Solar Tracking and Car Battery Charging System

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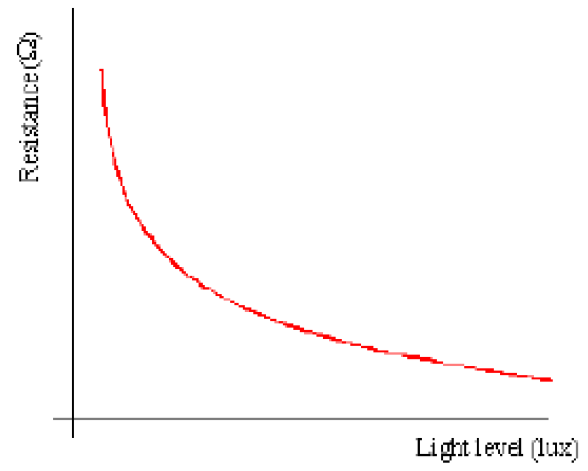
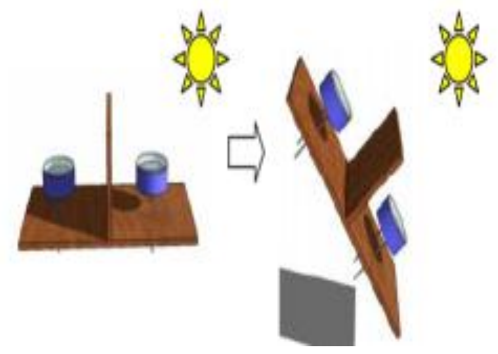


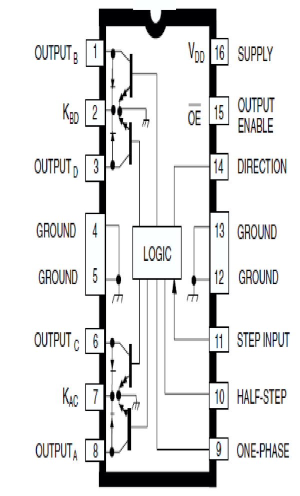
OBJECTIVE & MOTIVATION

•To design a an electromechanical system that is able to track the sun beam and get the optimum solar to electrical power conversion to charge a car battery.

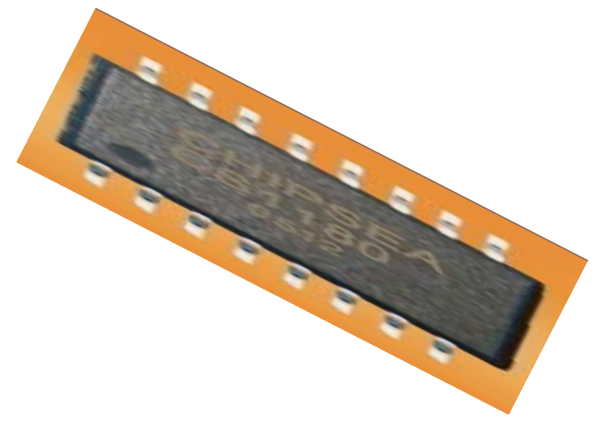
• To optimize the harnessed solar energy by the PV cells. Most solar panels are statically aligned; they have a stationary position at a certain angle towards the sky. This causes immense reduction in the time and intensity of direct sunlight falling upon the solar panel. This is where solar tracking comes handy. To ensure maximum power output from PV cells, the sunlight's angle of incidence should always be perpendicular to the solar panel. This requires constant tracking of the sun's apparent daytime motion. This project will make use of the tracking system to optimize the solar panel's po



INSTRUMENTATION



- •Stepper Motor
- •Stepper Motor Driver
- •Microcontroller
- •Solar Panel
- •Light Detecting Resistors
- •Analog to Digital Convertor

