# Solar Energy Tracking System


## Abstract:

The intent of this paper is to document our experience, in the development of a Solar Energy Tracking System. Our system can be utilized to collect, store and use clean renewable energy from the sun. Like many other solar products it can be used in residential, commercial and even personal application. It can be used for lighting, cooking, and heating when living/traveling “off-grid”. Or to power home appliances, pools, cars, irrigation systems, and much more. The system can do this without worry of safety concerns, with respect to pollution, or any type of contamination. The system operates by orienting a system of solar cells or solar panels into an optimal location to collect 100% clean energy from the sun. This energy is then stored in batteries so that it may be used at a later time, when convenient.

The system uses 2 solar panels, 6 light dependent resisters (LDRs), 2 unipolar stepper motors, 2 L298 driver boards, and an ATmega328P microprocessor. The hardware is mounted and constructed on a square, home-made, wood-based platform. The system uses the light dependent resistors to interpret how much light is in a specific area on the platform/base. This analog signal is then converted to a digital signal, represented by a value, ranging from 0-100. This gives the appearance of a percentage value and can be monitored to observe solar intensity, over a given time. That value is then used to direct the driver boards to function accordingly, moving the panel to the correct location.

The program begins by first moving the vertical motor, so that the panel will sit in the start position. To begin horizontal movement, the program compares values, using the four LDRs mounted to the platform/base and begins the movement to the appropriate location. Once the horizontal movement is complete the program compares the input values of the 2 LDRs mounted to the solar panel. It then begins its movement to the appropriate location, just as before. If the comparison of the 2 LDRs mounted on the panel are within 15 percent of each other, it will stay, or return itself to the center position. It continues to do this, following the sun as it moves until there is no light intensity on the LDRs. If the light intensity of the LDRs linked to horizontal movement is below thirty percent the system will interpret that the sun is not out and will return to the start position. Similarly this is done if the light intensity of the LDRs linked to vertical movement are below thirty percent.

The energy collected from the system is stored into an 18650 lithium ion battery pack. The collected energy can be used at a later time, via the batteries or used to power the system itself. The system can also be powered from an AC outlet, when possible.



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