**Paragraph 1**  
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 moved me from power engineering toward Computer Science. I now focus on trustworthy ML—methods that explain themselves and act reliably in real time today. My current interests center on reinforcement learning and large language models. Power systems are my proving ground for these ideas. This curiosity has guided my academic journey and continues to shape my research ambitions in trustworthy decision-making.

**Paragraph 2**  
To ground that curiosity, my academic preparation began at the Pakistan Institute of Engineering and Applied Sciences (PIEAS), where a B.E. in Electrical Power and modules in Linear Control Systems, Power System Analysis, Protection, High Voltage Engineering, and instrumentation trained me to reason about coupled dynamics and constraints. Electives in robotics and microcontroller interfacing built habits around sensing, actuation, and feedback. These foundations in control and optimization now underpin my shift toward CS: robust ML, reinforcement learning, and LLM-assisted decision-making for grid operations under uncertainty. Through discussions with Prof. Igor Molybog, I am exploring RL–LLM synergy for safe, interpretable control, drawing on RL2Grid and explainable operator assistants, and setting up the projects described next.

**Paragraph 3**  
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-bus transmission network—first with Genetic Algorithms and later with Particle Swarm Optimization—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. Building on it, I developed a Python-based fault-detection pipeline for grid behavior using SVM, Random Forest, and Logistic Regression to classify anomalies, and I ran a comparative study with Decision Trees and XGBoost to predict stability under variable load and renewable input. Alongside GEPCO workshop exposure to SCADA operations—and hands-on work with sensors and microcontrollers—these projects reinforced a habit I prize in CS systems research: trace the thread from data acquisition → modeling → inference → action, and evaluate against realistic failure modes.

**Para 3 A:**Growing up 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 in the room. 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.

**Para 4 :**Competitions and teaching sharpened both my algorithmic discipline and my communication. Alongside coursework, I led an AI project that taught me to build, evaluate, and ship models. I developed a retrieval-augmented, hallucination-resistant chatbot with Mistral-7B and Vectara (LangChain, Python), leading development and deployment. The system placed third in Un-hallucinate and helped me in my future role leading deployment in the “Reasoning with o1” hackathon, integrating OpenAI’s o1-preview with Chroma and Django. I also finished top-100 nationally in Meta Hacker Cup 2024. Teaching keeps me grounded: selected from 30,000+ for Stanford’s Code in Place, I taught Python, led interactive sessions, and offered 1:1 guidance; earlier, as a TA for Power Transmission, Distribution & Utilization 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.

**Para 5:**  
Industry experience taught me to make research deployable and to communicate it. At CureMD, as a Robotic Process Automation Engineer, I used UiPath and 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; at ROUSCH Power Plant I observed large-scale generation and protection with gas and steam turbines. These roles taught me to anticipate failures and integrate with legacy systems—skills for CS/AI experimentation, reproducibility, and safe deployment. I also volunteer as a backend developer for Muaawin-e-Ilm, serving underserved children, which sharpens documentation, training, and peer-mentoring for a TA role.  
 **Para 6:**

I see a strong research fit with the University of Hawaiʻi at Mānoa. I recently met **Prof. Igor Molybog** (Computer Science) to discuss trustworthy ML for grid operations and, in particular, the emerging synergy between RL and 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 am reading work on explainable assistants for grid operation, **RL2Grid** for standardized RL evaluation, and recent methods that use **LLM priors** to accelerate and stabilize training. From these readings, a clear agenda emerges. I aim to develop **LLM co-pilots** that keep the earliest, riskiest phases of reinforcement learning within safe operating envelopes in Grid2Op-style settings; to **encode language-model priors.** The objective is straightforward and testable: recommendations that are **effective, auditable, and understandable** to both operators and researchers.

**Para 7 :**

This agenda aligns with my broader interests in **robust, interpretable ML** for sequential decision-making and **state estimation**, and it connects naturally to Prof. Molybog’s prior work on robustness under nonconvexity and bad data. I have begun prototyping on **Grid2Op** tasks and organizing reading notes across explainable assistants, RL2Grid, and LM-guided RL so I can formulate concrete experiments early in the program. Prof. Molybog also encouraged me to **apply for a TAship**, and my selection from **30,000+** applicants 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 the lab while advancing this research at UH Mānoa.