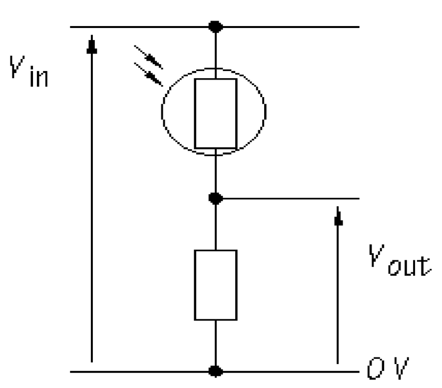


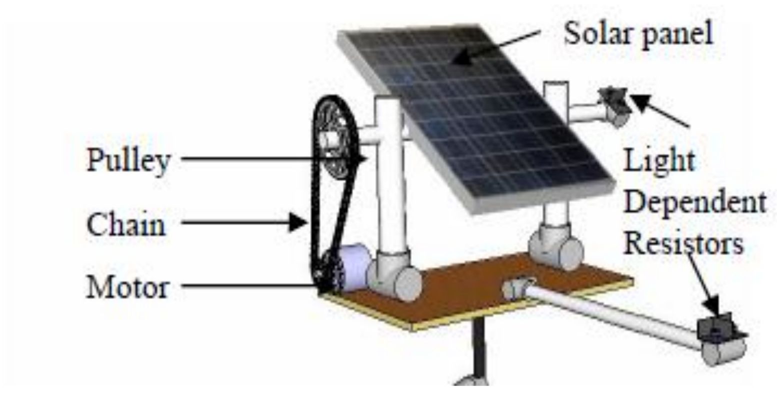
DESIGN

A mechanical apparatus is designed to support the solar panel and allow it to rotate based on the sensors feedback. Project is divided into two main subsystems: Sensing and Programming subsystems.

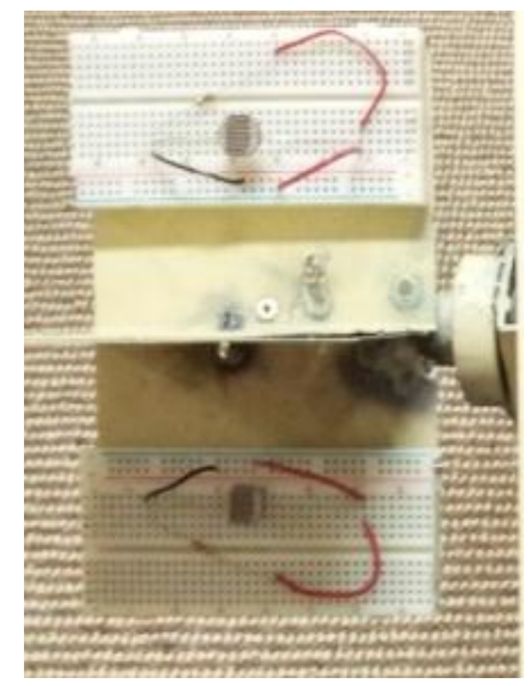
• Sensing: Two LDRs (Light Detecting Resistors) will be used as sensors, both placed at opposite sides of the panel, one on the left and the other on the right to determine which side faces more or less light. LDRs are basically photocells that are sensitive to light; after light is sensed by both LDRs; two values are sent to the MICROCONTROLLER.

•Programming Subsystem: Programming the Microcontroller using Assembly Language to do the comparison process. The comparison process takes place in the MICROCONTROLLER, if the output value equals zero, i.e. no difference between LDR output values, then nothing happens and solar panel stays in the same position. If the output value of the MICROCONTROLLER does not equal zero, then a signal will be sent to the Stepper Motor Driver Chip to actuate the motor; thus rotate and position the LDRs on the solar panel in a way where both LDRs face light and none falls under a shadow.





RESULTS AND CONCLUSION



•The tracking implementation is successfully achieved with complete design of one degree of freedom using the microcontroller.

•Problems were faced in the stepper motor movement and its torque capability to rotate the panel; however, they were overcome and we were able to leverage our aimed design and its purpose.

• A future improvement to the project would be developing a double axis design to enhance the freedom of movement of the solar panel; and thus provide more accuracy and more power harness.