

**xsens**

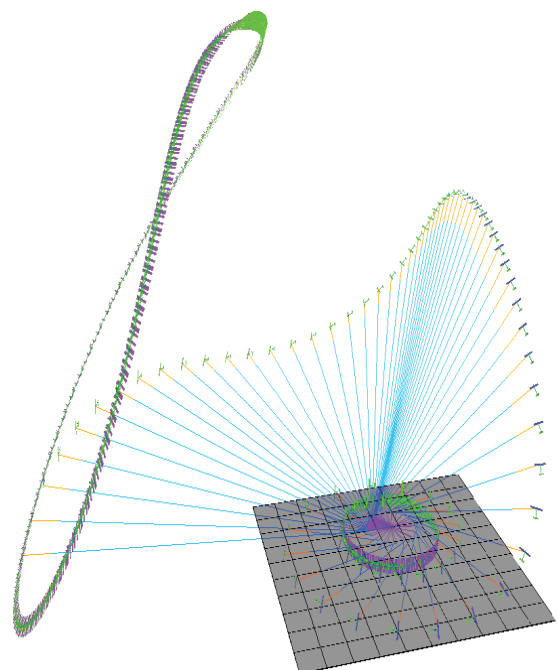
# PhD Position on Moving Horizon Estimation for 3D Motion Tracking

Xsens Technologies and the University of Freiburg have a vacancy for a PhD on tracking of 3D movements, particularly the movements of tethered airborne objects. The project is part of the European Training Network “AWESCO - Airborne Wind Energy System Modelling, Control and Optimisation” which focuses on wind energy harvesting using airborne systems.

## Your challenge

Airborne Wind Energy (AWE) is a novel wind energy technology based on flying high-performance wings several hundred meters above the ground in the wind field. These wings are anchored to the ground by a tether, like kites, and perform fast crosswind motions and specially designed cycles to harvest wind energy. AWE taps into the large wind resource in altitudes above 200 meters, and is expected to be able to produce electricity in a larger scale and at a lower price than classical wind turbines. AWESCO aims to tackle the major technological challenges that prevent large-scale adoption. For details please visit [www.awesco.eu](http://www.awesco.eu).

Given that the –flexible– airborne platform is moving with large dynamics under varying winds, a major hurdle lies in tracking the exact 3D movement needed for a stable and efficient control. Your challenge will be to design and implement novel control and estimation methods using the principle of moving horizon estimation (MHE) that are able to deal with this dynamic real-world tracking application. Your starting point will be AWE applications and include the non-linear state and parameter estimation problems as well as selecting a good sensor setup. Your algorithms will be targeted at providing accurate, real-time and robust performance at high output frequencies while running on embedded processors as well as handling of large differential equation systems arising from accurate, high order models or the integration of many different sensors on a non-rigid platform. The results will be demonstrated on an industrial-sized prototype within AWESCO.



## Your career

Your work will be carried out at Xsens' research department in Enschede, the Netherlands for a period of 3 years. Your PhD will be funded by the AWESCO network, which recruits altogether 14 PhD fellows in different countries who meet regularly during exchange visits, training events, workshops, and summer schools. You will have internships up to several months at the Systems Control and Optimization Laboratory at the University of Freiburg, as well as other project partners.

To kick-start your career, you will be supervised by world leading experts in mathematical modelling, optimization-based control and estimation as well as inertial sensor technology. Furthermore, you will have the chance to cooperate with and benefit from knowledgeable consortium partners. The remuneration will be in line with the EC rules for Marie Skłodowska-Curie grant holders and includes a mobility allowance.

## About your work environment

Xsens is the leading innovator in 3D motion tracking technology and products. Its sensor fusion technologies enable a seamless interaction between the physical and the digital world in consumer electronics devices and professional applications such as 3D character animation, motion analysis, and industrial control & stabilization. Clients and partners include Electronic Arts, NBC Universal, Daimler, Autodesk, ABB, Siemens and various other leading universities, institutes and companies throughout the world. See also [www.xsens.com](http://www.xsens.com). The Systems Control and Optimization Laboratory (headed by Prof. Dr. Moritz Diehl) at the University of Freiburg focuses on methods and software for optimal control and estimation, in particular on embedded systems, and its members developed, among other, the open-source tools ACADO, CasADi, and qpOASES. One of its more applied research lines is control and optimization of airborne wind energy systems, a topic on which it is well connected with all major actors in the field, and on which it is supported, besides AWESCO, by the European Research Council (ERC). See also <http://www.imtek.de/laboratories/systemtheorie>

## Supervisors and main contacts

Dr. Jeroen Hol

[jeroen.hol@xsens.com](mailto:jeroen.hol@xsens.com)

Senior research engineer at Xsens and daily supervisor

Prof. Dr. Moritz Diehl

[moritz.diehl@imtek.uni-freiburg.de](mailto:moritz.diehl@imtek.uni-freiburg.de)

Head of systems control and optimization laboratory at the University of Freiburg and academic PhD supervisor

## Your profile

- You are a result oriented, highly motivated scientist who is able to work as a team player, you feel at home in a small and flexible team of strong professionals. You derive motivation and satisfaction of being part of a world-class team in 3D motion tracking, developing and supporting Xsens' products used by customers' world-wide.
- A Master's degree in computer science, applied mathematics, related engineering discipline or equivalent.
- Experience with design and implementation of sensor fusion schemes is an advantage.
- You have less than four years of full-time equivalent research experience since your Master's degree. Additionally, you have not resided or carried out your main activity (work, studies, etc.) in the Netherlands for more than 12 months in the last 3 years.

## Application

If you feel this position represents an ideal next step in your career, send your application to [jobs@xsens.com](mailto:jobs@xsens.com) with the keyword [AWESCO] in the subject. The application deadline is February 29th, 2015. Please include a CV, recent transcript of course work and grades, statement of research interest and career goals, (a description of) your master thesis or another sample of technical writing, at least two references including contact details, (some) proof of proficiency in English. The position adheres to the European policy of balanced ethnicity, age and gender. Candidates that have a valid EU working permit are encouraged to apply.

