WSN for Solar Panel Applications

Karthik Sukumar
Electrical and Computer Engineering
Technical University of Munich
Munich, Germany
karthik.sukumar@tum.de

Johannes Machleid
Electrical and Computer Engineering
Technical University of Munich
Munich, Germany
johannes.machleid@tum.de

***Abstract*—The source of future energy production has to be and is undoubtedly renewable and environmentally friendly. Solar power is one of the most readily available energy sources in almost all parts of the world. Although Solar power is ubiquitous, certain physical and technological limitations allow for a maximum efficiency factor of 37% (And thats for commercially avaiable high end solar cells). This implies that only 37% of the sun's energy that is captured by the solar cell can be converted to useful electrical energy. This paper focuses on using Wireless Sensor Networks (WSN) to utilise the maximum possible energy of the solar cells without any further losses.**

I. Introduction

The energy generated by the solar panels is highly dependent on the angle of incidence of the suns rays on the panel.

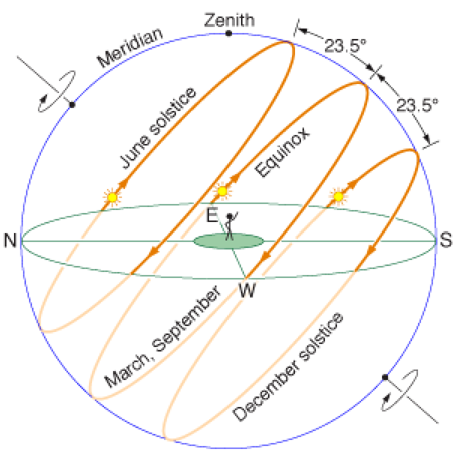

Fig. 1: Suns path in Winter and Summer. Source: [?]

The suns path in the horizon is dynamic and dependent on the time of the year. In the northern hemisphere, the sun is higher in the sky during summer and lower in the winter. In the summer the sun rises in the north east and sets in the north west. Whereas in winter, the sun rises in the South east and sets in the South west as it can be seen in Fig. 1

As we can see from Fig. 2, consequent of the suns path in the sky the angle of incidence of the sun's rays on the panel changes during the day as well as the during the diffent months.

In order to track the suns rays so that the solar panel is always perpendicular to the suns rays we need a dynamic

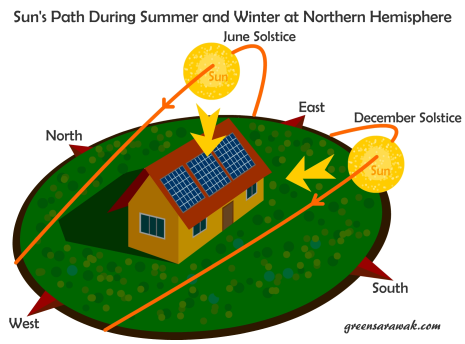

Fig. 2: Angle of incidence of the suns rays on the panel Source: [?]

system that adjusts to the E-W changes in the suns angle during the different times of the day as well the N-S tracking during the changes in the months.

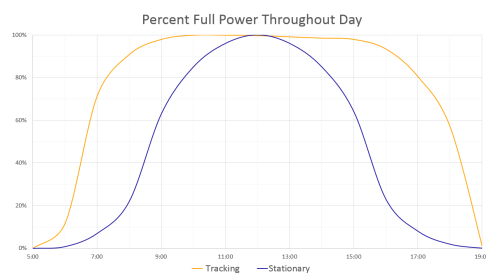

Fig. 3: Comparison of energy produced by a tracking vs non tracking system Source: [?]

II. Application Set up

A. Sensors

Described below are the different types of sensors used in our application along and their uses:

- Servo Motor x 7 (1 per mote). The servos will be used to change the angle of solar panels.
- Light Sensor x 7(1 per mote). The light sensors are used in this proof of concept to simulate the power output of the solar panel.

B. Motes

Subsubsection text here

C. Sensors

Subsubsection text here [1].

III. Routing Algorithm

Subsection text here.

IV. GUI

Subsection text here.

V. Application specific features

Subsection text here.

VI. Conclusion

The conclusion goes here [2].

References

[1] A. Bachir, M. Dohler, T. Watteyne, and K. K. Leung, "Mac essentials for wireless sensor networks," *IEEE Communications Surveys & Tutorials*, vol. 12, no. 2, pp. 222–248, 2010.

[2] A. Dunkels, "The contikimac radio duty cycling protocol," 2011.