Master thesis proposal - MATE reverberation chamber testbed

Description and Background

The MATE testbed is a 28 GHz Massive MIMO-capable transceiver system with 2 GHz real time bandwidth that can be utilized for arbitrary waveform applications such as radar and massive MIMO. The system is currently based on a lab bench and can be accessed via a web-portal for anyone to experiment with high-end microwave hardware and software. In this project we wish to add capabilities to move objects in the vicinity of the system in a controlled manner. Thus, a motion control system should be designed around the current MATE system to allow for applications such as linear translation of an antenna. Further, the motion capabilities introduced, should be utilized in manufacturing a reverberation chamber that can be placed around the antenna system to perform controlled measurements of different properties of interest.

About Bluetest

Bluetest is a spin-of company from Chalmers and a world-leader in over-the-air testing of antennas and wireless communication systems. Bluetest develops and manufactures reverberation chambers which are sold to all major vendors of wireless equipment in the world. Currently Bluetest is working to introduce test systems relevant for the 5th generation of mobile systems that will be available in the next few years. One such interest for Bluetest is the move to mm-wave communication, which will happen in 5G.

Scope

The project consists of three major parts:

1. Design of a motion control system, e.g. using a Raspberry pi or some other system which can be accessed via internet in the same manner as the rest of the MATE system.
2. Design of a reverberation chamber (RC) utilizing the capabilities introduced in step 1 above. The RC should be possible to retro-fit to the MATE testbed and easy to remove depending on the testing requirements.
3. Measurements on 28 GHz signals in the RC using MATE.

Tasks

- Initial literature study
- Purchase of hardware required for building the motor control system and the RC.
- Programming of the motor control system including making it accessible with a documented API from the Internet.
- Building an RC which can be retrofit and removed with ease around the MATE antenna system
- Measurements of communication signals through the above introduced RC using MATE.

**Required qualifications**

- We believe the master thesis candidate has a background in applied physics, electrical engineering or computer science
- The candidate should have programming skills at sufficient level to program the motor control system and make it accessible via sockets to a client connecting via Internet.
- Microwave theory and communication
- Capability of hands-on work in building real hardware and performing tests in a microwave lab.

**Resources**

- Bluetest will provide supervision
- MATE testbed
- Office at Chalmers and Bluetest
- Budget for purchase of required hardware

**Duration**

This project is sized for 30 ECTS
We believe that the work is appropriate for 1 student during ½ year.

**Supervisor**

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**More information**

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