

DeepLight: Improving Solar Photovoltaic Systems Efficiency using Deep Learning

Project Summary

- Partial shading is a major source of power losses in solar PV systems that could reach to ~21%. This project utilizes computer vision and artificial intelligence innovatively to decrease the power losses of solar PV systems operating under partial shading conditions leading to increase their overall efficiency.
- The power losses are minimized through ensuring the operation of PV systems on the voltage point at the highest power peak. This is realized by utilizing an optical camera. The captured images by the camera are processed, using image processing and artificial intelligence tools to locate and estimate shading which are, then, used to calculate the operating point at the highest power peak.

Project Impact

The proposed technology provides an extended solution to enhance the efficiency of solar PV modules under partial shading. Improving the efficiency of solar PV systems is a current escalating need and is a major goal sought by the US Department of Energy DOE and industry. Therefore, it is expected that the proposed technology would facilitate attaining the DOE targets for lower solar cost and higher efficiency.

Key Personnel/Organizations

- Prof. Yousef Mahmoud, Kennesaw State University, GA
- Prof. Thirimachos Bourlai, University of Georgia, GA