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SUN TRACKING SOLAR PANEL WITH MICROCONTROLLER

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ABSTRACT

As the energy demand and the environmental problems increase, the natural energy sources have come veritably important as an volition to the conventional energy sources. The renewable energy sector is fast gaining ground as a new growth area for multitudinous countries with the vast eventuality it presents environmentally and economically. Solar energy plays an important part as a primary source of energy, especially for pastoral area. This paper aims at the development of process to track the sun and attain maximum effectiveness using Arduino uno and Lab VIEW for real time monitoring. The design is divided into two stages, which are tackle and software development. In tackle development, four light dependent resistor(LDR) has been used for capturing maximum light source. Two DC motors have been used to move the solar panel at maximum light source position seeing by LDR. The GUI is constructed by using LabVIEW. The performance of the system has been tested and compared with stationary solar panel. This paper describes the design of a low cost, solar shadowing system.

Keywords solar shadowing, Arduino, LabVIEW

1. INTRODUCTION

The world population is adding day by day and the demand for energy is adding consequently. Canvas and coal as the main source of energy currently, is anticipated to end up from the world during the recent century which explores a serious problem in furnishing the humanity with an affordable and dependable source of energy. Renewable energy is deduced from natural processes that are replenished constantly. Renewable powers are indefatigable and clean. The energy comes from natural coffers similar as sun, wind, runs, swells, and geothermal heat. Solar energy is relatively simply the energy produced directly by the sun. Solar energy is radiant light and heat from the sun exercised using a range of technologies similar as photovoltaic, thermal electricity andetc. A solar cell(also called a photovoltaic cell) is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect. A solar panel is a set of solar photovoltaic modules electrically connected and mounted on a supporting includes software controls and pointers that mimic physical controls similar as buttons, sliders, LEDs, and maps. The block illustration is a graphical representation of the beginning software program. It consists of icons that represent typical programming rudiments similar as constants, variables, subroutines, and circles. Arduino is a single- board microcontroller, intended to make the operation of interactive objects or surroundings more accessible. It's an open- source physical computing platform and a development terrain for jotting software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or detectors, and controlling a variety of lights, motors, and other physical labors. Arduino has some advantages for educational and interested recreational over other systems like Inexpensive, Open source and extensible software, extensible tackle.The LabVIEW Interface for Arduino(LIFA) allows druggies to control detectors and acquire data through an Arduino microcontroller using the graphical programming terrain LabVIEW. Arduino microcontroller acts as an I/ O machine that interfaces with LabVIEW VIs through a periodical connection.This helps to move information from Arduino legs to LabVIEW without conforming the communication, synchronization. Using the common Open, Read/ Write, Close convention in LabVIEW, we can pierce the digital, analog, palpitation- range- modulated, I2C, and SPI signals of the Arduino microcontroller. The LabVIEW software package from National Instruments is used to develop the custom data accession.

1.1 Solar

Sun has two factors, the direct ray that carries about 90 of the solar energy, and the verbose sun that carries the remainder. The verbose portion is the blue sky on a clear day and increases proportionately on cloudy days. As the maturity of the energy is in the direct ray, maximizing collection requires the sun to be visible to the panels as long as possible. A typical solar panel converts only 30 to 40 percent of the incident solar irradiation into electrical energy.

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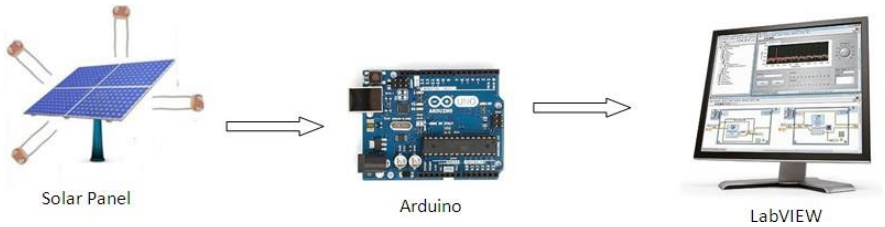

Fig. 1 Block illustration of system

This paper proposes the use of binary- axis solar shamus. The paper continues with specific design methodologies pertaining to Light Dependent Resistor(LDR), DC motors, solar panel, and a software. The binary- axis shamus is a veritably compatible system to be developed with the operation of LabVIEW Interface for Arduino. The regulator entered an analog input from the Light Dependent Resistor(LDR) and converts it into digital signal by Analog- to- Digital motor. The program is designed in the terrain of LabVIEW. The affair given to the DC motor will determine the movement of the solar panel.

2. METHODOLOGY

The main impulsion is to design a high quality solar shamus. This paper is divided into two corridor; tackle and software. It consists of three main element which are the inputs, regulator and the affair as shown in Fig 1. A print resistor or Light-dependent resistor(LDR) or photocell is a light- controlled variable resistor. LDRs or Light Dependent Resistors are veritably useful especially in light/ dark detector circuits. Typically the resistance of an LDR is veritably high, occasionally as high as 1000000 ohms, but when they're illuminated with light resistance drops dramatically. LDR's have low cost and simple structure. A DC motor relies on the fact that like attraction poles repels and unlike glamorous poles attracts each other. DC motors correspond of one set of coils, called architecture winding, inside another set of coils or a set of endless attractions, called the stator. Applying a voltage to the coils produces a necklace in the architecture, performing in stir. DC motor with gear arrangement have been named since they're cheaper than servo and steppermotors.L293D IC having two channels has been used to drive the DC motors. DC motors with gear arrangement have been used to achieve the asked speed in moving the solar panel. The most important effect of using DC motor with gear medium in binary axis shadowing system is getting mechanical stability of solar panel without spending important power for DC motors. The Dc motors can turn either clockwise or anticlockwise direction depending upon the sequence of the sense signals. The sequence of the sense signals depends on the difference of light intensity of the LDR detectors.

