



DLR – DAAD Fellowships

Fellowship No. 407

Research Area : Aeronautics

Research Topic: **Development of Physical Layer Testbed for Modular APNT**

DLR Institute: Institute of Communication and Navigation, DLR Oberpfaffenhofen

Position: Doctoral Fellow

Openings: 1

Job Specification: Alternative Position, Navigation and Timing (Alternative PNT or APNT) systems are meant to provide navigation capability in the unlikely event of an outage in Global Navigation Satellite System (GNSS) services. For aviation users, the current generation of APNT is largely based on legacy technologies, like Distance Measuring Equipment (DME) or VHF Omnidirectional Ranging (VOR). These legacy technologies are not able to provide the same levels of performance as GNSS-based services do.

Terrestrial systems for airborne navigation typically suffer from relatively poor coverage, compared to navigation satellites. Installing new terrestrial transmitters can be expensive, for many reasons, and so maximum re-use of the existing infrastructure is a key capability in next-generation APNT. The modular integration of existing systems is a tool that enables this capability: multi-system hybrid navigation services that combine legacy technologies with state-of-the-art radionavigation. As such, the main research questions to be answered will revolve around topics like:

- How does Modular APNT need to accommodate faults (e.g. multipath, tropospheric anomalies) to guarantee integrity?
- How does it guarantee integrity when dealing with multiple, concurrent physical layers?
- How can measurements, of such diverse nature, be processed adequately to preserve integrity?

One possible approach would be to develop tools and methods to prove the integrity of the proposed navigation system, with confidence intervals

approaching 99.99%. These tools and methods may include, but not be limited to, studies of statistical confidence, simulation-based studies and data-driven modeling of integrity threats

Required Qualification: Master or diploma degree in electrical engineering, telecommunications, information technology or physics; solid background in communications, navigation, software-defined radio, and MATLAB programming

Advantageous Skills: DME/LTE/VOR signals, design and implementation of receivers and transmitters in SDR, channel modeling, antenna and RF measurement techniques, satellite navigation

English competence: See requirements on www.daad.de/dlr

Earliest Start Date: 1.2.2020

Application Deadline: Until position filled

Further Information: <http://www.dlr.de>
<http://www.daad.de/dlr>