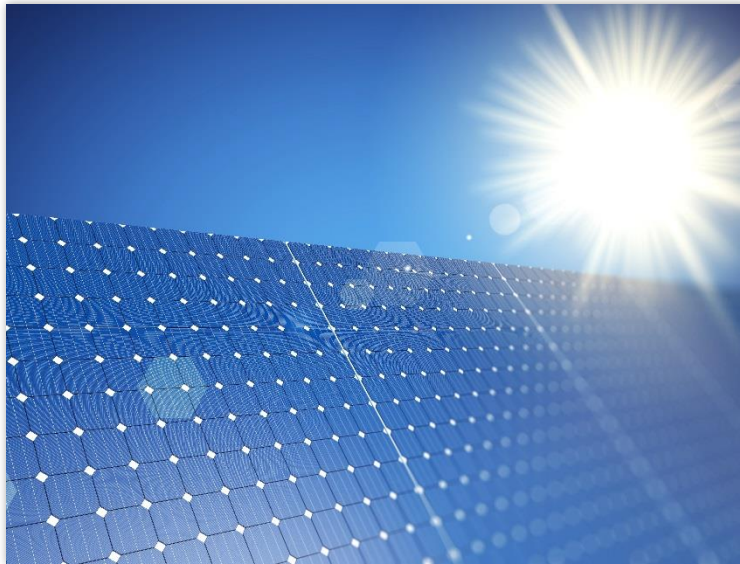


# Automatic system for the cleaning of solar photovoltaic modules

## Abstract

The diffusion of large photovoltaic systems for the generation of electrical energy has involved the necessity to carry out a periodical and systematic cleaning of solar panels in order to minimize the efficiency loss resulting from the fouling of modules. The proposed device represents a parallel kinematics motorized system which allows for the automatic fouling of the modules surface through lightweight and compact elements.



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parallel kinematics

photovoltaic modules fouling

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automatic cleaning

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## Description

The diffusion of large photovoltaic systems for the production of electrical power has involved the necessity to carry out a periodical and systematic cleaning of solar panels in order to minimize the efficiency loss resulting from the fouling of modules. The negative effect during the conversion prove to be more significant, the higher is the size of plants. The presented device consists of a parallel kinematics motorized system that performs the automatic cleaning of the panel modules. The invention is composed of a mobile platform

with brushes, that are moved along the surface of the panel by a parallel kinematics system. It uses wires connected to four traction motors arranged at the corners of the panel. Cleaning occurs through the combined use of brushes and demineralized water, mixed with an appropriate detergent. In the original configuration, the system is able to operate with a square form factor. The drop in output due to the fouling of modules can be easily offset by the reasonable cost of cleaning.

## Applications

The invention solves the problem of efficiency loss when photovoltaic modules are covered by sand, dust or salt. The presented system is an automatic device for the cleaning of solar panels, suitable for geographic areas with high probability of fouling and low rainfall, desert regions, industrial zones or in proximity to the sea. This technology offers the opportunity for companies that want provide innovative cleaning solutions to the solar photovoltaic industry.

## Advantages

Unlike manual cleaning and other automatic devices with fixed nozzles, parallel kinematics has considerable advantages in terms of weight and speed. In particular, the wired system is very performing because the actuators are attached to the structure and the moving parts are lightweight and compact elements. There is also the possibility to perform at regular intervals the cleaning on high added value systems, such as solar trackers, which in general are particularly difficult to clean.

