite to the sun powered vitality transmitted by the sun.

Keywords: Solar system, solar panel, microcontroller AT89C51, LDR, stepper motor.

I. Introduction

Renewable vitality is quickly picking up significance as a vitality asset as fossil fuel costs vary. The framework will have a tendency to boost the measure of force consumed by Photo Voltaic frameworks. It has been assessed that the utilization of a following framework, over an altered framework, can expand the force yield by 30% - 60%. The expansion is sufficiently noteworthy to make following a suitable relational word in spite of the improvement in framework cost. It is conceivable to adjust the following heliostat typical to sun utilizing electronic control by a small scale controller. Plan prerequisites are: i). amid the time that the sun is up, the framework must take after the sun's position in the sky. ii) It ought to be absolutely programmed and easy to work. The administrator impedance ought to be negligible and confined to just when it is really required.

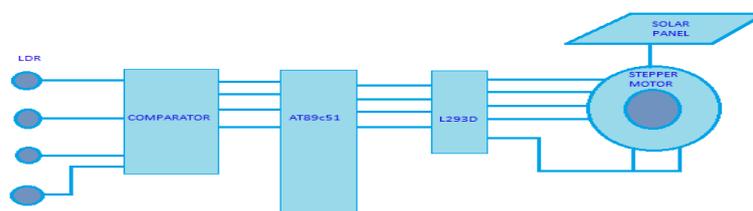


Figure-I : Block Diagram of AT89C51.

But these segments the associating wire, circuit board different gadgets are utilized. A USB based Superpro 280U general developer is utilized to '_burn' the chip (to stack the project in the chip. A PC with two programming, compiler (ASM) notebook and 8052 test system is required.

II. Description of the System

The complete hardware of this anticipate mostly can be appeared in three sections. These are: The sensor and comparator part: In this figure how we are getting the yield from the LDR through a comparator LM324 by contrasting and the reference voltage set by the potentiometer, and given to the Port 1 of AT89C51 is appeared. Firstly four LDR are associated with the comparator. we are getting yield of the LDR through 1k ohm resistance. The yield from this LDR is given to the comparator LM324. Four LDR are utilized here and every one of them associated in this comparative way. The yield of LDR is given to the transforming terminal of the operation amp of the comparator. LM324 has four comparators in it. Contribution to the comparator is given by setting a reference voltage. Reference voltage was set at 2.6 volt. As the light opposite to any LDR the relating yield from the comparator is gotten. The LDR that is utilized here gives yield voltage 2.00 volts while having opposite light on it. These yields are given to the port 1 of microcontroller AT89C51. The Microcontroller part: In the figure the interfacing hardware of the Unipolar Stepper Motor with microcontroller AT89C51 is appeared. The AT89C51 gives an arrangement of standard elements: 4K bytes of glimmer, 128 bytes of RAM, 32 I/O lines, two 16-bit clock/counters, and five vector two-level interfere with engineering. Here we have utilized L293D as the engine driver. Port 1 is getting the contribution from the yield of the comparator specifically bit design. Utilizing program it is looked at the bit design and send sign to the engine driver to drive the stepper engine in indicated course.

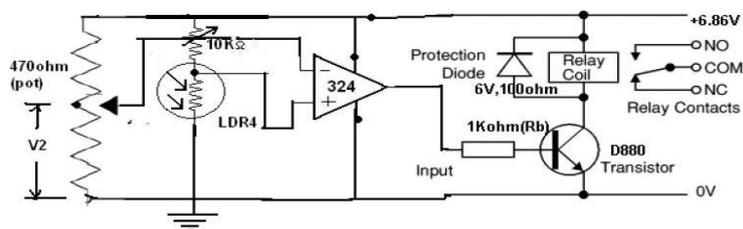


Figure II: LM324 and comparator circuit.

Number of steps an engine takes to finish one insurgency. As we have seen that down the middle mode, the quantity of steps taken by the engine to finish one transformation gets multiplied, so step point lessens to half. As in above illustrations, Stepper Motor pivoting in full mode finds a way to finish an insurgency, So step edge can be computed as... Step Angle $\theta = 360^\circ/4 = 90^\circ$ and if there should be an occurrence of half mode step edge gets half so 45° . So along these lines we can ascertain step plot for any stepper motor[8]. In morning when sun ascends in the east first and

second LDR getting most extreme power of light the engine pivots in a predetermined edge. At that point some of the time last second and third LDR will get greatest light then stepper engine turns next indicated edge. So also next third and fourth LDR will get most extreme light. After sun set in the west stepper engine return back means sun powered board will be at starting position.

