



Improving on existing solar charging solutions

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Introduction

Solar power is an eco-friendly and economical way of powering home appliances and recharging empty power cells such as batteries. For home owners, it is a useful method of lowering the energy consumption and saving money. Compared to other sources of power, solar does not produce high amounts of power and is primarily used to store energy during peak hours and consumed at a later period such as when there is a high demand.

The image below is credited to:
P. Stearns, "Solar Charger Tutorial – Part 3," 2011. [Online].
Available: <http://www.voltaicsystems.com/blog/solar-charger-tutorial-part-3/>. [Accessed: 04-Oct-2016].



Hypothesis

This project will aim to answer the question of whether using a solar panel alongside solar tracking from sunrise to sunset is more efficient at producing energy than using a static panel only during peak hours of the day.

In order to do this, the prototype will be used to record data relating to the energy produced during a 12 hour period using a static solar panel and solar tracking.
The data will then be compared to see if solar tracking has a noticeable effect on the overall energy produced.

Another question that can be answered is which charging method is more efficient when transferring the power output from the solar panel to the power cells.
To do this, multiple methods will be investigated and discussed to show the pros and cons of each method.

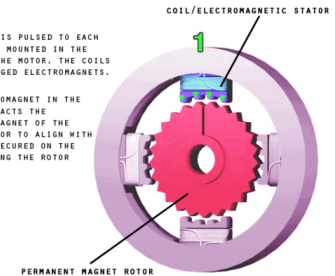
Aims & Outcomes

This project sets out to investigate different methods of solar charging and improving the performance. This includes looking at the technology used to regulate the output from the solar panel along with the code needed to implement solar tracking. By the end of the project, a prototype will be made which can demonstrate the chosen method of solar charging and analytics showing the energy produced and the effects of using solar tracking.

STEPPER MOTORS

AS CURRENT IS PULSED TO EACH OF THE COILS MOUNTED IN THE STATOR OF THE MOTOR, THE COILS BECOME CHARGED ELECTROMAGNETS.

EACH ELECTROMAGNET IN THE STATOR ATTRACTS THE PERMANENT MAGNET OF THE STEPPED ROTOR TO ALIGN WITH THE TEETH SECURED ON THE COIL, DRIVING THE ROTOR FORWARD.



The image above is credited to:
Autodesk Inc., "How to use a Stepper Motor," 2014. [Online].
Available: <http://www.instructables.com/id/How-to-use-a-Stepper-Motor/?ALLSTEPS>. [Accessed: 04-Oct-2016].

Materials & Methods

The prototype will include a custom built charge controller used to regulate the output power from the solar panel to the power cells. If there is more time, solar tracking will be implemented using a stepper motor to rotate the solar panel so that it faces the sun.

The motor will be controlled by a microcontroller and will gather data from other components to calculate if the solar panel needs to be rotated and in which direction.