Solar Panel with Sun Position Tracking

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Abstract

As the demand for power is increasing recently, the power sector has been taking part as a significant role in our day nowadays life. solar power is one in all the foremost vital renewable energy sources on the world that should be collected and may be used to its most potency. Considering the use of solar energy we've got tried to develop a solar array with sun position following which might offer or utilize the most solar energy headed by the sensible potency. Experimental styles tried that alternative energy utilization will simply solve the matter of power within the world if the U.S. used economically.

Keywords: solar panel, solar tracker, stepper motor, sensor, microcontroller MEGA8P.
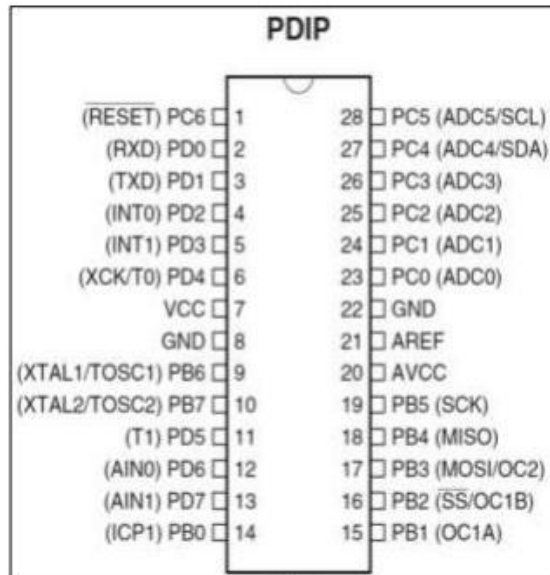
I. INTRODUCTION

The vast quantity of energy is out there inside the core of the sun. The energy that's received from the sun during an hour is over the energy consumed by the United States of America in a year [1]. If we have a tendency to area unit able to capture even a hundred and twenty-fifth of the overall energy that sun delivers then our want may be fully stuffed for many years. Solar panels provide the most output once the plane of the reflector is traditional to incident radiations [2]. In recent years, the growing global interest in the conservation of the environment has provided a fresh impetus for research in the area of solar energy utilization. Installation of solar energy extraction devices such as solar panels, solar water heaters, solar cookers, etc. is becoming popular in urban buildings. Most of these devices consist of a solar receptor that is kept facing the sun during the day with the help of a sun tracking mechanism operated by an electrically driven unit consisting of a sensor, an actuator, and a controller. It is obvious that an external power source is necessary for energizing the sun tracking unit [3].

II. WORKING PRINCIPLE OF PROPOSED SYSTEM

Solar cells are semiconductor diodes that convert a portion of accessible daylight into electric power. These are primarily tangency photodiodes with terribly massive sensitive space [4]. every photodiode could be an electric cell. A solar array is created by connecting these cells within a module. These solar panels are cascaded along to make arrays to get high power electricity [5]. To capture most of the energy, we want to position solar panels within the acceptable direction. This direction depends on varied factors. The panels are mounted at a hard and fast tilt, however as a result of the sun keeps ever-changing its position because of the rotation also because the revolution of the earth, these panels will capture additional energy if their tilt is adjusted periodically. There are two types of systems: closed-loop system and open-loop system. In the closed-loop system, the sensor senses the position of the sun and sends a signal to the controlling unit. In an open-loop system control algorithms are preloaded in the controlling unit, which determines the amount of actuation required and sends an appropriate signal to the motor which tilts the solar device towards the sun.

The position of the sun with respect to earth changes in a cyclic manner during a calendar year. Tracking the position of the sun in order to expose a solar panel to maximum radiation at any given time is the main purpose of a solar tracking PV system. recent years there has been increasing interest within the photovoltaic cell as another supply of energy. after we think {about|contemplate|take into account} that the ability density received from the sun confused level is about a hundred MW/cm2, it's definitely associate degree energy supply that needs additional analysis and development to maximize the conversion potency from start to current.

