PhD Open Days

Failure Diagnosis for Predictive Maintenance of PV Systems

PHD PROGRAMME IN ELECTRICAL AND COMPUTER ENGINEERING (PDEEC)

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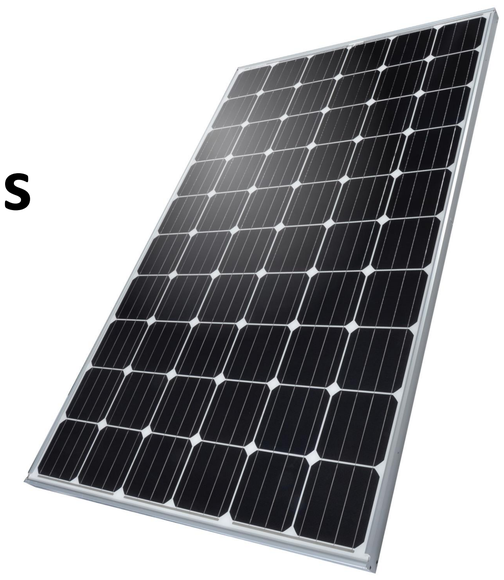


How to get the most out of a PV system?

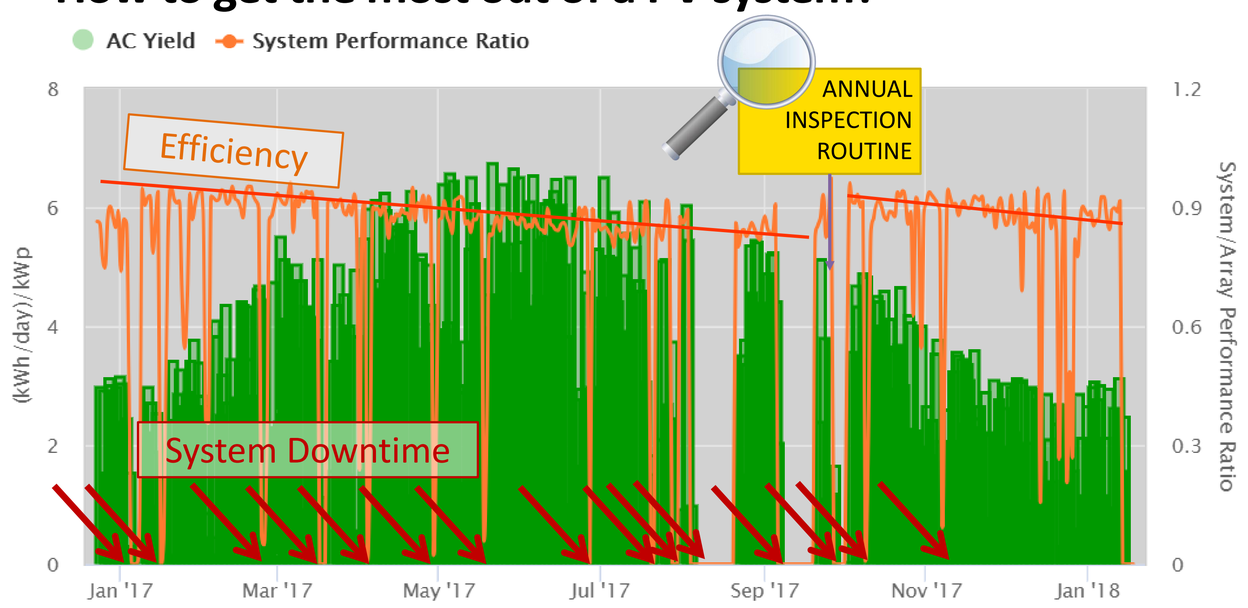


Figure 1 – Output energy and performance ratio of the system per day for an entire year. PV system with 95 kW installed capacity from NREL facilities at Denver, US.

