Company Information

Company Name	Honeywell International Inc.	Date Submitted	11/06/2025
Project Title	Intelligent Device Health and-Use Monitoring for Industrial Android Mobility Devices using AI (HONEYWELL_ANDROID)	Planned Starting Semester	Spring 2026

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical		Electrical	
Computer	4-6	Systems	1-2

Company and Project Overview:

Honeywell helps organizations solve the world's most complex challenges in automation, the future of aviation and energy transition. As a trusted partner, we provide actionable solutions and innovation through our Aerospace Technologies, Building Automation, Energy and Sustainability Solutions, and Industrial Automation business segments – powered by our Honeywell Forge software – that help make the world smarter, safer and more sustainable.

This project introduces an innovative, on-device solution for monitoring the health and handling of industrial-grade Android mobility devices. In sectors like logistics, manufacturing, and field services, these devices are critical operational tools but are frequently subjected to harsh environments, leading to a high incidence of damage from drops, rough handling, and misuse. Traditional methods of damage assessment are reactive and often fail to capture the context of an incident. This initiative will leverage on-device Artificial Intelligence (AI), specifically Machine Learning (ML) models, coupled with Large Language Models (LLMs), to proactively detect, analyze, and report potential device abuse and high-risk events. By analyzing data from built-in sensors, the system can identify drops and rough handling in real-time. The LLM component will provide

contextual understanding and generate nuanced alerts, transforming raw sensor data into actionable insights that can mitigate damage, reduce downtime, and improve the total cost of ownership.

Project Requirements:

Objective:
The primary goal of this project is to develop and implement a sophisticated on-device system that actively monitors for abuse, drops, and rough handling of industrial Android devices. The system will utilize AI to analyze sensor data for early detection of events that could compromise the device's functionality. The integration of an LLM will allow for intelligent interpretation of these events and the generation of detailed, contextualized alerts. This will enable organizations to proactively address potential damage, enforce proper handling procedures, and make data-driven decisions regarding device maintenance and replacement, ultimately extending the lifespan of the hardware and ensuring operational continuity.

Key Components:
· On-Device Sensor Data Analysis Engine: An AI/ML model, optimized for mobile environments, will be developed to run directly on the Android device. This engine will continuously process data from the device's accelerometer, gyroscope, and magnetometer to detect patterns indicative of drops, impacts, and other forms of rough handling.
· Large Language Model (LLM) for Contextual Event Interpretation: A compact, efficient LLM will be integrated to analyze the output from the sensor analysis engine. It will be trained to understand the nuances of different impact events, differentiating between, for example, a minor jostle and a significant drop that poses a risk to the device's internal components. The LLM will translate complex sensor readings into easily understandable, human-readable alerts.
· Damage Tracking and Logging System: Every detected high-risk event will be logged with a timestamp, the severity of the incident as determined by the AI, and a contextual description generated by the LLM. This data will be securely stored on the device and can be synchronized with a central management system, creating a comprehensive history of the device's physical treatment.
· Real-Time, Intelligent Alerting Mechanism: Upon the detection of a critical event, the system will trigger immediate alerts. These alerts, enriched by the LLM's analysis, will be delivered to both the device user and a centralized management dashboard. The alerts will provide clear, concise information about the nature of the incident, enabling swift intervention and assessment.
· Centralized Monitoring Dashboard: A cloud-based dashboard will provide administrators with a holistic view of the health of their entire fleet of devices. This will include aggregated data on the frequency and severity of incidents, allowing for the identification of trends and patterns of misuse across different teams or locations.

Expected Deliverables/Results:

- Proactive Risk Mitigation: The system will enable the early detection of handling behaviors that are likely to lead to device failure, allowing for preventative measures to be taken.
- Reduced Device Downtime and Repair Costs: By identifying and addressing the root causes of device damage, the project aims to significantly reduce the frequency of hardware failures, leading to lower repair and replacement costs and increased device uptime.
- Improved Accountability and User Behavior: The tracking of handling events will foster a greater sense of accountability among users, encouraging more careful use of the devices.
- Data-Driven Asset Management: The collected data will provide valuable insights into the lifecycle of the devices, helping to inform decisions about future procurement, device allocation, and the development of more effective user training programs.
- Enhanced Device Functionality and Longevity: By minimizing physical stress on the devices, their operational lifespan will be extended, maximizing the return on investment.

Disposition of Deliverables at the End of the Project:

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):
- Interest in AI and Machine learning
- Interest in application development for Android devices