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**A PRESENTATION
ON
Adaptive Control for Sun
Tracking Devices**

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Definition of problem

Demand:

- More energy to use

Solution - Solar Energy:

- Weather conditions over solar productions units
- The direction of maximum radiation sunlight
- Constructions problems

PURPOSE OF PRESENTATION

One solution for solar tracking systems:

- A novel adaptive system to drive the sun trackers to collect over 7% energy of the usual types of astronomic algorithms.



INTRODUCTION

Finding sufficient supplies of clean energy for the future is one of society's most daunting challenges. Alternative renewable energy sources such as sun energy can be substituted for exceeding human energy needs.

INTRODUCTION

- Directly converting sunlight to electricity is accomplished via PV solar cells.



Sun Tracking methods

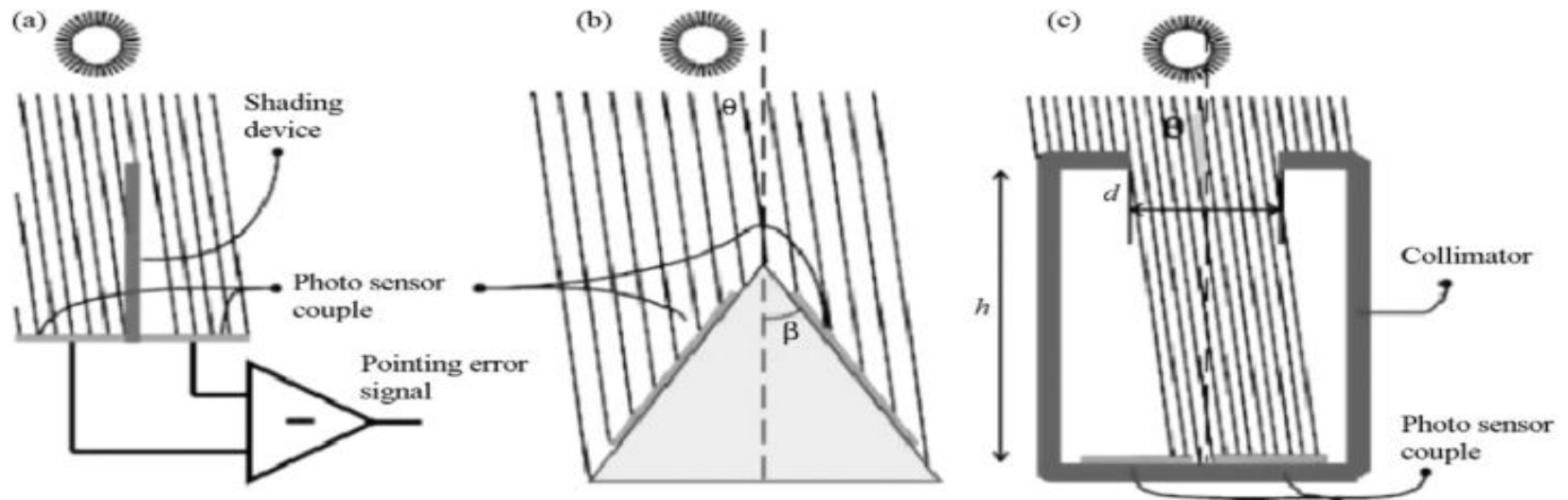
Solar trackers, problems :

- cost,
- reliability,
- energy consumption,
- maintenance and
- performance.

Sun-tracking systems:

- passive (mechanical) and
- active (electrical)
 - microprocessor and electro-optical sensor based,
 - PC controlled date and time based,
 - a combination of these systems.