Table I: One Phase on Sequence,

STEP	1a	1b	2a	2b
1	1	0	0	1
2	1	1	0	0
3	0	1	1	0
4	0	0	1	1

III. Software Part

The microcontroller chip AT89C51 is coordinated as the project in its glimmer memory teaches it. So it is evident to stack the system into the chip. System is composed in ASM scratch pad and aggregated. On the off chance that any assemblage blunder happens, then it is repaired. At that point the HEX-code is produced. At that point the project is reenacted in 8052 test system. This gives a chance to see what will be the consequence of the code. On the off chance that the code gives fancied result then the USB based superpro is utilized to stack the system; or to 'burn' the chip. USB based superpro is fundamentally an all inclusive software engineer. In the wake of downloading the HEX code in the chip is again associated with the principle circuit

IV. Working Principle and Methodology

In the setup of the hard product for the more prominent use of this anticipate, the LDRs must be put on the surface of a vast arch. What's more, the system ought to be done as such that any quick two LDRs stay dynamic at once. What's more, the stepper engine will take after the bit example of the, and the sunlight based board associated on the pole of the stepper will dependably confront the sun regularly. The LDR blend assumes the imperative part. Really these mixes of signs are nourished to the microcontroller 8051 and this coordinates the engine related to it.

Table II: Desired Bit Pattern

LDR1	LDR2	LDR3	LDR4
1	1	0	0
0	1	1	0
0	0	1	1
1	0	0	1

Engine driver L293D with stepper engine part: The L293D is a fourfold high-momentum half-H driver intended to give bidirectional drive streams of up to 600-mA at voltages from 4.5 V to 36 V. It is intended to drive inductive loads, for example, transfers, solenoids, dc and bipolar venturing engines, and additionally other high-present/high-voltage loads in positive-supply applications. There are three approaches to drive unipolar stepper engines (one stage on full stride, two stages on full stride, or half stride), everyone has a few preferences and impediments. In this anticipate two stage full stride mode is utilized. In two stage mode, progressive sets of adjoining curls are empowered thus, movement is not as smooth as in one stage mode, power utilization is more vital yet it produces more prominent torque. As in one stage mode, applying the progressions all together makes the stepper engine run clockwise and switching request makes it turn counter-clockwise. The graph of two stages is appeared in Fig. 4. Step Angle: Step point of the stepper engine is characterized as the edge navigated by the engine in one stage [8]. To compute step point, just partition 360 by number of steps an engine takes to finish one insurgency. As we have seen that down the middle mode, the quantity of steps taken by the engine to finish one transformation gets multiplied, so step point lessens to half. As in above illustrations, Stepper Motor pivoting in full mode finds a way to finish an insurgency, So step edge can be computed as... Step Angle $\phi = 360^\circ/4 = 90^\circ$ and if there should be an occurrence of half mode step edge gets half so 45° . So along these lines we can ascertain step plot for any stepper motor[8]. In morning when sun ascends in the east first and second LDR getting most extreme power of light the engine pivots in a predetermined edge. At that point some of the time last second and third LDR will get greatest light then stepper engine turns next indicated edge. So also next third and fourth LDR will get most extreme light. After sun set in the west stepper engine return back means sun powered board will be at starting position.