Preventive Maintenance

Low periodicity = Underperformance

Corrective Maintenance

High Impacting failures + Urgent intervention = High Costs

PhD Project objective is to apply Predictive Maintenance to PV System

Knowledge failures + Synthetic Data + A.I. = Health diagnosis

State-of-the-Art

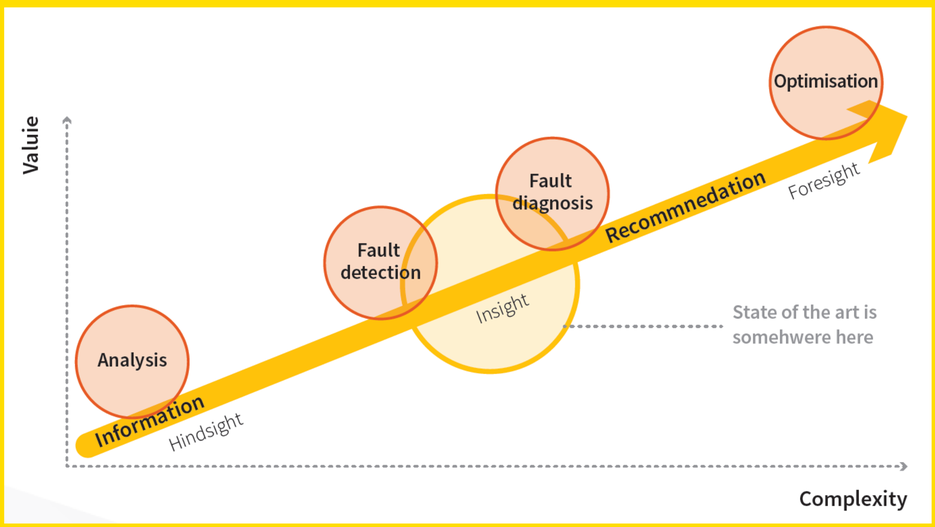
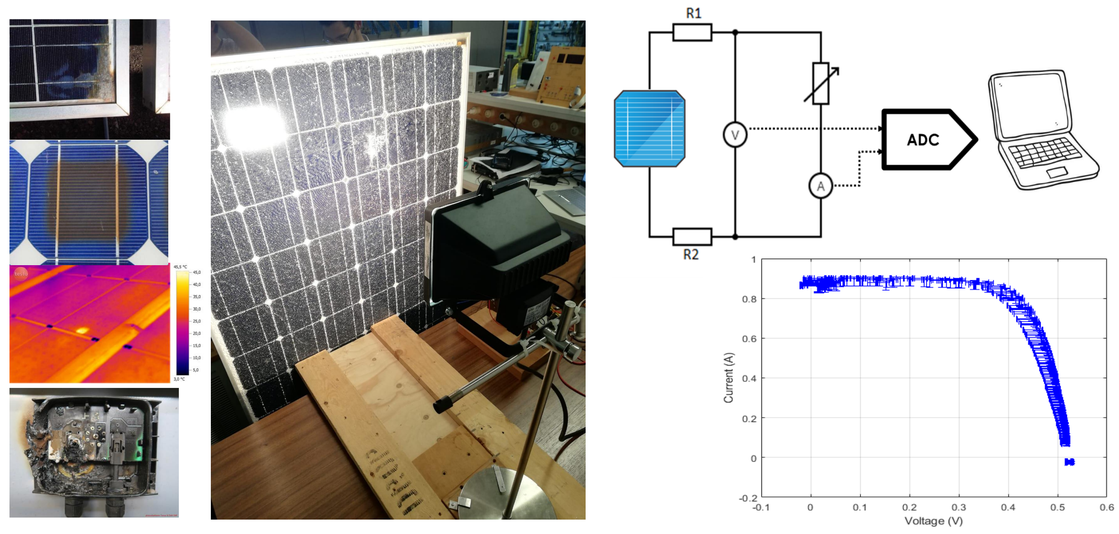


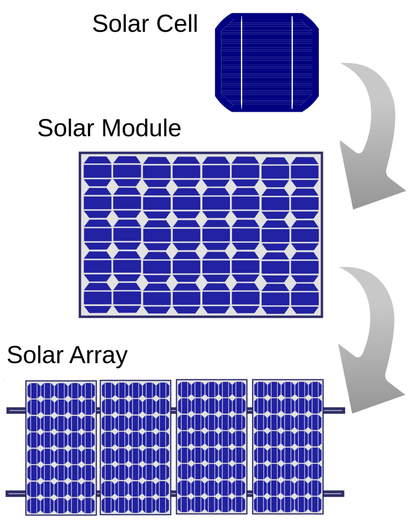
Figure 2 – Representation of the State-of-the-Art in automated PV systems performance diagnosis. The technological frontier is between the failure detection and the diagnosis of its type and root causes [1].

