AUTOMATIC SOLAR TRACKER

[1]Jill Desai, [2]Karan Panchal,[3]Vatsa Patel, [4]Jigar M. Chauhan
[1]Student, [2]Student, [3]Student, [4]Assistant Professor
[1]Information Technology,
[1]Universal College of Engineering, Vasai, India

Abstract: The utilization of non-renewable energy sources and the ozone depleting substances emanation is a developing worry of the universal group. Thus, the innovative work of elective sources is constraining down the expenses related with sustainable power sources. Generating electricity by solar energy that are inefficient and costly. Thus, to minimize the cost and to maximize the usage of energy Automatic Solar Tracker is proposed. This sun tracker system uses two light dependent resistors as sensors element to find the brightest point in the sky and move the position of solar panel according to the data collected by the LDR sensor. The data and signal processing of light sensors are performed by an Arduino Uno based system which controls a rotating DC Motor. This system tracks the maximum intensity of light by adjusting the solar panel to the incident light.

Keywords: **Arduino Uno, DC Motors, LDR sensors, Breadboard, Motor Driver, Battery.**

I. INTRODUCTION

As we all know energy crisis is the most important issue in today's world. Conventional energy resources are not only limited but also the prime felon for environmental pollution. Renewable energy resources are getting priorities in the whole world to lessen the dependency on conventional resources so as to reduce pollution. Solar energy is rapidly obtaining the spotlight as an important means of expanding renewable energy uses. Thus, by using solar tracker we can track the brightest position of the sun and maximum energy can be produced. An Arduino Uno based design methodology of an automatic solar tracker is being used. Light dependent resistors are used as the sensors of the solar tracker which generates data that tells the system on what position maximum energy can be gained. The technical feasibility and economic viability of these solar energy generator depends on the amount available sunlight (solar radiation) in the area where they intended to be placed. The most popular technology used to convert solar energy to electrical energy is photovoltaics (PV). It is a method of generating electrical power by converting sunlight into direct current electricity using semiconducting materials.

II. LITERATURE SURVEY

This paper describes the development of a low-cost, dual axes solar tracker (DAST) which is low power consuming. The work encompasses the design, construction, assembly of the entire mechanical structure, electrical systems and devices and the elaboration of the control logic responsible for all the movement of the module to search the position of maximum solar power consumption. The tracking is designed through the use of LDR sensors responsible for providing the input signal to the Arduino Uno. The Solar panel rotates automatically based on the sun irradiance during the day while at night, the panel remains in a stationery position to prevent the system from over using the battery overnight. The proposed system also has a development of a 9V battery charging system used for module movement and as a power source for electronic devices. Results show that a system with the designed DAST can reduce in 8 percentage the payback of a single solar panel installation when compared with a fixed structure. Single axis sun trackers track the sun only by varying the angle, while keeping the tilt angle fixed. These systems, though they are more efficient than fixed solar panel systems, doesn't utilize the available solar energy to maximum extent and has less efficiency when compared to dual axis trackers.

III. PROPOSED SYSTEM

The proposed tracking system does track of sunlight more effectively by providing PV panel rotation in two different axis. In dual-axis tracking system optimum power is achieved by tracking the sun in all the four directions. In this way we can capture more energy from sun . Movement in two axis is explained with the help of figure which is explaining basic idea behind the dual axis solar tracker. The dual-axis solar tracker follows the angular height position of the sun in the sky in addition to the following the sun's east-west movement. The dual-axis working is similar to single axis but it captures the solar energy more effectively by rotating in the horizontal and vertical axis. The tracker model is composed of 2 LDR sensors, two DC Motors and Arduino Uno. One sensor and one motor are used to tilt the tracker in sun's east-west directions and the other sensor and the other motor which is fixed at the bottom of the tracker is used to tilt the tracker in the sun's north-south direction.

