Yawar Badri

Systems Engineering | Hardware Architecture

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Professional Summary

Systems Architect | High-Reliability Power Electronics. I believe in building high-reliability hardware from first principles, architecting the bridge between complex physical domains and robust control logic. Proven ability to deploy end-to-end solutions spanning from high-power analog frontends to deeply embedded firmware.

Core Competencies

- **Hardware & EDA:** KiCad, Altium, Cadence, SolidWorks, SolidEdge, PCB Layout, Bed of Nails Design
- **Simulation & Modeling:** MATLAB, Simulink, LTspice, Qspice, Root Cause Analysis (RCA), FMECA, WCCA
- **Languages & Firmware:** C, C++, C#, Python, JavaScript, STM32, ARM Cortex, Embedded DSP
- **Test & Measurement:** DSO, MSO, Logic Analyzer, LCR, Megger, PQA, DMM, Hardware-in-the-Loop (HIL)

Experience

Pixxel Space **2022 – Present**
Senior Electrical Engineer *Space / High-Rel Electronics*

– Architected full EPS design end-to-end for LEO satellites—from sizing to parts selection, categorization, and assembly. Designed buck power tiles (up to 100V) achieving power densities ∼800W/in^3.

– Led small engineering teams in the design, testing, and commissioning of Firefly satellites (6 currently in orbit), driving cross-functional collaboration across thermal, mechanical, AOCS, and AIT teams.

– Led internal COTS-in-space program, reducing lead times from months to under 2 weeks and achieving massive cost cuts.

– Developed custom Electrical Ground Support Equipment (EGSE), including a modular 500W solar string simulator and high-speed multi-channel power loggers.

Kashmir University **2021 – Present**
Technical Advisor & Mentor *Hardware Startups & Prototyping*

– Providing strategic technical architecture guidance and mentorship to students and emerging hardware startups.

– Guided multiple PhD students in hardware design and conducted workshops on embedded systems integration.

NIT Srinagar **2022 – Present**
Project Associate & Mentor *Power Systems*

– Led a small engineering team to direct hardware architecture and systems integration for an experimental 10kW grid-tied inverter testbed.

– Provide active, unpaid mentorship for students in hardware and power electronics.

University of Kashmir (Sponsored by J&K Govt.) **2021**
Research Analyst / Associate *EV Infrastructure Analysis*

– Analyzed electrical distribution constraints for emerging EV infrastructure, synthesizing deep technical findings into actionable state infrastructural policy.

Hardware Architecture & Electronics

- **Ongoing R&D:** Developing a Custom Camera Plugin (Hardware), PCB Heater, Portable Power Supply, and experimenting with Line Scanners and Electro-Optics (MOKE).
- **10-Channel Power Logger:** Bidirectional DC power logger (100Vmax) featuring custom analog front-end hardware and STM32 USB 2.0 interface. Included hardware design, firmware, calibration, and desktop app.
- **DACard-Basic HIL Interface:** Architected a comprehensive hardware-in-the-loop testing ecosystem encompassing physical hardware, embedded firmware, host software, and custom Python libraries.
- **3-Phase Grid-Tied Inverter:** Hardware design layout for 3-phase grid-tied power conversion, engineered to support active and reactive power injection algorithms.
- **Ground Energy Storage BMS:** Designed and deployed comprehensive battery management systems (BMS) for large-scale energy storage solutions.

Software & Embedded Tools

- **CATS (CAN Automated Testing Software):** Used to test hardware with a full command, read, verify, record cycle based on PCAN hardware as an interface.
- **KiWay & Transformer Tools:** PCB Design routing framework for automating redundant constraints, and internal CAD tools to calculate and paramaterize custom magnetic transformers.

- **sigLib:** C++ DSP library tailored for real-time waveform conditioning, smoothing, and analysis on embedded targets.
- **Custom DAQ & Desktop Apps:** Developed bespoke desktop applications tailored for determining electrical load profiles, automated billing, and general data acquisition systems.

Interactive Engineering Utilities (Web-Based)

- **Power & Systems Engineering:** Developed interactive tools for **SMPS Topology & Ratio** solving, **Loop Compensators (P/Z)**, **AC Motor Dynamics**, **PV Yield Simulators**, and **Battery Pack (S/P) Configuration**.
- **Electronics Design (EDA) Calculators:** Built advanced tools including **Filter Designers (RC/LC/Pi)**, **Resistor Divider** smart solvers, **Voltage/Current Margining (DAC)**, **Thermistor R-T Curves**, **IPC-2221 Trace Width**, **AWG Wire Ampacity**, **E-Series Finders**, and **Magnetics & Harness** drop calculators.
- **Hardware Interfacing: Web Serial Interface** providing real-time hardware stream monitoring and plotting directly in the browser.

Education

Lovely Professional University (LPU) **2022**
Master of Technology (M.Tech) in Electrical Engineering (Power & Renewable Energy) *Grade: A*

University of Kashmir **2019**
Bachelor of Technology (B.Tech) in Electrical Engineering *Grade: A*

Selected Publications

- *Ultracapacitor Integration with Regenerative Braking Systems in Electric Drive Trains* (ScienceDirect/Elsevier, 2023)
- *Experimental Implementation of Optimally Tuned Multifunctional RLMLS Driven VSc...* (Springer Link, 2023)
- *Application of V2V Energy Sharing in Electric Vehicles with Source Switching* (IEEE Xplore, 2022)
- *A New Modular Multilevel Converter Topology Using Flying Ultra-capacitor...* (Springer, 2021)