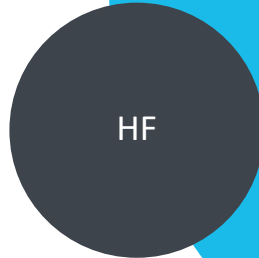# Universität Stuttgart

Institut für Robuste
Leistungshalbleitersysteme

M.Sc. Laura Manoliu
Pfaffenwaldring 32, 70569 Stuttgart
Interimsgebäude 1
+49 711 685-61685
laura.manoliu@ilh.uni-stuttgart.de

27.07.2020

HF

EIVE

EVM optimization for the on-board AWG implemented on FPGA for a satellite mission

www.eive.space

Bachelor/Research/Master Thesis – Bachelor-/Forschung/Master-Arbeit

Project:

In the framework of the EIVE Project the Institute of Robust Power Semiconductor Systems (ILH) is developing a 6-Unit CubeSat, flying in the Low Earth Orbit (LEO). An arbitrary waveform generator (AWG) has to be efficiently implemented in Programming Logic (FPGA) and Programming Software (CPU).

Scientific Mission:

- (1) PRBS transmission with various modulation schemes (QPSK, n-QAM, …) and different data rates for in-depth data-link analysis;
- (2) E-Band Link Budget calculation, considering all the atmospheric effects;
- (3) Download high resolution images stored on-board for Earth observation applications.
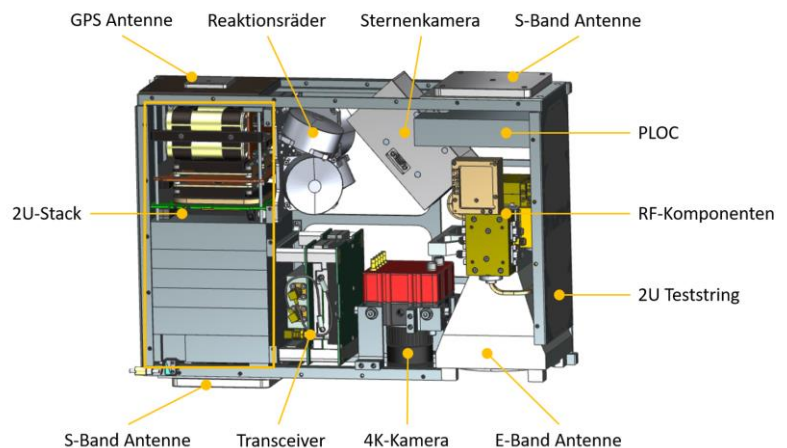
Your Tasks:

1. Investigate possible coding/filter algorithms for the raw PRBS data to improve the system (FPGA+DAC) Error Vector Magnitude (EVM);
2. Implement on the FPGA and on the CPU the selected algorithms and draw the conclusion about the energy efficiency and feasibility;
3. Measure the resulting EVM in different scenarios;
4. (Optional) Implement the decoding algorithms in the receiver.

Your Benefits:

1. Consolidate your knowledge in various (satellite) communication systems;
2. Get ready for a (space) industry career;
3. Learn about different coding techniques;
4. Learn about FPGAs and DACs and acquire hands-on experience;
5. Learn about digital and analogue communication systems to provide high performance radio communication solutions;
6. Develop team working skills.

www.ilh.uni-stuttgart.de

German description also available at request.

GPS Antenne — Reaktionsräder — Sternenkamera — S-Band Antenne — PLOC — RF-Komponenten — 2U Teststring — 2U-Stack — S-Band Antenne — Transceiver — 4K-Kamera — E-Band Antenne

Your Qualifications:

- Digital communication systems/algorithms knowledge;
- Hands-on experience in developing C/Matlab/Python codes;
- Knowledge with software development: VHDL and/or Verilog, Xilinx Vivado is advantageous;
- Passionate for producing high-quality, space-ready and well-tested code;
- Knowledge of analogue communication systems is a plus;
- Knowledge of communication protocols is an asset;
- Availability for team working is required.