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Portfolio Overview

Highly analytical Renewable Energy Engineer with a Master's degree and a robust foundation in solar energy principles. This portfolio showcases a track record of engineering excellence at Enpal B.V., specializing in PV system analysis, hardware R&D, and the application of international technical standards to drive sustainable energy innovation.

Achievement 1: Photovoltaic R&D and Mechanical Engineering

Project: Optimization of Residential PV Mounting Systems (Enpal B.V.)
Challenge: Re-engineering structural components to balance material efficiency with extreme weather resilience.

- **Design & Simulation:** Utilized **SolidWorks** for generative design and iterative CAD modeling of panel mountings. Conducted Finite Element Analysis (FEA) to identify stress concentrations and eliminate redundant material in over-engineered brackets.

- **Rapid Prototyping:** Leveraged FDM 3D printing to validate mechanical tolerances and installation ergonomics before transitioning to mass production.

- **Quantifiable Result:** Achieved a **5% reduction in total material usage and manufacturing costs** while maintaining structural compliance with wind and snow load regulations.

- **Efficiency Gain:** Developed a cross-departmental hardware database that **reduced information retrieval time by 50%**, streamlining the transition from design to procurement.

Achievement 2: Power Electronics Reliability & Performance

Project: Next-Gen Inverter and BMS Lifecycle Optimization
Challenge: Increasing system uptime and battery longevity through hardware-software synergy.

- **Validation Testing:** Led the installation and rigorous testing of new-generation inverters and Battery Management Systems (BMS). Established stress-test protocols to verify safety and connection integrity.

- **Operational Optimization:** Redesigned the backup mode logic for residential inverters, resulting in an **8% increase in system uptime** during grid blackouts.

- **Failure Mitigation:** Identified critical failure modes through hardware-in-the-loop (HIL) simulations, successfully **reducing defect rates by 4%**.

- **Innovation:** Integrated advanced firmware features that are projected to **extend battery longevity by at least two years** by optimizing charge/discharge thermal profiles.

Achievement 3: High-Volume PV Planning & Grid Compliance

Project: Large-Scale Residential PV Deployment Strategy
Challenge: Ensuring high-fidelity energy yield predictions and rapid grid approval for a diverse portfolio of consumer projects.

- **Advanced Simulation:** Conducted comprehensive grid integration and performance simulations for **over 150 consumer PV projects** across Germany using **PVSyst**.

- **Technical Standards:** Ensured 100% technical compliance with **VDE-AR-N 4105/4110**, **DIN VDE 0100**, and **IEC 61215** standards, minimizing legal and operational risks.

- **Data Infrastructure:** Established a robust specification database for **100+ PV panel models**, enabling automated selection and yield calculation.

- **Impact:** Accelerated the technical review cycle by **15%** and maintained a **98% first-time approval rate** with regional Distribution System Operators (DSOs).

Technical Projects & Research

Master's Thesis: IV Characteristics and Temperature Dependence

- **Institution:** SRH Berlin University of Applied Sciences.

- **Scope:** Conducted an in-depth study on the performance of PV panels under varying environmental conditions following **IEC standards**.

- **Methodology:** Utilized numerical methods and Python-based modeling to identify silicon-based PV module parameters.

- **Key Result:** Developed a model capable of rapidly identifying module degradation and

temperature-dependent losses, significantly reducing the time required for field performance audits.

NREL 5MW Turbine Simulation & Aerodynamics

– **Scope:** Optimized blade design for an NREL 5MW turbine using **Qblade**.

– **Key Insight:** Investigated error sources in LIDAR and Radar wind speed measurements, ensuring simulations adhered to **IECWind** standards for long-term structural performance.

Case Study: Environmental Impact of Decommissioning

– **Scope:** Detailed analysis of the end-of-life cycle for mid-to-large scale solar projects, covering module recycling and land restoration feasibility.

Engineering Toolset

Category	Proficiency
CAD/CAM	SolidWorks, AutoCAD (2D/3D), 3D Printing (FDM/SLA/SLS)
Simulation	**PVSyst (Expert)**, PVSol, ANSYS, Qblade, MATLAB/Simulink
Data & GIS	Python (NumPy/Pandas), QGIS, SQL, Excel/VBA
Standards	**IEC 61215/61730, VDE-AR-N 4105/4110, DIN VDE 0100**