Automated Optimized Tilt Angle For Solar Modules

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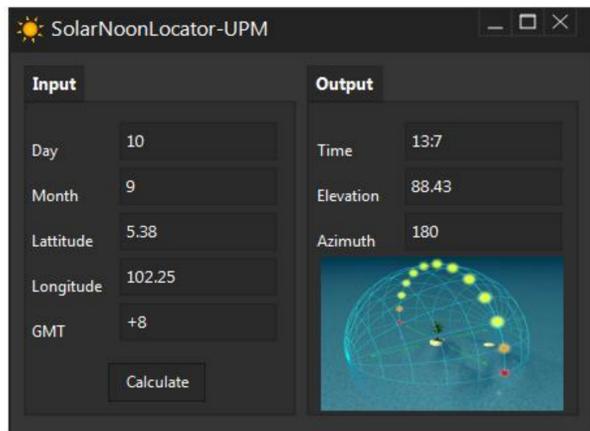
Optimized Tilt Angle
Software

Optimized Tilted Angle
Solar Modules (1kW)

Optimized Tilted Angle Solar
Modules (500W)

INTRODUCTION OF TECHNOLOGY

Green energy generation has many long term benefits such as low operating cost and environmental friendly. In Malaysia, particularly, the solar electricity generation potential is 6500MW, while, grid connected solar PV is only 230MW. Meanwhile, there are needs of optimized angle for solar modules since optimized tilted solar modules can increase the efficiency up to 23% as compared to fixed solar modules. However, the optimized tilt angle depends on geographic locations. Moreover, the surrounding obstacle also affected the optimized tilt angle. The tilt angle also need to be adjusted at regularly because the loss in the amount of collected energy when using the yearly average fixed angle is around 8% compared with the monthly optimum tilt angle. Therefore an automated optimized angle is a must to harvest solar energy effectively.

INVENTION

The optimum tilted angle calculation is based on solar noon in which from the equation, a software has been developed for tilted angle calculation, namely Solar Noon Locator UPM. The developed GUI is shown in the Figure 1. The user need to input the date, location and GMT data then software will calculate the optimum tilted angle. Figure 2 shows the mechanical drawing of the structure for holding the solar module and moving the optimum tilt angle toward solar noon. The designed four wings can easily be pulled out to harvest solar energy and push in to minimize its size during delivery or storage. The tilted mechanism assisted by 2 unit of linear actuator remove the necessary of human effort to adjust the optimum tilt angle and automated by a processor based on Arduino platform.

ADVANTAGES

The installation of automated optimized angle mechanism for solar modules

➢ **Increase daily solar energy harvesting**
➢ **Remove the necessary of human effort to adjust the optimum tilt angle**
➢ **Simple design and mechanism**
➢ **Low cost but reliable processor for automation**

MARKET POTENTIAL

Consumer/End User
• Portable solar generator

Industry
• Large or small scale solar farm

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