

EFFICIENT SOLAR PANEL BASED ON ARDUINO MICROCONTROLLER

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Ecology is an urgent problem for mankind nowadays. One of the main reasons for its change is pollution, which is come out by using these resources, which we do not completely transform into energy. That is why humanity has begun to look for alternative renewable energy sources and the solar panel is one way out of this situation but needs to be refined to increase efficiency.

To increase the effectiveness factor of the panels should be installed on special support that allows the elements to rotate after the sun. This can be done more efficiently with two servomotors, four photoresistors and an Arduino microcontroller, so the configuration will not be very expensive and affordable, will not be inferior to competitors. Servos are used to rotate the panel in two axes. This allows the installation to move in the right direction.

Photoresistors, in turn, are used to track the sun at any time of the day, regardless of the time. As a rule, it provides the optimum orientation of a working surface. Besides, it will allow you to use the maximum efficiency of the solar panel, which in turn will allow you to get much more output power than compared to a stationary installed solar panel.

Taking into mind the peculiarities of the daily trajectory of the sun, we can say that the effective angle of rotation of the panel is about 180° relative to the support. Stationary panels, in the middle direction between west and east, can lose up to 75% of the maximum possible energy produced. That is, as a result of a small angle of incidence of the rays on the plate, the amount of energy produced will be significantly reduced. The location of the device relative to the geographical coordinates is also important, as the optimal angle of incidence for the north of Ukraine will be different from the southern regions. Therefore, to obtain a high amount of energy throughout the day, you should use a movable hinge that determines the optimal position and angle. Typically, such a movable base can increase efficiency by up to 20-65%. This difference is shown by the graph in Figure 1, which shows the dependences of energy produced on time and type of platform.

And yet this design has several drawbacks. One of these is to reduce the reliability of the installation, as strong winds can cause damage to the panel mounting. The second problem is relatively high. But every year more and more people want, because with the development of science and technology, solar power plants are becoming more affordable [2, p. 1]. Today, automated solar panels can be found only in industrial electrical installations and in enthusiasts who manufacture their own

equipment and software for solar panel management, if the factory equipment for such an automated complex is expensive and therefore uncommon.

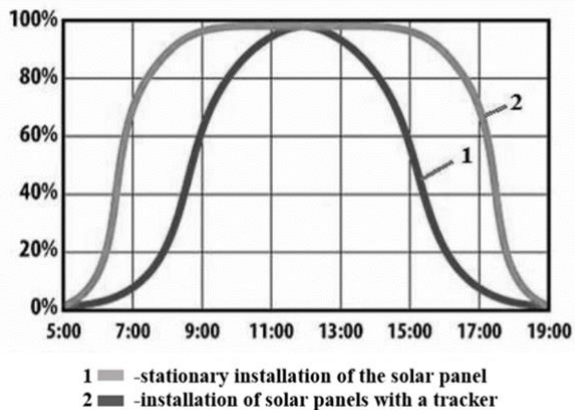


Fig. 1 - The difference between the efficiency of stationary and movable fastening [1, p. 138]

Thus, the base based on microcontrollers and servos due to its advantages increases the efficiency of the solar panel by 20-65% relative to the stationary space, and due to cheapness, simplicity and modularity that allows the user, solar energy can become an educator of modern economic problems. Before that, the shortcomings that are used can be solved in the process of open testing and mass production.

References:

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