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Solar Panel Cleaner Robot (SPCR)

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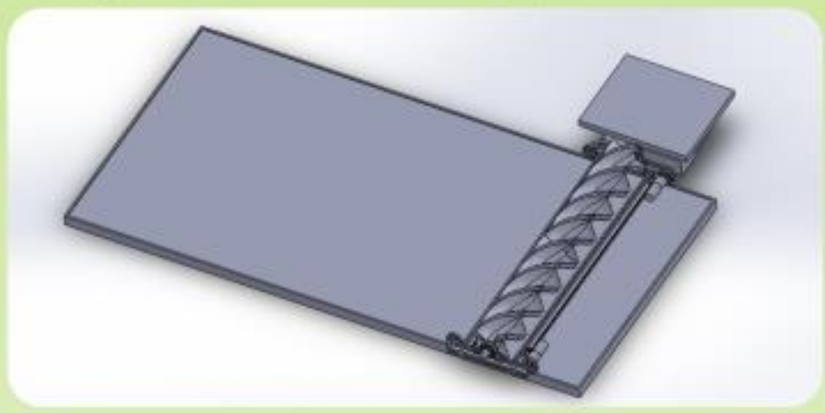
The use of solar panels and significantly improving their efficiency in providing electrical energy is one of the basic priorities of using renewable energy. In 2030, the share of energy from panels is expected to reach 1040 billion kilowatt hours per year. The efficiency of solar panels is affected by the cleanliness of their surfaces. Dust and dirty surfaces have reduced the panels' efficiency by **50%**.

Recently, automatic panel cleaning devices have been designed and developed to wash with water and dry, which cleans the panel surfaces. This project designed a cleaning robot that removes pollutants on panel surfaces in a dry manner, finally, the efficiency of the built robot, especially in dry areas, as well as its costs have been evaluated.

In this research, a solar panel cleaning robot has been designed and developed. It was designed in SolidWorks software and the designed robot has two motors and one Degrees of freedom (DOF), moves horizontally on panels installed side by side. A cleaning brush in the form of a spiral (helix) on the vertical axis performs dry cleaning. The energy needed to move the robot is provided by a solar panel placed on it and stored in its battery. The panel washing robot is controlled remotely by the GSM module.



According to research, ready-made washing robots that work dry can clean up to 80% of the surface of the panels and remove dust from them. Cleaning the panels by this robot can increase the amount of force produced in increase the length of time by an average of 3.5%. This robot has a lower manufacturing cost than other robots, and the amount of energy consumed is less, and it also has no pollution.

In general, this robot does the washing job completely and can make many improvements in the future in the direction of clean energy. To improve the performance of the panel washing robot, the material of the brush, its movement speed, and the number of brushes can be changed. Also, the design of a robot with the ability to change its dimensions to fit all types of panels is one of the suggestions to continue the process of this project.

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