Microprocessor and electro-optical sensor based for active trackers

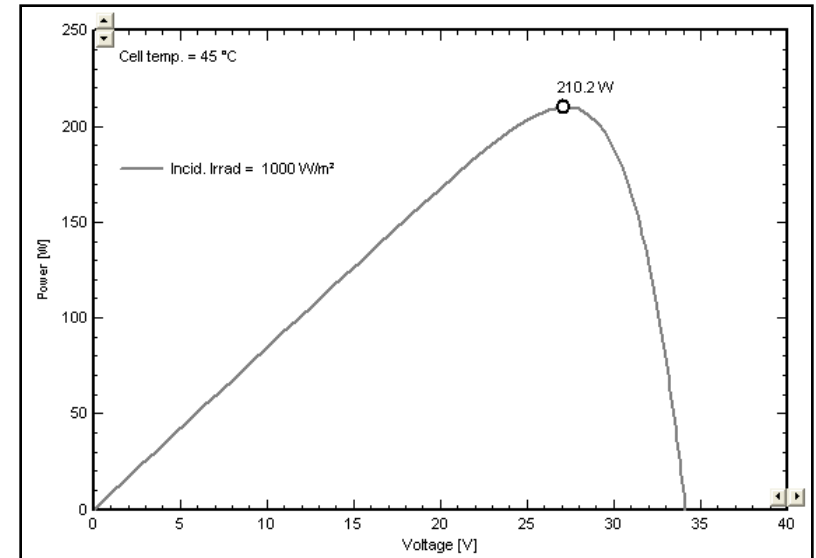
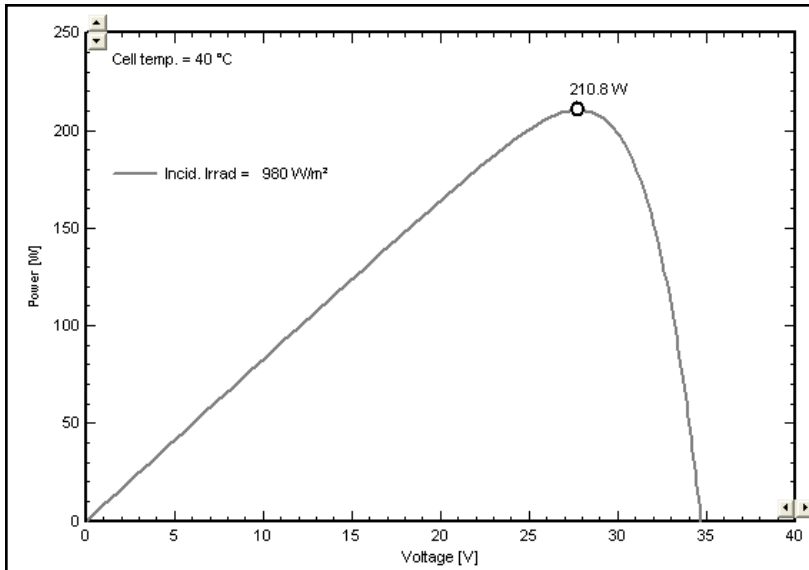


(a) sun-pointing sensors

(b) tilted mount of photo sensors

(c) precise sun pointing by means of a collimator

The presence of temperature in Photovoltaic modules



Power vs Voltage with main parameter of module temperature
(T= 40 - 45 degrees Celsius)

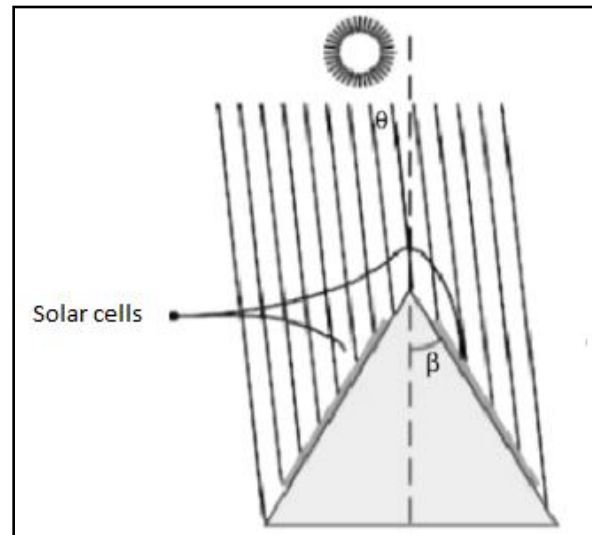
- The maximum power of the PV module is depended from the temperature of the module.