Fig 1 : DC Gear Motor:

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                       PDIP

      (RESET) PC6 □ 1          28 □ PC5 (ADC5/SCL)
         (RXD) PD0 □ 2          27 □ PC4 (ADC4/SDA)
         (TXD) PD1 □ 3          26 □ PC3 (ADC3)
        (INT0) PD2 □ 4          25 □ PC2 (ADC2)
        (INT1) PD3 □ 5          24 □ PC1 (ADC1)
     (XCK/T0) PD4 □ 6          23 □ PC0 (ADC0)
             VCC □ 7          22 □ GND
             GND □ 8          21 □ AREF
 (XTAL1/TOSC1) PB6 □ 9          20 □ AVCC
 (XTAL2/TOSC2) PB7 □ 10         19 □ PB5 (SCK)
           (T1) PD5 □ 11         18 □ PB4 (MISO)
        (AIN0) PD6 □ 12         17 □ PB3 (MOSI/OC2)
        (AIN1) PD7 □ 13         16 □ PB2 (SS/OC1B)
        (ICP1) PB0 □ 14         15 □ PB1 (OC1A)
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Slow speed gear motor to maneuver the photovoltaic cell base platform .Microcontroller MEGA8P. This document expressly describes the dominant electrical device with the assistance of microcontroller to trace most alternative energy. The precise management of the electrical device is finished by a stepper motor. Having dominant action. gauge boson energy is captured at right angles to the electrical device by a stepper motor. Solar panel encompasses a series of star cells whose output power in terms of electrical voltage is provided to the battery for the storage purpose.

The potency calculations are provided at the top to possess a certain plan of twin axis model. This twin axis model is completely interactive in nature thanks to the microcontroller action. The ports of microcontroller outline the particular functions of the look, like port1, defines the input from the detector, port2 handles the stepper motor, port3 defines the exciting star cells and therefore the regenerate power is outlined by port4. Environmental conditions also are detected by the microcontroller like cloudy conditions.

Supply:

pin of this ic is pinned no forty. unremarkably we have a tendency to apply a five potential unit regulated dc power provide to the current pin. For this purpose either we have a tendency to use step down electrical device power provide or we have a tendency to use nine potential unit battery with 7805 regulators.Ground:pin of this ic is pin no twenty. Pin no twenty is normally connected to the bottom pin (normally negative purpose of the ability provide. XTAL:it's connected to the pin no eighteen and pin no nineteen of this is. The quartz generator connected to XTAL1 and XTAL2 PIN. These pins additionally want 2 capacitors of thirty pf price.Reset Pin:Pin no nine is that the reset pin of this is. it's full of life high pin. On applying a high pulse to the present pin, the small controller can reset and terminate all activities.

a) PORT0: Port zero occupies a complete of eight pins. Pin no thirty-two to pin no 39: It is often used for input or output.

b) PORT 1: ALL the ports in ar eight-bit wide pin no one to pin no eight as a result of it's an eight-bit controller. All the most register and SFR all is especially eight bit wide.

c) PORT2: A pair of even have eight pins. It is often used as an input or output. there's no want of any pull up resistor to the present piN.

It works on the conception of H-bridge. H-bridge may be a circuit that permits the voltage to be flown in either direction. As you recognize voltage got to modification its direction for having the ability to rotate the motor in dextrorotary or anticlockwise direction, therefore H-bridge IC ar ideal for driving a DC motor. during a single l293d chip there 2 h-Bridge

