

Project Work:
Design and development of a python-based software for controlling a long-term test setup for evaluating the cosmic ray ruggedness of GaN HEMTs

Project Description

The goal of "Flightpath 2050" is to significantly reduce the CO₂ emissions of air traffic. This can be reached by electrifying not only the auxiliary systems, but also the main propulsion of the aircraft. To reduce energy storage weight and volume, a high efficiency distribution grid is necessary. Novel wide-bandgap semiconductors based on gallium nitride (GaN) promise lower losses, but are not yet examined for their principal suitability and qualification for use in the harsh aircraft environment. Especially sudden failures due to cosmic radiation pose a large and not yet evaluated danger. Therefore, this research project will contain a methodical evaluation of the radiation hardness of GaN devices.

One major step is the planning and commissioning of a test setup for conducting long term tests. This test will expose a large number of DUTs (device under test) to an increased radiation environment. The test will last for at least one year. Due to the long time span and the prospectively remote test site, the setup has to be fully automated. For that, a software based on Python has to be developed. This software has several main tasks:

1. Controlling hardware equipment via various interfaces
2. Collect and interpret voltage, current and temperature measurements
3. Contain routines for error handling
4. Send the measurement data to the institute via internet
5. Optional: GUI for remote control

As the test setup will not be maintainable during the runtime, a high reliability of the software is mandatory. Next to thorough error handling by the software, also hardware measures for a fail-safe operation can be implemented.

This project work starts with the initial design of the software at a high abstraction level and ends with the actual implementation and testing of the code. Afterwards, further work in the project team (e.g. as master student) is strongly encouraged.

The project work is planned for a total of 120 h (in 3-6 months). The payment is approx. 12€/h.

Requirements

- Basic knowledge in electrical engineering
- Structured working approach
- Ability for abstract thinking
- Optional but useful: Python programming language

Contact information

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