Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M22-007P
Published: 7/26/2022

Inventors

Yu Yao

Govindasamy Tamizhmani

Contact

Physical Sciences Team

Polarimetric Imaging for On-Site High-Speed Photovoltaic Module Inspection

-Potential Applications • Quality control for photovoltaic module manufacturing • Operation and maintenance (O&M) of photovoltaic plants • Drone-mounted inspection systems Benefits and Advantages • Rapid and efficient inspection of PV module defects, degradation, and failure • Ultra-compact form factor permits drone-mounted deployment • Operates under a variety of lighting conditions Invention Description Researchers at Arizona State University have developed a novel polarimetric imaging technique for photovoltaic (PV) module manufacturing quality control and field analysis. This technology is designed to deliver non-interruptive, rapid, and accurate inspection of PV cells and modules under indoor or sunlight conditions. Results show that polarimetric images exhibit high contrast suitable for detecting PV cell micro-cracks, scratches/cuts on panel top surfaces and backsheets, and soiling levels. Polarimetric imagers based on this technology contribute negligible weight and size increases (< 0.1%) in relation to conventional imagers. Background Conventional techniques for photovoltaic (PV) cell and module inspection include visual inspection, electroluminescence (EL), infrared (IR), and UV fluorescence (UVF) imaging methods. However, these state-of-the-art techniques often cannot accommodate a wide range of lighting conditions, and concerns exist over the achievable accuracy, cost, speed, and continuity of operation of these approaches. Hence, integration of new imaging technology in the PV manufacturing process could result in more efficient defect inspection at higher speed and lower cost. Similarly, improved in-field monitoring of degradation and failure of individual PV modules could reduce costs by streamlining the prioritization and preparation of module replacement. Research Homepage of Professor Yu YaoResearch Homepage of Professor Govindasamy Tamizhmani