Solar Tracking System

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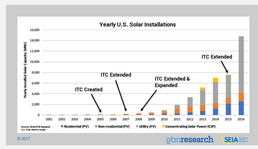
Goal

- The objective was to create a solar system capable of following the sunlight at its most intense position each second of the day in order to convert as much of the sun into usable energy as possible
- Provide our code to the public for further research on best ways possible to utilize the panel at its maximum productivity



Abstract

- Using renewable energy resources to produce the electricity is a rising trend in various countries worldwide
- Solar energy being part of the future major contributors to energy means finding ways to improve solar panel efficiency is a must
- We take the need for more productivity to new heights by using sensors on a panel fixed on a battery powered stands to guide it toward positions with highest intensity of sun radiation
- Make the code available for public usage through the use of a raspberri pi on an open network

Sensors

- Digital light intensity sensor -acts as server which is how the interaction with the panel and the coder happens

- Temperature sensor - provides a voltage output that Is linearly proportional to the Celsius temperature. It also doesn't require any external calibration to provide typical accuracies

- Luminosity sensor breakout - measures both the Infrared and visible light to better approximate the Response of the human eye

Acknowledgements

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Observations

Figure 1: **50W 18V 12V Lightweight Bendable Semi Flexible Solar Panel Charger with MC4 Connector** Solar Panel with on the base made of pvc piping with the motors attached to rotate the panel around. Panel is equipped with temperature and luminosity sensors to catch the sun radiation

Figure 2: Showing a picture of the back of the structure with the motors that enable the panel to move on its two axes

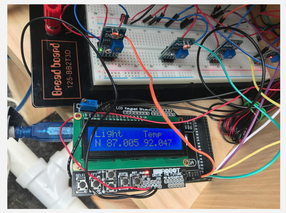


Figure 3 : Breadboard circuit implementation of the digital light intensity sensors and the temperature sensor. Value of the temperature is displayed on the output of the board

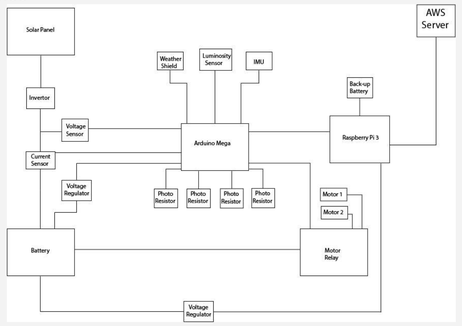
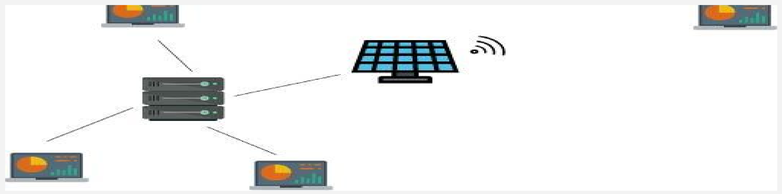


Figure 4 : Main idea of how the whole project is supposed to work together. All the connections between the solar panel all the way to the raspberri pi which allows the information we get to be transferred to a public server. There are a number of voltage regulators to make sure that the voltages going in and out of each part are either sufficient or insufficient.

Vision

- In order to see significant differences between the conventional stable panels and the solar tracking system our data has to be spread out throughout the year and done over the time span of a few years for even more reliable findings
- Can be instituted on a bigger scale mostly in a setting such as a PV plant
- Make it accessible to public use online through the use of a connected raspberri pi on a server



Results

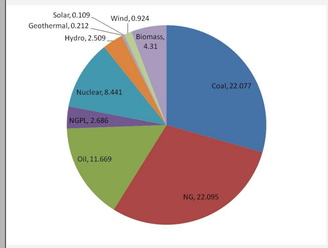


Figure 4 : Shos the electrical enrgy consumption in the US and how much each part of the energy is coming from each constituents as far as the sources of energy used to create electricity

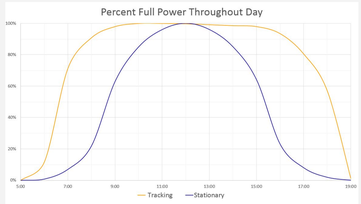


Fig 5: Graph comparing dual-axis tracking power to stationary power

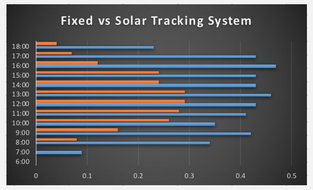


Fig 6 : As shown from the results obtained in the graph above, we can conclude that the productivity of the solar panel with a tracking system is way higher on average compared to the stationary

Challenges

- Where does the whole system store its energy?
- What platform should we use to hold the panel to enable the motors to move the system using the least energy?
- How can the system be powered?
- How can the electrical part be shielded during any bad weather?

References

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