LABAU Alexandre, Double Degree : UGA, Grenoble INP - ENSE3 (ME) & KTH, 2024-2025

• Master Thesis •
Manufacturing Digitalization for Logistics and Sustainability

European Space Agency

The European Space Agency (ESA) is an intergovernmental organization with 23 member states, working closely with international partners and the space industry, ESA is actively working to ensure Europe's independent access to space while sustainability challenges.

Objectives

- Manufacturing Process Digitalization through technologies as Digital Twins and Predictive Maintenance to reduce downtimes, costs and energy consumption of ESA assets.
- Support the energy consumption reduction of ESA manufacturers' assets to meet ESA's Green Agenda 2025 and the Paris Agreement.

Competencies

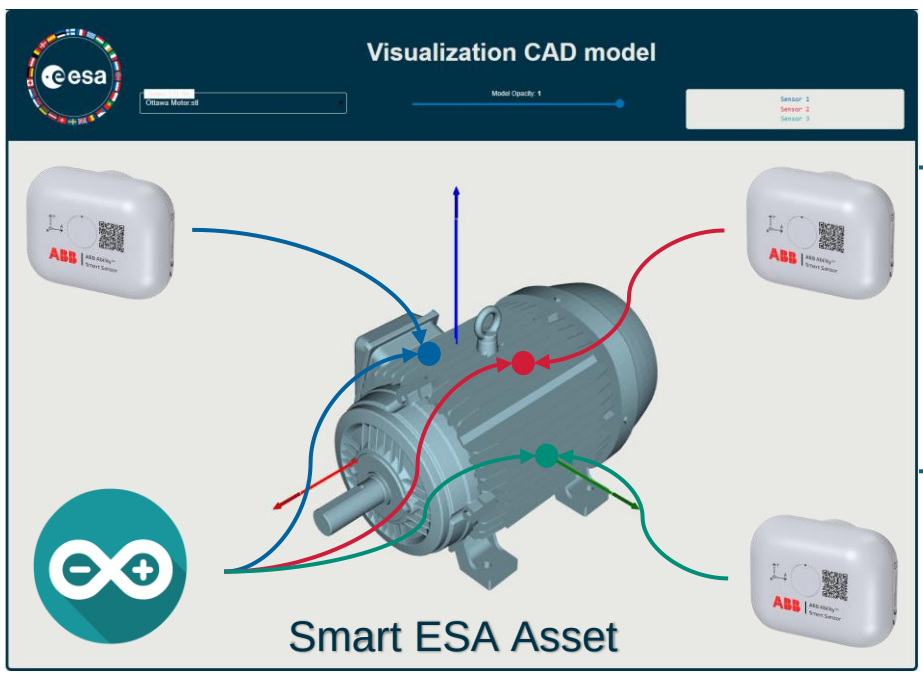
- Dashboard application development on Jupyter Lab in Python.
- Sensor development (C++, CAD).
- Signal treatment.
- Artificial Intelligence : Machine Learning & Audio Transformers.
- Work within a multicultural environment
- Communication : subject presented at the AI@ESA conference.

Work Completed

- Supporting the Energy consumption reduction of ESA Manufacturers' Assets.

- Application development featuring Dashboard, Predictive Maintenance to detect anomaly patterns in real time and Digital Twins from CAD model to asset information such as Energy Consumption.

Dashboard created for ESA Digital Twins

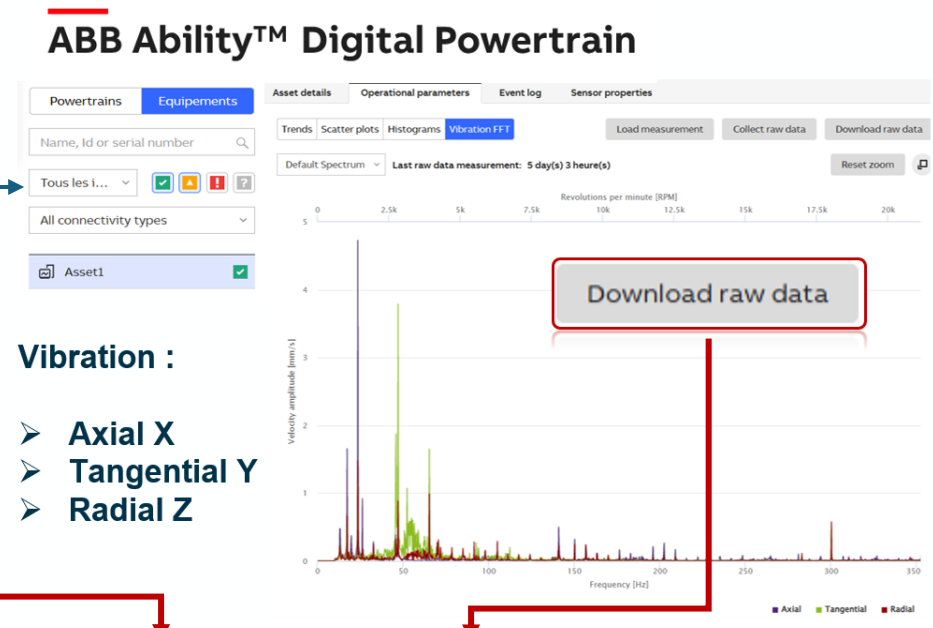


1 Data acquisition

ABB Smart Ability sensors

Thesis Arduino sensor

Online ABB Dashboard link the sensors

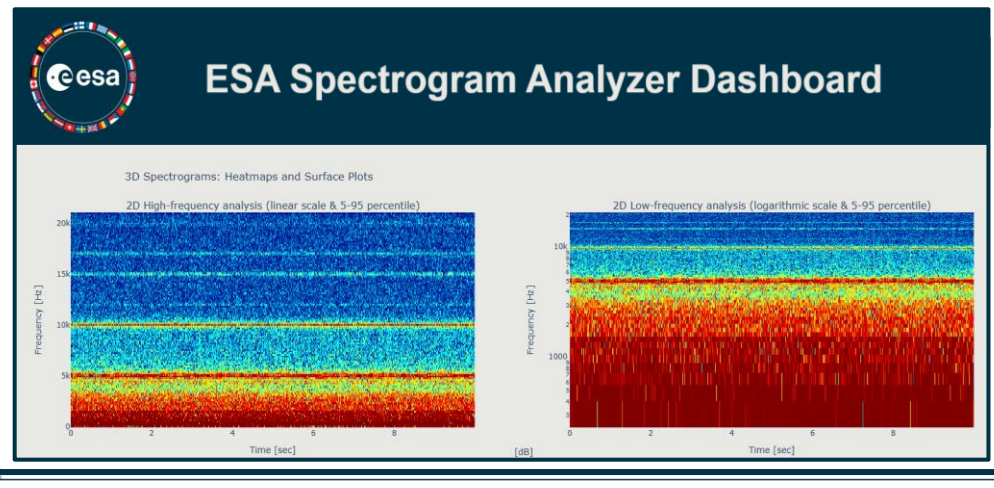


Vibration :

- **Axial X**
- **Tangential Y**
- **Radial Z**

2 Comparison and validation of data acquisition methods

3 Feature extraction & selection



4 Health State Recognition : Hierarchical Token Semantic Audio Transformer Classification