

Fully funded PhD-Research Position on Design of High Resolution Scanning Wind Lidar for Aviation Applications

A fully funded research position (full-time, 40 hours/week) at the PhD-student level is offered in the group of Prof. Georg Schitter at the Automation and Control Institute (ACIN) of the Vienna University of Technology.

Project goal:

This PhD-project aims to design a scanning wind lidar system for turbulence measurements and its suppression in light aircrafts for advanced air mobility (AAM) in local areas. In spite of recent advancement of various sensing technologies, turbulences are still one of the biggest threats in the safety as well as comfort during the flight. In addition, the turbulences also cause the increase of fuel consumption and CO2 emission by avoiding them in the nominal flight route. Turbulence load suppression is a technique to compensate for the time-varying turbulence actively by morphing flaplets based on the anticipation of the upcoming turbulences. A wind lidar is a technique that can measure the local wind speed using the Doppler effect of the transmitted laser by the aerosols and dust particles in the clear air. and has investigated for turbulence prediction for far distances in various applications such as meteorology, wind farm, wind shear detection in the airport. However, the typical wind lidar systems are relatively slow and low resolution to be used in turbulences load suppression with a short anticipation.

The main challenges of the project are developments of measurement strategies, mechatronics for precision laser beam scanning, and reconstruction algorithms for high resolution scanning wind lidar, enabling high resolution wind field measurements for turbulences load suppression. First, the measurement strategies are investigated for high resolution wind field measurement with a given scanning systems via a simulation. Then scanning system and their control are designed and implemented in a mobile FPGA and microprocessor board (Xilinx Zynq Ultrascale+) to operate the scanning mirror for the desired measurement strategy. Then, the scanning wind lidar is evaluated in the wind tunnel for verification of the measurement strategy. Finally, the designed scanning wind lidar is installed in a manned aircraft, and its performance is evaluated for turbulence load suppression with morphing flaplets and other MEMS sensors, developed by other partners.

Due to the nature of the wind lidar techniques, the project consists of multidisciplinary research topics in the field of physics, optics, aerospace engineering, as well as mechanical, electrical, and system engineering, providing huge opportunities for the applicant to gain experiences in those various fields during the project.

The starting date is planned as soon as possible, depending on the availability and preference of the successful candidate.

Requirements:

We are looking for candidates holding an MSc degree in Electrical or Mechanical Engineering, Aerospace Engineering, Cybernetics, Physics, or equivalent, preferably with a strong background in at least one area of optical measurement systems, mechatronics, digital design, embedded systems, signal processing, actuation and sensors, precision engineering, and scientific instrumentation. Good fundamentals, excellent grades, and interest in mathematics and physics are prerequisites. Good programming skills and experiences of Matlab, Simulink and C are required. HDL is not strongly required but is only preferable. Motivation to pursue novel research in close collaboration with well-reputed international industry partners and research universities is essential. Thus good communicational skills, fluency in English or German, and a goal-oriented work attitude as member of a dynamic international research team are expected.

Conditions of employment:

The appointment will be for a period of up to four years. As an employee of the TU Vienna you will receive a competitive salary as well as excellent secondary benefits package, including a flexible work week, health insurance, social security, and additional company retirement benefits. Salary and benefits are in accordance with the Collective Labor Agreement for Austrian universities. The salary of a research assistant (PhD student) is a minimum of currently **EUR 3,277.30/month** gross, 14 times per year for 40 hours/week, corresponding to the annual gross in the first year starts at **€ 45.882**. This grows to **€ 54.392** in the 4th year of the appointment.

We offer the opportunity to perform scientifically challenging research in a multi-disciplinary research environment, with a group of international researchers and strong collaboration with industrial, governmental, and university research laboratories. Further career growth in all teaching, research, and industrial applications is provided.

How to apply:

To apply for this position, please email your application in pdf-format to yoo@acin.tuwien.ac.at:

- a cover letter, including a statement that gives your motivation for this position
- a full CV, and your grades
- an abstract of your MSc thesis and a list of your publications (if any), and
- the names and contact information of two professional references

The position will remain open until filled, but an early date for application is preferred and encouraged.

TU Wien is committed to increasing the proportion of women in particular in leadership positions. Female applicants are explicitly encouraged to apply. Preference will be given to women when equally qualified, unless reasons specific to a male applicant tilt the balance in his favour. People with special needs are equally encouraged to apply as well.

For more information about the project, please visit the project page.

<https://www.acin.tuwien.ac.at/en/project/research-and-flight-test-of-advanced-turbulence-cancelling-technologies-for-sustainable-urban-and-regional-air-mobility-smartwings2/>

For more information about the ACIN department and Vienna University of Technology, please visit our website http://www.acin.tuwien.ac.at/fileadmin/acin/files/IATpositions_webpage.pdf and <http://www.tuwien.ac.at>.

Further information about Vienna, the city with the highest quality of living worldwide (https://en.wikipedia.org/wiki/Mercer_Quality_of_Living_Survey), can be obtained at <http://www.wien.gv.at/>.