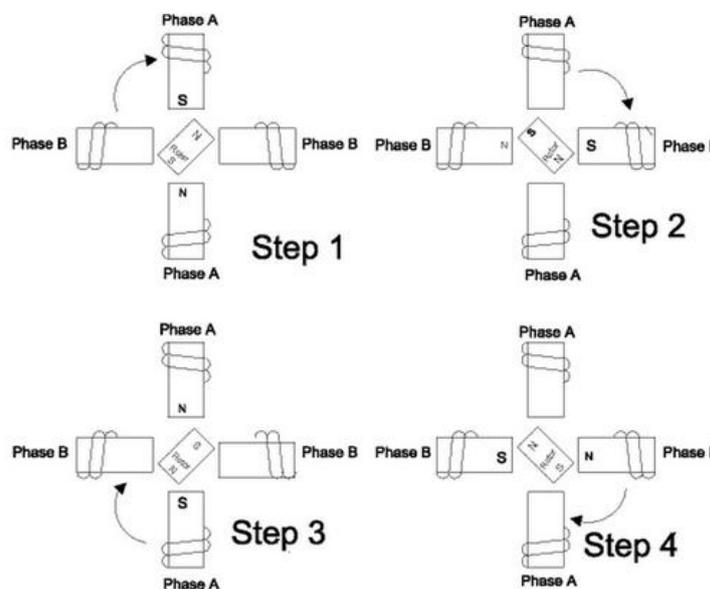


Figure.III: Two Phase Stepper Motor.

V. Conclusion

In this anticipate a sunlight based tracker has been produced to expand the measure of force created by the sun powered board as the sun navigates over the sky. An 8051 microcontroller was utilized to control the development of the sunlight based board. The framework is intended to be independent; such that vitality produced by the sunlight based board would be utilized to charge two lead corrosive batteries. In this anticipate a few challenges with respect to the position or the LDRs is confronted, so that at a same time more than two LDR don't get actuated. Every one of the readings are taken precisely amid the undertaking to dispense with the blunders whatever number as would be prudent. Sun oriented Energy is a standout amongst the most mainstream renewable sources these days. It is by and large generally utilized likewise, and inside some more years it will be exceptionally prevalent that it will be utilized for some reasons, in businesses and family also. So it is most vital reality to use the greatest vitality of the sun with the goal that greatest force can be created. The idea behind this anticipate is likewise gotten from this reality. In numerous spots examination is being done on this reality how it is conceivable to make full utilization of the sunlight. In numerous spots utilization of this anticipate can be seen too. This anticipate has a splendid future extension further. Exactness of this sun based board can be expanded further and number of steps can be expanded too to get more precise sought yield. Clock circuit can likewise be coordinated with this so that this framework reactions all the more precisely. Indeed, even in a shady day when power of daylight may fluctuate at various time of a day, the clock circuit can be progressively that convenient to drive the sun powered board accurately in that low light. According to vitality concerned sun oriented vitality is a standout amongst the most encouraging vitality which will be a principle wellspring of vitality in not so distant future.

References

1. B.Suchitha Samuel, J.Mrudula, Design of Intelligent Solar Tracker Robot for Surveillance,|| International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 2, Issue 10, October 2013.
2. Bhavesh Pandey¹, Anita Agrawal, Automatic Sun Tracking System Using PSoC, || International Journal of Innovative Research in Science, Engineering and Technology, Vol. 1, Issue 1, November 2012.
3. Sobuj Kumar Ray, Md. Abul Bashar, Maruf Ahmad & Fahad Bin Sayed, Two Ways of Rotating Freedom Solar Tracker by Using ADC of Microcontroller ||, Global Journal of Researches in Engineering General Engineering||, Volume 12 Issue 4 Version 1.0 Year 2012.
4. Mazidi Md.Ali, Mazidi J.G., The 8051 Microcontroller and Embedded systems||, Pearson Education, 2nd edition.

5. Kais i. abdul-lateef, a low cost single-axis sun tracker system using pic microcontroller,|| diyala journal of engineering sciences, vol. 05, no. 01, pp.65-78, june 2012.
6. Meghana Sharma, An Efficient Low Cost Solar Tracker Using Microcontroller, || IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE), Volume 9, Issue 4 Ver. V (Jul – Aug. 2014), PP 37-40.
7. Mostefa Ghassoul, Design of an Automatic Solar Tracking System to Maximize Energy Extraction, || International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 5, May 2013.
8. <http://www.8051projects.net/stepper-motor-interfacing/step-sequence.php>
9. [http://www.hbeonlabs.com/reports/Time Operated Solar Tracking System_Report.pdf](http://www.hbeonlabs.com/reports/Time%20Operated%20Solar%20Tracking%20System_Report.pdf)
10. http://www.icee.usm.edu/ICEE/conferences/asee2007/papers/1213_A_MICROCONTROLLER_BASED_SOLAR_PANE.
11. <http://www.electroschematics.com/8019/diy-solar-tracker-system/>
12. <https://www.pc-control.co.uk/step-motor.htm>