# Computer Vision for Photovoltaics

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SenSIP INDUSTRY CONSORTIUM

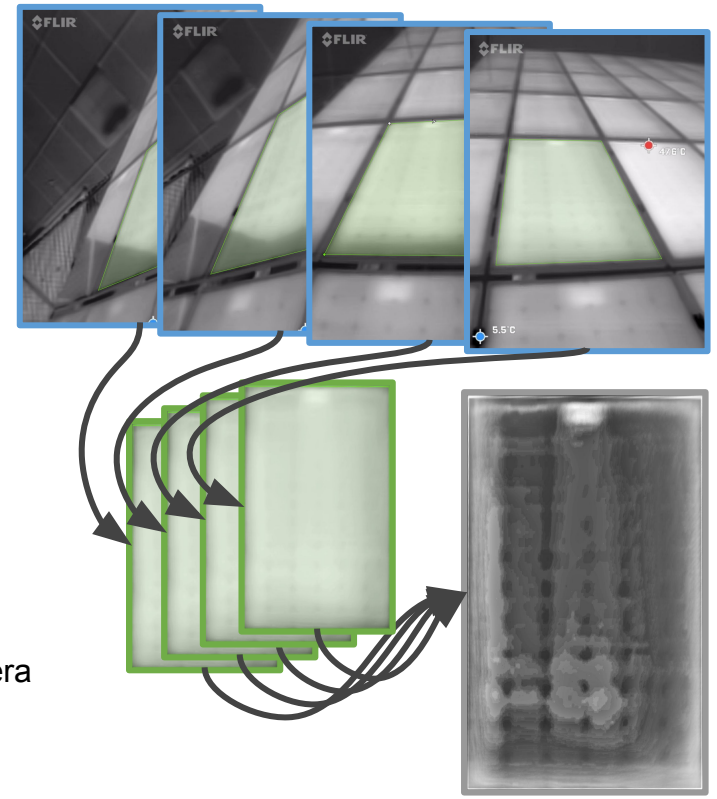
Solar facility at ASU Research Park used for experiments and data collection.

## Problem Statement

- Utility-sized solar arrays require unique management
- Solar panels **degrade** over time and need replacement
- Material **faults** can be a serious safety concern
- **Shading** can cause an exponential loss in power
- Transient **clouds** greatly affects entire power grid
- Predicting faults and forecasting environmental conditions can i**mprove the operation of solar power**

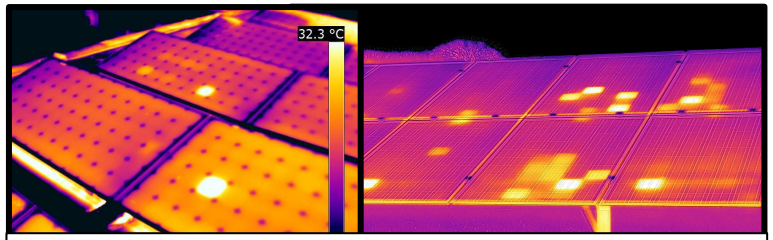

## Proposed Solution

- **Computer vision** has utility for solar monitoring
- **Thermal/infrared** camera for PV fault diagnosis
- **360-camera** collects wide field of view
- **Cloud tracking** can forecast power generation
- **Irradiance forecasting** important for utility-grid
- 3D environment modeling using stationary camera
- Solar path to predict shading geometry




## Thermal Imagery Processing

- Automatically isolate panels for analysis
- Rectify using perspective transform
- View-dependent PV cells effects
- Align and combine for super-resolution
- Goal: **Machine learning** automated PV **fault detection** and condition grading




heat-sensing **infrared camera** can capture PV defects and faults not visible to the human eye.

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Sensor Signal and Information Processing Center
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