circuit within the IC which might rotate 2 dc motor severally. Due its size it's pretty much employed in robotic application for dominant DC motors. Given below is that the pin diagram of a L293D motor controller. There ar 2 change pins on l293d. Pin one and pin nine, for having the ability to drive the motor, the pin one and nine got to be high.
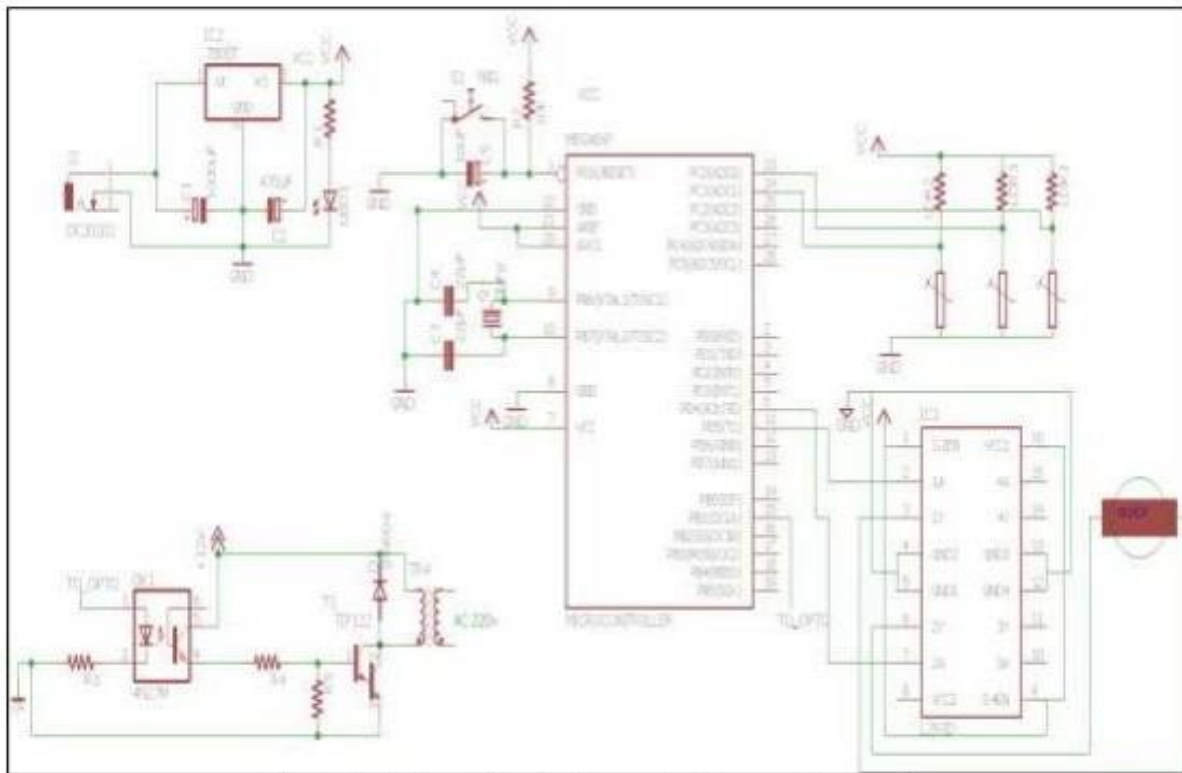

Discription:

From fig shows the tracking result using microcontroller. These fig are based on intensity, current, power. Power vs. day time curve: power increase with respect to the day time because intensity increase. After 1pm the intensity decreases so the power automatically decreases This graphshows difference of power output between with tracking and without tracking .
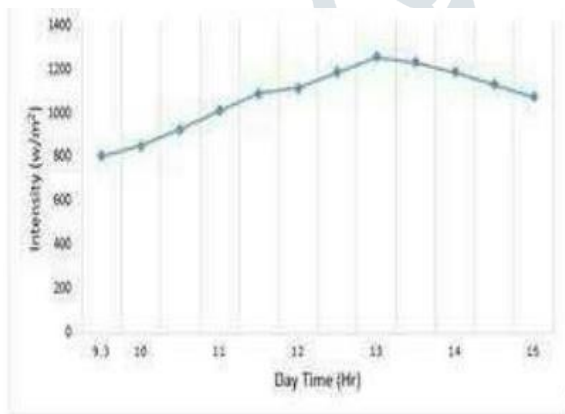
Efficiency vs. day time curve:

This graph represents that panel efficiency increase voltage, and current intencity increase. After 1pm the voltage current, intensity decreases so the efficiency automatically decrease. with respect to the day time because.
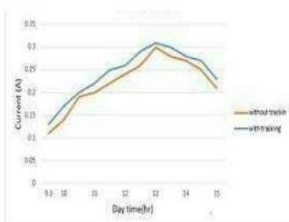
As the sun is assumed to be at infinite distance, more then one solar panels can be attached with only one detection module. It can be used on the satellites in space to prevent solar blackouts.

III. CONCLUSION:

In this project an endeavor has been created to implement solar array with sun position pursuit model by victimization microcontroller operational on a solar array. the look goes to extract most power from the sun by dynamical the position of solar array. The project puts forward a brand new approach in rising the facility potency of the solar array. With the increasing demand of energy and the Diminution of the fossil fuels, with increase in pollution level and depletion of the ozone layer the demand for the natural and renewable sources of energy is the need of the hour and this has been the point of discussion all over the world with many organizations working for the utilization of these resources and its promotion and United Nations allocating huge amount of funds for its promotion we have also made an effort to contribute a bit in the same direction. It is a known fact that the most unutilized source of energy is solar energy and efforts are on all over the world to increase its utilization every body knows its importance but we, by creating this project, have tried to show the importance of getting the maximum energy out of this resource.

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