Adaptive Control of Active trackers

Characteristics of the system:

- photovoltaic modules
- measures the temperature of the PV modules
- Recognize weather condition

Structure:

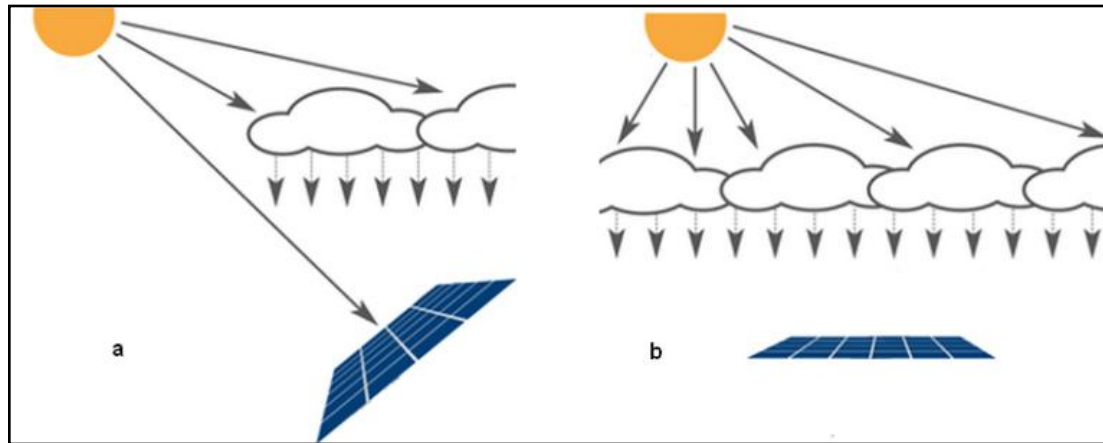


Adaptive Control of Active trackers

- The idea was:
 - equal power production of both PV modules
 - Temperature control of PV modules
- Result:
 - Max power production of solar tracker

