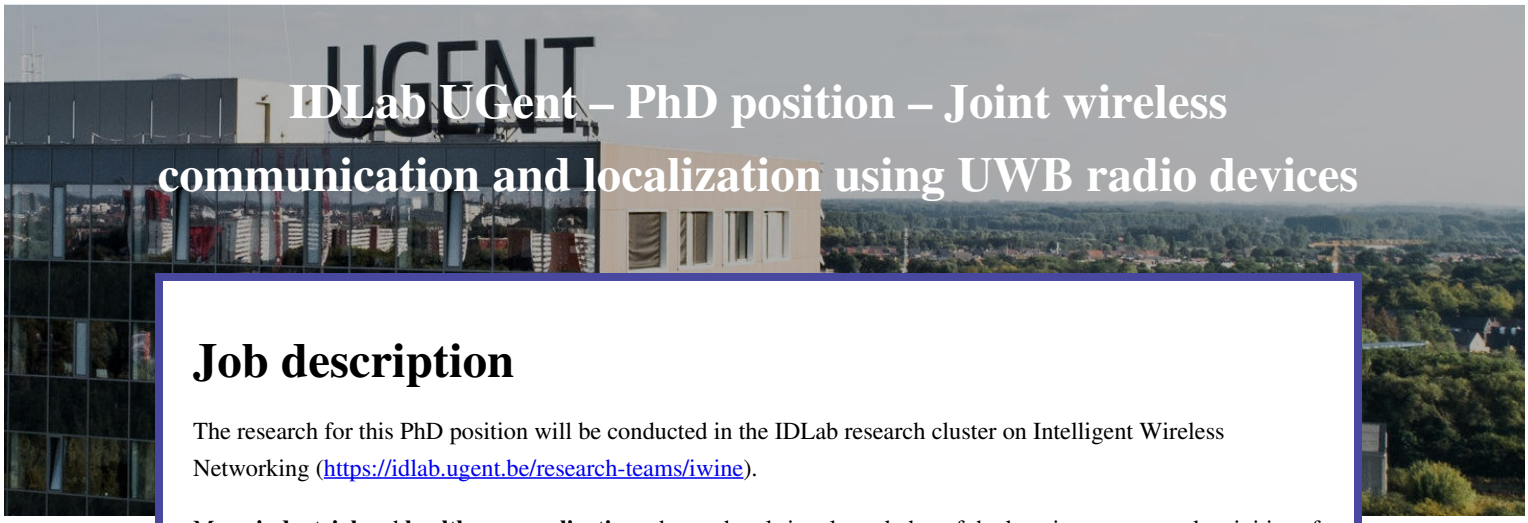
IDLab
INTERNET & DATA LAB



IDLab UGent – PhD position – Joint wireless communication and localization using UWB radio devices

Job description

The research for this PhD position will be conducted in the IDLab research cluster on Intelligent Wireless Networking (https://idlab.ugent.be/research-teams/iwine).

Many **industrial** and **healthcare applications** demand real-time knowledge of the location, status, and activities of both people and equipment. Traditionally, this has required separate, specialized wireless systems for **communication**, **radar-based sensing, and localization**—each relying on dedicated hardware. However, the emerging field of **joint wireless communication, sensing, and localization** offers a unified approach that combines data transmission with simultaneous environmental awareness and position estimation. **Ultra-Wideband (UWB)** technology, in particular, stands out as a strong candidate for this integration due to its large bandwidth, which enables high-precision localization, robust communication, and fine-grained sensing. In this **PhD** project, you will develop **advanced signal processing techniques** that empower a single UWB multi-antenna radio platform to perform all these functions concurrently, significantly enhancing the situational awareness and versatility of deployed wireless systems.

- You study how to implement both localization and radar sensing capabilities using a single radio platform. Traditional localization systems typically rely on multiple anchor nodes—often three to four—strategically placed around the perimeter of the coverage area. In contrast, your approach leverages a single infrastructure node equipped with multiple antennas. By analyzing the phase, polarization, and timing characteristics of incoming signals across these antennas, you will be able to simultaneously estimate the distance, angle of arrival, orientation, and even classify the activity types of mobile tags and individuals. This method significantly reduces hardware complexity while enhancing spatial awareness and functionality. Your work will involve designing advanced algorithms that efficiently utilize UWB signal features (RSSI, channel impulse response, phase and amplitude data, Doppler maps,..) to support both high-precision localization and radar-based sensing.
- You will develop adaptive algorithms that dynamically select the optimal radio configuration based on the specific requirements of each application. The radio platform supports a range of physical layer settings, which must be intelligently adjusted in real time to account for factors such as obstacle types, energy efficiency, and desired detection range. These algorithms will enable the system to autonomously optimize performance for varying operational conditions, ensuring reliable communication, accurate localization, and efficient sensing across diverse environments.
- You implement the designed solutions on embedded hardware platforms and experimentally validate their performance using our large testbed facilities representing industry (https://idlab.ugent.be/resources/industrial-iot-lab) and residential environments (https://idlab.ugent.be/resources/homelab). Experimental validation can be backed by modelling or theoretical assessments.
- You collaborate with IDLab colleagues working on other radar technologies. You work together with industry partners on challenging healthcare and robotics use cases and present your results during meetings.
- You publish and present results both at international conferences and in scientific journals, using open science practices.
- This research will lead to a PhD degree. Throughout the complete PhD period, you receive a full-time,

attractive salary.

- You assist in limited educational tasks of the research group.

We envision innovations in regards to signal processing for both localization and radar, mainly targeting embedded UWB devices.

Your profile

We are looking for candidates with the following qualifications and skills.

- You must have (or will receive in a few months) a Master's degree in Computer Science Engineering, Master of Science in Information Engineering Technology, Master of Science in Electrical Engineering, or a related field.
- You are interested to do research in an academic environment for a 4 years period in view of a PhD degree.
- You are proficient technically and have an affinity with wireless communication, signal processing and embedded programming.
- Knowledge of C and C++ is a must. Previous hands-on experience with wireless technologies such as Bluetooth Low Energy or Ultra-Wideband is a plus.
- You can plan and carry out your tasks in an independent way. You have strong analytical skills to interpret the obtained research results.
- You are a team player and have strong communication skills.
- You can commit to timing and milestones set forward by different research projects.
- Your English is fluent, both speaking and writing.

Our offer

- We offer a full-time position as a doctoral fellow, consisting of an initial period of 12 months, which - after a positive evaluation, will be extended to a total maximum of 48 months.
- The fellowship amount is 100% of the net salary of an AAP member in equal family circumstances. The individual fellowship amount is determined by the Department of Personnel and Organization based on family status and seniority. A grant that meets the conditions and criteria of the regulations for doctoral fellowships is considered free of personal income tax. Click here for more information about our salary scales
- All Ghent University staff members enjoy a number of benefits, such as a wide range of training and education opportunities, 36 days of holiday leave (on an annual basis for a full-time job) supplemented by annual fixed bridge days, bicycle allowance and eco vouchers. Click here for a complete overview of all the staff benefits (in Dutch).

Interested?

For further information, please contact Prof. Eli De Poorter (eli.depoorter@ugent.be).

How to apply?

You can apply online via this application form.

Applicants should bundle the following

· Personal letter where you introduce yourself, your experience relevant to the position and motivation to apply for this position

· Curriculum Vitae

· Two reference contacts

· Copy of your diploma (if already in your possession)

Incomplete applications will not be considered. Selected candidates will be contacted for an interview (remote interview possible for international applicants).

https://idlab.ugent.be