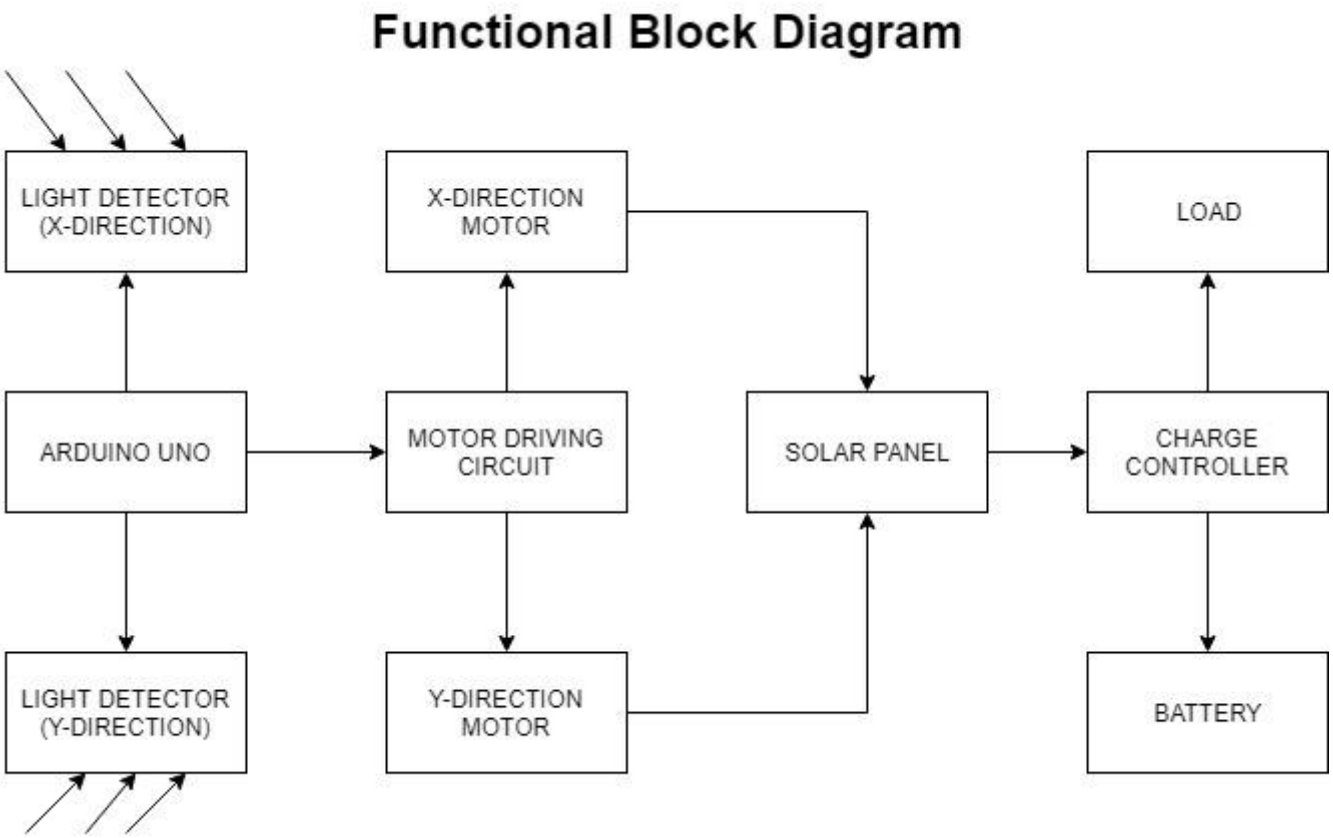

Fig.2 Block Diagram

IV. IMPLEMENTATION

1. The Arduino Uno is the heart of the Automatic Solar Tracker which controls the motors via the motor drivers.
2. Motors are connected to the motor driver and the motor driver is connected to pins 2,3,4,5 on the Arduino board.
3. Arduino Uno and Motors are powered with 9 volts power supply with the help of motor driver.
4. The motors shift their position with the data collected from the LDR sensor 1 and 2.
5. The amount of light on the LDR sensor decides the position of the LDR sensor.

Components of hardware module: -

1. Arduino Uno
2. DC Motor
3. Motor Driver
4. Breadboard
5. LDR sensors
6. Solar panel
7. Battery

Steps: -

1. Solar panel will be placed on the east direction.
2. As soon as the sun will rise the LDR sensor will give the reading.
3. By tracking the position of the brightest light the solar panel will move with the help of DC motor.
4. During dark the solar panel will rotate once in search of light, if not found the it will take its original position.

