MSc Assignment Electrical Engineering

THE ASSIGNMENT

How nice is it to work on a high-tech development that contributes to the world of tomorrow? We are looking for an ambitious student who can help our Electrical Systems team with their project concerning the antenna systems of the first flying car! We think it is important that you can grow in your profession, that is why you will work with experienced colleagues to make this project a success!

About the project and your assignment

The PAL-V vehicle (see www.pal-v.com) uses a receiver/transmitter for communication at the 118 - 136 MHz band. It uses amplitude modulation, predominantly A3E double sideband with full carrier.

A transponder is installed as well, working at 1030 MHz and 1090 MHz. Data is transmitted in a pulse amplitude/pulse position-modulated format.

In case of a crash, an Emergency Locator Transmitter is activated working at 406 MHz. It transmits bursts of digital information to orbiting satellites. The carrier is modulated plus or minus 1.1 radians with the data using Manchester encoding.

The PAL-V structure consists of steel tubes. This frame is covered by carbon composite panels that can be regarded as semiconducting. The mast is made out of aluminum and is covered with carbon composite panels. The two-blade rotor and propeller are also made out of carbon composites and are covered with copper mesh for lightning protection. Rotor diameter is 10.6 meter, propeller diameter is 1.9 meter. Rotor RPM is approx. 310, propeller RPM 1500-2650.

Clearly this is not the optimal environment for efficient transmission. The research question is to find suitable locations and antenna solutions delivering the best reception/transmission efficiency, and radiation pattern. To optimize these solutions, it is possible to select antenna positions, antenna length, and/or use impedance matching components. The use of (local) copper mesh as a top layer on the carbon composite panels is also an option. In Drive mode, the transmitters/receivers do not need to work. The conversion process Drive/Fly adds some additional complexity to the task.

Your tasks:

- Investigate possible solutions for optimal installed antenna performance by means of electromagnetic modelling and computations. Antenna placement limitations and boundary conditions shall be taken into account.
- Build test setups to verify and improve the selected solutions.

QUALIFICATIONS

The assignment will be done at the premises of PAL-V as far as possible w.r.t. the Covid-19 measures.
Daily supervision is done by PAL-V and bi-weekly meetings will be held with supervisors of the UT.
Interviews with PAL-V will be part of the selection process for this assignment.

CONTACTS

For more information concerning the assignment you can contact:
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