

Using Artificial Vision Techniques for Dust Detection on Photovoltaic Panels

Authors : Gustavo Funes, Eduardo Peters, Jose Delpiano

Abstract : It is widely known that photovoltaic technology has been massively distributed over the last decade despite its low-efficiency ratio. Dust deposition reduces this efficiency even more, lowering the energy production and module lifespan. In this work, we developed an artificial vision algorithm based on CIELAB color space to identify dust over panels in an autonomous way. We performed several experiments photographing three different types of panels, 30W, 340W and 410W. Those panels were soiled artificially with uniform and non-uniform distributed dust. The algorithm proposed uses statistical tools to provide a simulation with a 100% soiled panel and then performs a comparison to get the percentage of dirt in the experimental data set. The simulation uses a seed that is obtained by taking a dust sample from the maximum amount of dust from the dataset. The final result is the dirt percentage and the possible distribution of dust over the panel. Dust deposition is a key factor for plant owners to determine cleaning cycles or identify nonuniform depositions that could lead to module failure and hot spots.

Keywords : dust detection, photovoltaic, artificial vision, soiling

Conference Title : ICSEP 2024 : International Conference on Solar Energy and Photovoltaics

Conference Location : Santiago, Chile

Conference Dates : September 16-17, 2024