3. MODELING AND ANALYSIS

The principle of the solar shadowing system is done by Light Dependant Resistor(LDR). Four LDR's are connected to Arduino analog leg AO to A4 that acts as the input for the system. The erected- in Analog- to- Digital Converter will convert the analog value of LDR and convert it into digital. The inputs are from analog value of LDR, Arduino as the regulator and the DC motor will be the affair. LDR1 and LDR2, LDR3 and LDR4 are taken as brace. Still, a difference will do on knot voltages transferred to the separate Arduino channel to take necessary action, If one of the LDR in a brace gets further light intensity than the other. The DC motor will move the solar panel to the position of the high intensity LDR that was in the programming.

Algorithm had been constructed using LabVIEW programming. The algorithm of the program is given as way in the following.

Step 1. Read all analog voltages from analog channels

Step 2. If all voltages are equal also motor will be in stop position.

Step 3. If LDR1> LDR2 Also the top motor will rotate clockwise.

Step 4. If LDR1

4. RESULT AND DISCUSSION

Data collected through the monitoring system will be anatomized to identify the features of the effective solar system. The sun position is one of the main factors that caused insecurity dimension affair voltage. The solar panel won't be suitable to achieve a maximum illumination from the sun from its standard position. As pertaining to graph, the affair voltages for panel are slightly changed. The comparison between static and moving panels shows that the solar panel with shamus produced advanced affair voltages as it gets optimum immersion. Fig 4. Shows the graph for a period of interval attained from the trial.

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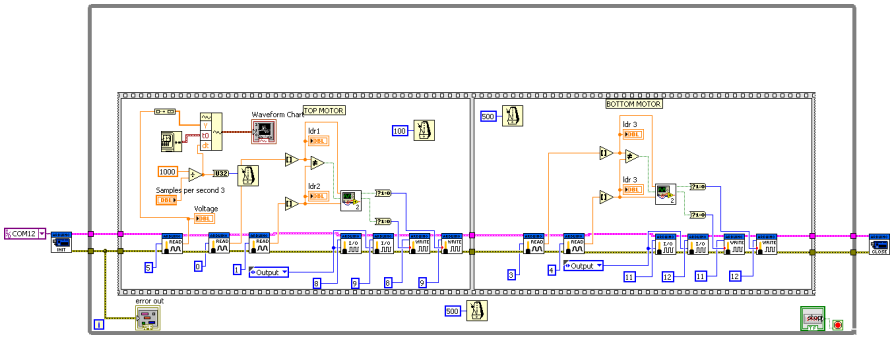

Fig. 2. Block illustration of system in LabVIEW

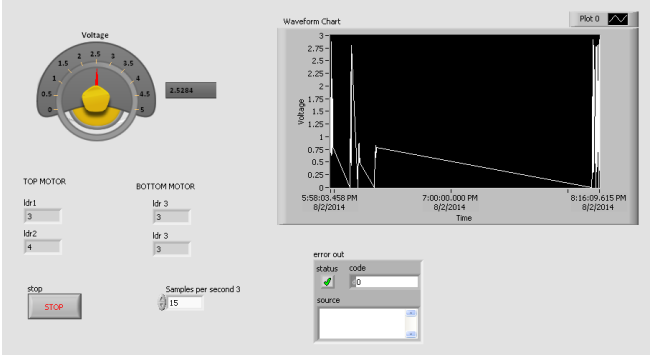

Fig.3. Front panel of the system

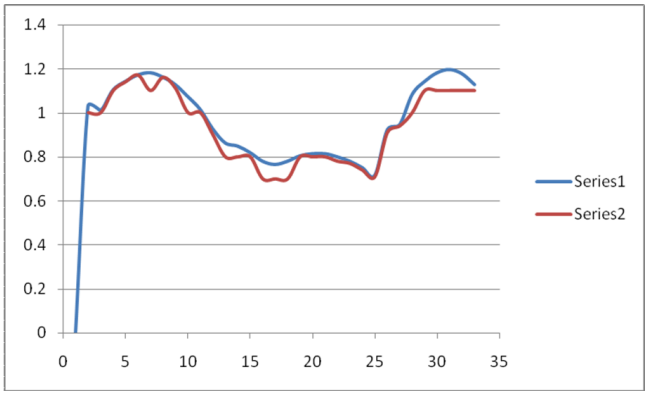

Fig. 4. Affair voltage relative of solar panel

Grounded on the results attained, it can be concluded that the system will reply at their stylish with a constant voltage is produced. Arduino Uno turned out to be an easy platform apply the control strategy.

5. CONCLUSION

Data collected through the monitoring system will be analyzed to identify the features of the effective solar system. The sun position is one of the main factors that caused instability measurement output voltage. The solar panel will not be able to achieve a maximum illumination from the sun from its standard position. As referring to graph, the output voltages for panel are slightly fluctuated.

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