My Research Views: Early in my role, I kept asking a question: how do we make systems choose safely when data is messy and time is short? That challenge shifted me from power engineering to Computer Science. I now focus on trustworthy Machine Learning (ML) methods that explain themselves and act reliably in real time. My interests center on reinforcement learning and large language models, with power systems as the proving ground for these ideas. This curiosity has guided my academic journey and continues to shape my research in trustworthy decision-making.

Academic Foundations: At the Pakistan Institute of Engineering and Applied Sciences (PIEAS), my Bachelor of Engineering (B.E.) in Electrical Power Systems and coursework in Power Systems and Robotics & Instrumentation trained me to reason deeply about coupled dynamics and constraints. Electives in robotics and microcontroller interfacing also built habits around sensing, actuation, and feedback. These foundations in control and optimization underpin my shift to Computer Science (CS) robust ML, RL, and LLM-assisted decision-making for grid operations under uncertainty. I am interested in RL & LLM synergy for safe, interpretable control, drawing on RL2Grid and explainable operator assistants.

From Theory to Research: Following that foundation and those discussions, I pursued these questions through research-style projects that allowed me to test ideas end to end. In my capstone, I optimized a 177 buses grey transmission network achieving a 12% reduction in line losses while improving economic dispatch; I presented this work at an international venue. That effort made clear that algorithmic choices, objective shaping, constraints, and termination criteria map directly to system-level performance. Built a Python fault-detection pipeline (SVM, Random Forest); comparative study (Decision Tree, XGBoost) predicted stability under variable load/renewables. Separately, as co-researcher with an Assistant Professor at Namal University I worked on autonomous maritime path planning for MASS using GHT-Bézier curves integrated with a Grey Wolf Optimization–based energy model. The simulations generated smooth, low-curvature, constraint-satisfying trajectories, demonstrating robustness for real-time adaptation and multi-vessel coordination.

Personal Context & Teaching Ethos: Having been raised in rural Pakistan as the son of a farmer gave me a grounded sense of reliability and access; it taught me to notice constraints, work within them, and design support that reaches everyone. Competitive scholarships enabled my studies at PIEAS, and managing a lifelong stammer trained me to prepare thoroughly, communicate with precision, and listen closely, skills central to leading labs, giving clear explanations, and supporting diverse learners. Sustained practice, mentorship, and community support shape my teaching style as patient, scaffolded, and outcomes-oriented, making me a strong fit for a TA role.

Competitions & Applied AI: Competitions and teaching sharpened my rigor and communication. Alongside coursework, I led an applied AI project: a retrieval-augmented, hallucination-resistant chatbot (Mistral-7B + Vectara with (LangChain/Python) from build to deployment. It placed **3rd** in Un-hallucinate and informed my later role leading deployment in the "Reasoning with o1" hackathon (o1-preview, Chroma, Django). I also finished top-50 in Pakistan in the Meta Hacker Cup 2024. Teaching keeps me grounded: selected from 30,000 for Stanford's Code in Place, I taught Python through interactive sessions and 1:1 support. Earlier, as a Power Systems TA at PIEAS, I helped students connect equations to system behavior. Together these experiences prepare me for a PhD: build, test, explain, iterate and help others do the same.

Bridging Academia and Industry: Industrial experience taught me to make research deployable. At CureMD, as a Robotic Process Automation Engineer, I used Automation Anywhere to streamline healthcare workflows and explore AI-assisted validation and intelligent routing. I handled backend testing (SQL, API automation) and collaborated across Angular, Django, and .NET Core, building cross-team skills and interface discipline. Earlier, at Mashal Construction Company, I worked with PLCs, motors, and control circuits in asphalt plants. These roles taught me to anticipate failures and integrate with legacy systems skills for CS/AI experimentation, reproducibility, and safe deployment.

Why UH Mānoa? RL–LLM Research Agenda for Grid Operations: I see a strong research fit with the University of Hawai‘i at Mānoa, where I recently met Prof. Igor Molybog (Computer Science) to discuss trustworthy ML for grid operations and, in particular, the emerging synergy between reinforcement learning (RL) and large language models (LLMs) in safety-critical settings. He encouraged me to study LLM-based assistants for operators and to engage with **RL benchmarks for grid control**. Guided by that conversation, I have been reading work on explainable assistants for grid operation, RL2Grid for standardized RL evaluation, and methods that use language models to guide RL safely and efficiently. From these readings, a clear agenda emerges: to develop LLM co-pilots that keep the earliest phases of RL within safe operating envelopes in Grid2Op-style settings, encode language-model priors for efficiency and robustness, and generate recommendations that are effective, auditable, and understandable to both operators and researchers. This agenda aligns with my broader interests in robust, interpretable ML for sequential decision-making and state estimation, while connecting naturally to Prof. Molybog's prior work on robustness under nonconvexity and bad data. Prof. Molybog encouraged me to apply for a TAship, and my experience as a mentor for Stanford's Code in Place, together with my TA experience at PIEAS, has trained me to plan carefully, explain clearly, and support diverse learners. I look forward to contributing in the classroom and lab while advancing this research at UH Mānoa.

Future Plan: Growing up in a context where many communities still face unreliable electricity and where inefficiencies persist because automation and optimization are unevenly applied has grounded my resolve to tackle infrastructure problems. This experience motivates a research agenda centered on trustworthy ML and the synergy between RL and LLMs to enable safe, interpretable decisions in grid and other critical systems. I aim to build methods and tools that reduce losses, improve resilience, and expand access, while remaining auditable to the operators who rely on them. Long term, I plan a research career in academia or industry that advances the foundations of reliable ML and translates ideas into deployable platforms for grid automation, renewable integration, and predictive diagnostics. I also hope to mentor students and collaborate across disciplines so that rigorous theory and careful engineering move forward. A PhD at the University of Hawai‘i at Mānoa will provide the depth in learning theory, probabilistic modeling, and systems and the collaborative environment needed to pursue this agenda with rigor and impact. I look forward to contributing my end-to-end systems mindset, experience at the intersection of AI and engineered systems, and commitment to clear, collaborative research to your community.