



Case Study

CC-130J Hercules Machine Learning R&D

Lockheed Martin Aeronautics and Contextere entered into a project partnership as part of Lockheed Martin's agreement with the Canadian government to provide in-service support of the 17 CC-130J Super Hercules transport aircraft delivered to the Royal Canadian Air Force in 2010.

Our project involves the design and development of an insight engine for Lockheed Martin Aeronautics. Its purpose is to explore methods where procedural guidance can be delivered to field-based workers to assist them with their daily work tasks. This insight engine consists of two elements: a mobile user experience and back-end data curation and guidance routing capability. Given the nature of our engagement with Lockheed Martin

Aeronautics, the project followed a multistage roll-out, outlined here, wherein each phase built upon its predecessor and was validated by Lockheed Martin Aeronautics.

The first step of our engagement validated our user interface functionality and general user experience workflows on smartphones and wristworn wearables. These interfaces were configured using database mock-ups and utilize minimalistic instruction sets. Given the wide range of potential assets, equipment, data, and user competencies, the initial user scenario focused on a single aircraft platform and occupational specialty but is designed to incorporate other platforms and specialties.

The second step developed initial back-end curation functionality using representative databases and a mocked-up streamed data interface. The mock-up of the stream data interface uses

an Industrial Internet of Things sensor/transmitter prototyping capability with multiple representative sensor data feeds. Initial information curation algorithms were developed and tested using the representative data to validate the architectural approach to the curation engine.

The third phase established a connection to fire-walled representative databases to demonstrate a connection to 'real' enterprise database systems. We also focussed on developing specific application programming interfaces to a unique set of enterprise database systems associated with Lockheed Martin aircraft platforms to demonstrate a connection to live enterprise database systems. In addition, equipment assets and algorithms were refined to identify and extract common and repetitive human errors that may represent systemic issues associated with user populations.

In the fourth phase, we connected to Lockheed Martin live sensor feeds, which enabled the insight engine to act on the combined set of active and archived real-world data sources. This phase also included the initial implementation of machine learning algorithms to classify, predict, and cluster data elements that are used to alter the function of the insight engine in real-time to adapt to user performance and equipment conditions.



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