Bild: Rolls Royce Electrical

Master Thesis

Concept creation of an on-board data logger for digital twin applications in future electric aviation

Background:

Do you enjoy analyzing, exploring and identifying solutions to solve complex problems? Join us at the Institute of Flight Systems and Automatic Control (FSR) in cooperation with Rolls Royce Electrical (RRE). In the research project ETHAN, the FSR is working on Condition Monitoring concepts and measurement aggregation hardware for future (hybrid) electrical aircrafts. In coordination with RRE and many more partners, our goal is to develop a condition monitoring concept from scratch. The usage of machine learning methods will be a strong focus to derive system health states and predict Remaining Useful Lifetimes. Your aim in this thesis will be the creation of a hardware concept of a data logger for condition monitoring purposes of various subsystems from batteries to electric motors in the context of digital twins.

Work Statement:

In this thesis your task is to create a concept of an on-board data logger for condition monitoring in electric aviation. In a first step you will do an extensive literature research of possible solutions and data processing units (e.g. FPGAs, Speedgoat, Raspberry Pi, ...) which are suitable for the collection, preprocessing and transmission of collected sensor data from various sources. In close cooperation with other students, you will define dependencies and interfaces towards the software architecture. On-board updating of functions and algorithms as well as data transmission towards a central database should be consired. After evaluating different solutions based on defined constraints, a final hardware concept should be proposed. The thesis closes with the comprehensive documentation and presentation of the results.

Requirements/Skills:

- Currently enrolled in Master's degree program in Mechanical Engineering, Aero Space, CE, Computer Science or similar
- Electrical Engineering or Mechatronics Master desired
- Strong background in information technology, data management and aviation desired
- Beneficial lectures: Avionics Systems Safety, (Machine Learning Applications)

Tasks:

- Getting familiar with the topic, researching and evaluating applicable processing units
- Define and align requirements with software architecture
- Evaluate possible designs and processing units based on requirements and constraints
- Create a final hardware concept for the data logger
- Documentation and presentation of the results

Bild: Speedgoat

Organisational:

Start according to agreement
(immediately available)

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