**NASA PROJECT PROPOSAL**

**Problem Description:**

To all that read, My name is Ezra Bakatubia, and I would like to begin by thanking you, professor for a great semester. I’ve appreciated the opportunity to learn more about Ai and its real world applications, especially when its space exploration. Modern space missions involve an complex network of systems and machinery, all of which must operate flawlessly in some of the most extreme and erratic conditions known to man. However though, like any mechanical system spacecraft components wear down over time or may fail suddenly due to harsh environmental factors, manufacturing defects, or unexpected anomalies.

Failures in key systems such as power, propulsion, thermal regulation, or life support can have mission-ending consequences. Historically system monitoring has been reactive or schedule-based, where parts are checked after set intervals or only once a fault occurs. This approach does not guarantee timely intervention and can lead to costly or even catastrophic failures.

We NEED a more proactive, intelligent method that can predict equipment issues before they escalate into failures. Most especially as space agencies and private companies plan longer, crewed missions to the Moon, Mars, and beyond.

**Why It Matters**

Predictive maintenance using AI has been successfully applied in industries such as aviation, automotive, and manufacturing. Bringing this innovation to the space domain can significantly improve mission safety, reduce maintenance costs, and increase the lifespan of spacecraft and satellites.

In a space context, you cannot call roadside assistance. Replacement parts and technicians aren’t just minutes away. Having an early warning system that flags potential mechanical issues before they happen allows mission control or autonomous systems to take corrective action, potentially saving millions of dollars and human lives.

The closer we get to deep space missions, long duration astronaut travel and interplanetary exploration, the more we need real time predictive failure detection.

**Objective**

The goal of this project is to design a conceptual AI system that can forecast equipment failure risks based on telemetry data. The system analyzes patterns, anomalies, and historical failure records to predict which components are likely to malfunction. Days, weeks, or even months in advance.

This early detection system would be designed to issue alerts when a component is at elevated risk, providing mission operators with enough lead time to plan repairs, reroute systems, or conserve power. Thank You.