Suncokret

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Abstract— Every day solar cells run at an efficiency of 18-20% means that they convert 18-20% of solar energy to electric energy. To bring enough power we either need to improve the efficiency of our panels or find ways of extracting more electric source from our current solar panels. Nowadays we fix the solar panel at 45 degree angle in south direction. The simplest way of getting more energy from solar panel is to track the sun. In this project I am going to use Arduino, 9g Metal gear servos, LDR- Light Detecting Resistors, 5.5v solar cell, LED volt meter, Terminal block and some hardware product like Screws and Nuts for better structure. Arduino, in which all coding part will be done. Servos are used for 3d rotation. LDR- Light Detecting Resistors help to detect the light which is coming from sun. Solar cell convert the solar energy in to electric energy. Volt meter I am using, is get power directly from the Solar Cell. We can also connect the volt meter to the Arduino using Sensor shield.

Key words: UNO Arduino, Servos Motor, Arduino Shield, LDR Register, Ohm Resister, Solar Panel

I. INTRODUCTION

Every day solar cells run at an efficiency of 18-20% means that they convert 18-20% of solar energy to electric energy. To bring enough power we either need to improve the efficiency of our panels or find ways of extracting more electric source from our current solar panels. For the most part solar cells run at an efficiency of 18-20%, meaning they convert 18-20% solar energy into electricity. While this is far better than the 3-6% efficiency that most green plants end up with, it doesn't quite meet our power needs. To bring in enough power we either need to improve the efficiency of our panels or find ways of getting more from our current solar panels. Nowadays we fix the solar panel at 45 degree angle in south direction. Every panel you see in your day to day life is in a fixed position, most likely facing south at a 45 degree angle. While this approach is extremely simple and meets the needs of most small applications, it isn't producing as much energy as it could be.

The simplest way of getting more energy from solar panel is to track the sun. My main aim is to create a non-soldering, inexpensive, "smart" computer controlled, dual axis tracker for houses and schools. My system is quite easy to use and can be used in various environments. It provides features such as identify the direction of sun, provide more efficiency, convert the solar energy in to electricity.

II. LITERATURE REVIEW

1) Apparatuses are disclosed for adjusting the position of the photovoltaic panels. The adjustments of the photovoltaic panels can be performed in two axes: pivot and tilt. The photovoltaic panels can be pivotably mounted along the longitudinal axis of rotatable frames. The substantially parallel photovoltaic panels in a frame can be simultaneously pivoted by a pivoting drive mechanism attached to the frame. Multiple tiltable frames can be arranged in parallel to each other, thus creating a 2-D matrix of the photovoltaic panels.
2) The tiltable frames can be supported by an elevated structure permitting the unobstructed rotation of both the frames and the panels inside the frames. A controller can synchronize the tilt and pivot, such that the combined rotation of the photovoltaic panels results in the photovoltaic panels of the entire array being substantially perpendicular to the incident solar radiation.
3) A high efficiency, environmentally friendly system comprising a plurality of photovoltaic solar collecting panels is disclosed. The system comprises an outer frame to which a plurality of inner frames are mounted to which the plurality of PV panels are attached. To minimize shadowing by the outer frame upon one or more PV panels, at least one PV panel may extend beyond an endpoint of the main frame. The system also comprises an outer frame rotation actuator that rotates the outer frame and an inner frame rotation actuator that rotates the inner frames and the plurality of PV panels.

III. STUDY FINDINGS

A. *Arduino UNO*

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as
Do-it-yourself (DIY) kits.

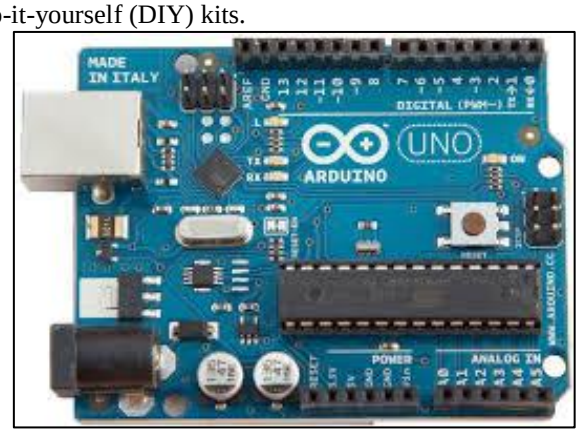

Fig. 1: Arduino UNO

B. *Metal Gear Servos*

This metal gear servo has a torque of as large as 13.5KG. It rotates from 0-180 degrees. You can control its gear to rotate to a certain degree by program. The metal gear used is not prone to breaking due to crashes so it is perfect for various

smart remote models. The connection cable is 30cm long; the orange wire is the signal wire, brown, the ground, and red, the power. The servo works under the voltage of 4.8~6.0V.

Fig. 2:

C. A photoresistor

A photoresistor (or light-dependent resistor, LDR, or photo-conductive cell) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits, and light-activated and dark-activated switching circuits.A photo resistor is made of a high resistance semiconductor. In the dark, a photoresistor can have a resistance as high as several megohms (MΩ), while in the light, a photoresistor can have a resistance as low as a few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and their hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a photoresistor can substantially differ among dissimilar devices. Moreover, unique photoresistors may react substantially differently to photons within certain wavelength bands.

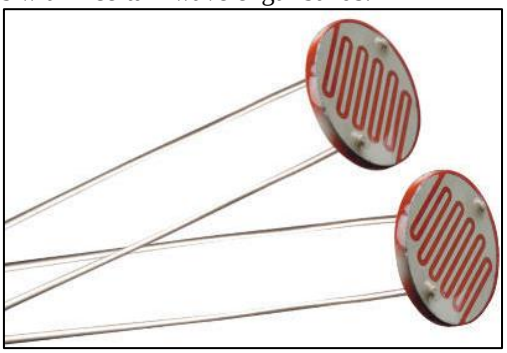

Fig. 3: photoresistor

IV. Future Enhancements

With the available time and resources, the objective of the project was met. The project is able to be implemented on a much larger scale. For future projects, one may consider the use of more efficient sensors, but which are cost effective and consume little power. This would further enhance efficiency while reducing costs. If there is the possibility of further reducing the cost of this project, it would help a great deal. This is because whether or not such projects are embraced is dependent on how cheap they can be.

Shading has adverse effects on the operation of solar panels. Shading of a single cell will have an effect on the entire panel because the cells are usually connected in series. With shading therefore, the tracking system will not be able to improve efficiency as is required.

V. Conclusion

This project was successful and the initial goal was achieved. At the end we had a very good working solar tracker. With a very strong mechanical connection. With the panels always in the most optimal possible position. The electronics can still be improved and custom printed circuit boards can be made for the electronics. If the control electronics allow it the motors can be controlled with PWM to get an even more precise control.

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