4.1 HARDWARE IMPLEMENTATION:
The figure below shows the hardware connection:

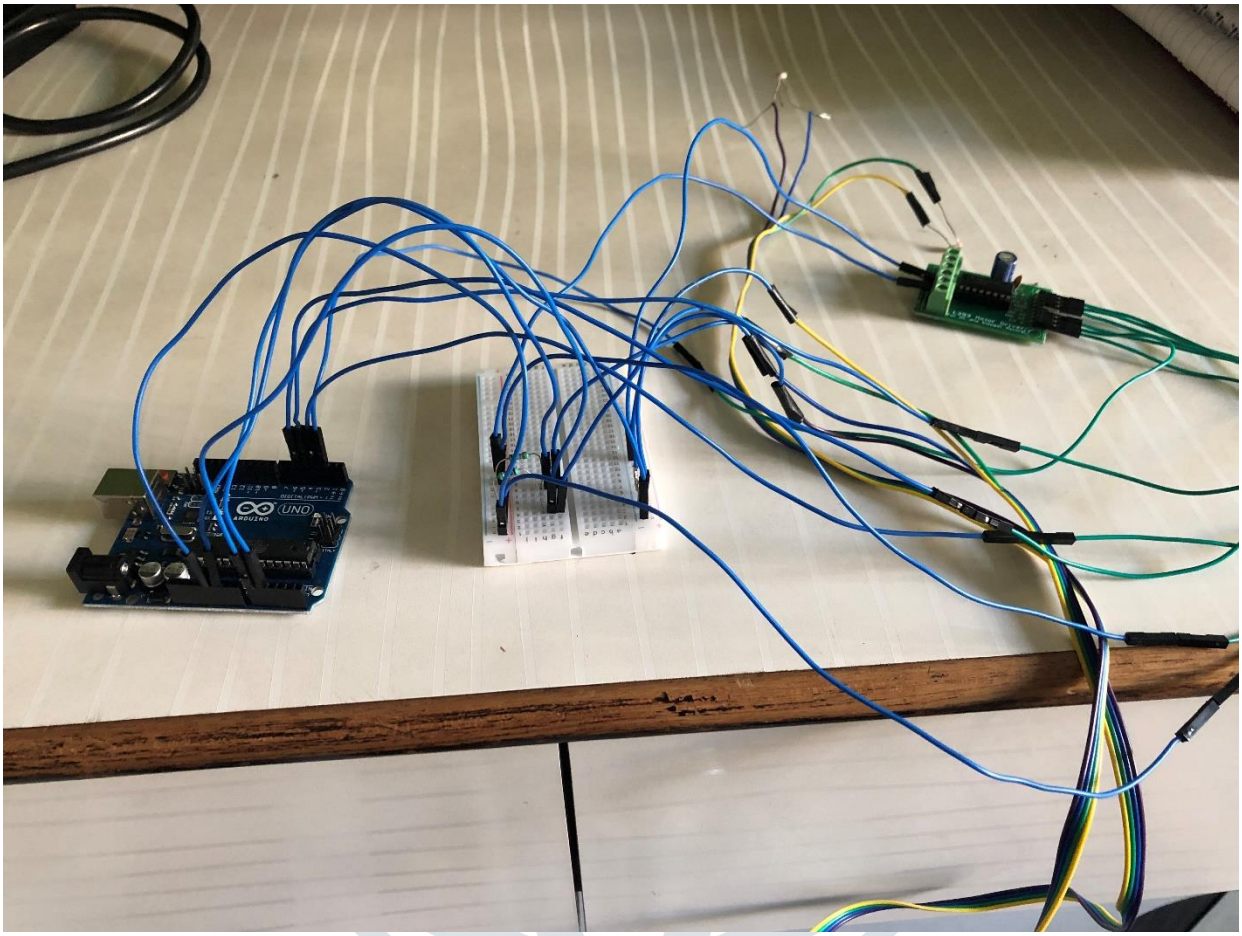

Fig.3 Circuit diagram

We will use Arduino Uno for processing all the things used in project. The LDR sensor is place on the solar panel. The solar panel is then placed on two DC motors, in which one motor will move in north-south direction and the other will move in east-west direction. The whole system will be connected to Arduino Uno which will take the readings from the sensor. With the help of LDR sensor the motor will move near the brightest light.

4.2 SOFTWARE IMPLEMENTATION:
Arduino Uno platform is used for coding.

V. CONCLUSION

The implementation of Automatic solar Tracker will consume 40% of more energy than the static solar panel. The wastage of non-renewable resources will also be less.

VI. ACKNOWLEDGEMENT

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VII. SCOPE

1. This system will detect light and rotate or revolve accordingly.
2. System will consume 40% of more energy.
3. This system will help reduce the usage of non-renewable resources.

VIII. REFERENCE

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