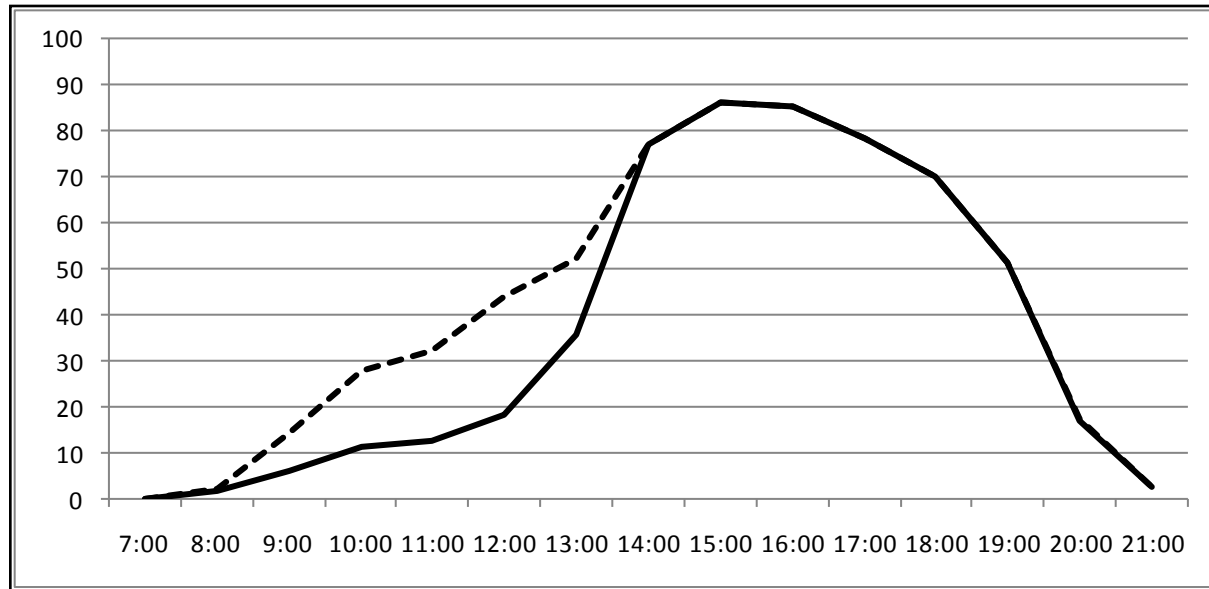
Adaptive Control of Active trackers

Power production is depended in the level of the cloudiness.



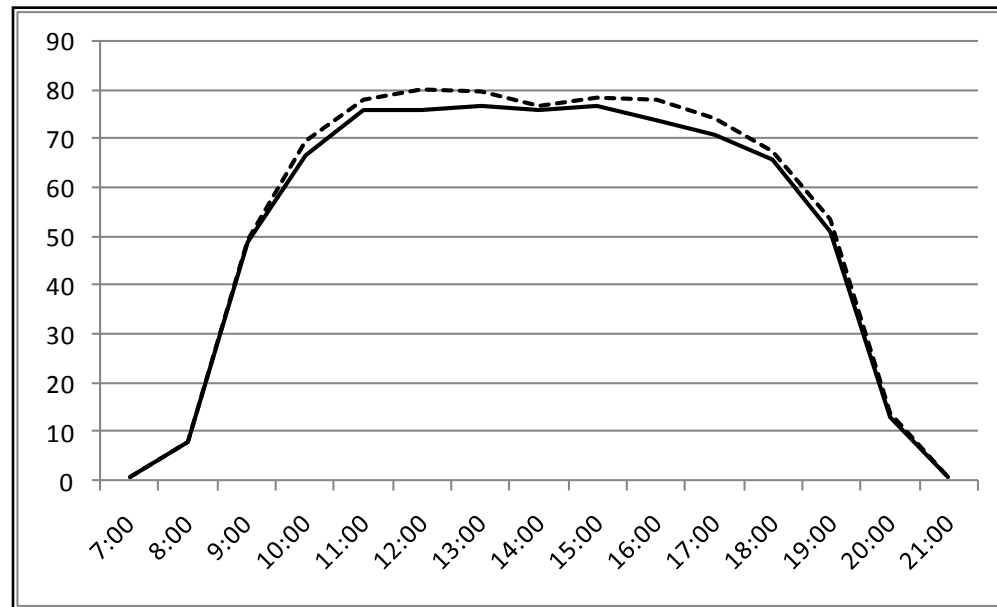
1. Partly cloud: In addition to the direct solar irradiation, diffused light is also used to maximize the effect of the PV module.
2. Overcast sky: The system catches all the diffused light by moving the tracker to horizontal position.

Adaptive Control of Active trackers



- Comparison of power production of solar panels in kWatt between adaptive active tracking system (slashed line) and sun position tracking system (continues line).
- The adaptive system was moving according to the maximum power production spot instead of the suns spot in the sky.
- Energy increases at 16.5%.

Adaptive Control of Active trackers



- Comparison of power production of solar panels in kWatt between adaptive active tracking system (slashed line) and active tracking system (continues line).
- The difference is spotted between the noon hours when the adaptive system is taking into account the temperature of the module, while the active system is only considering the sun positioning.
- Energy increases at 3.7%.

Conclusions

This solar tracker system has already been constructed and it is working on environmental conditions. All the Conclusions we have are from 3 solar trackers that we have feedback.

THANK YOU