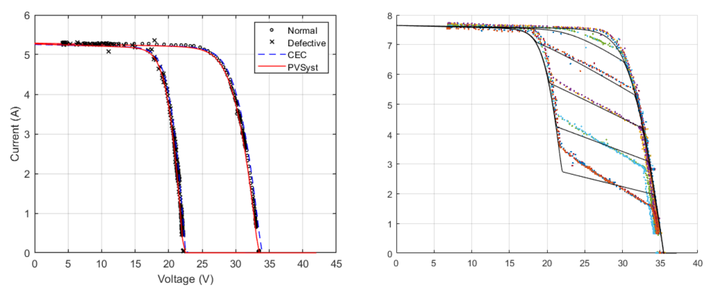
Failure characterization

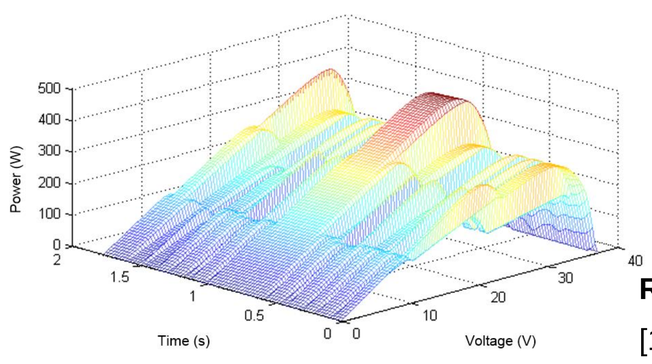


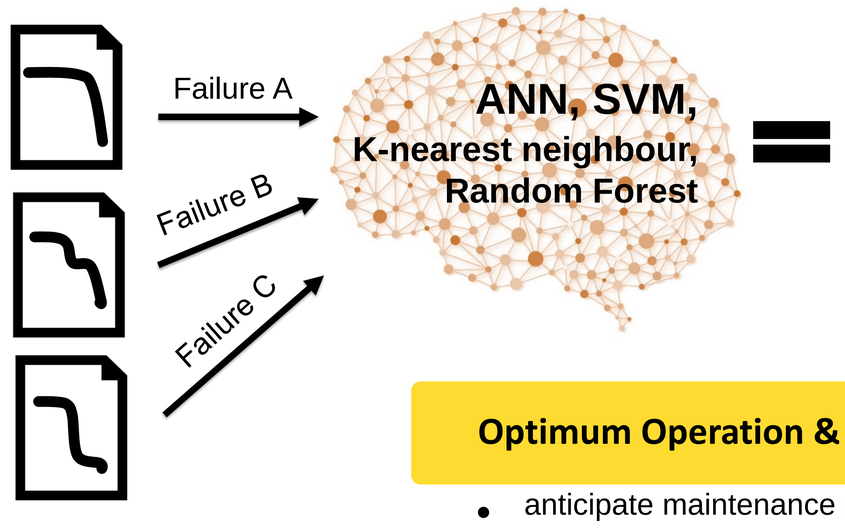
Artificial Intelligence supervised training using data labels of failures

Synthesize a Data Set with Failures (bottom-up)









Predictive Algorithm for Detection & Diagnosis

Optimum Operation & Maintenance

- anticipate maintenance activities,
- reduce time to repair,
- optimize spare parts management, and
- increase the availability of systems.

References:

[1] SolarPower Europe. (2018). Operation & Maintenance Best Practices Guidelines / Version 3.0.

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