Tension-Based Quantum Anomaly Detector

1-Page Technical & Conceptual Summary

Objective

This project simulates structural tension using quantum states to detect anomalies. Instead of pattern matching, it uses fidelity and entropy to observe disruptions in quantum system behavior.

Core Logic

- Expected behavior: Superposition via Hadamard gate
- Anomaly: Injected via X gate (bit-flip)
- Measured Metrics:
  - Fidelity: how much the state diverged
  - Entropy: how much disorder was introduced

Key Insights

Anomalies create measurable spikes in entropy and drops in fidelity. This models 'tension' - a divergence between expected and actual state evolution, aligning with systems thinking and cybersecurity logic.

Real-World Applications

- Quantum-enhanced anomaly detection
- Prototype for secure state monitoring
- Conceptual bridge between cybersecurity and quantum theory

Tools Used

Python, Qiskit, Matplotlib, NumPy