Data integration and simulation in urban digital twins for the support of planning, collaborative processes and citizen participation

Summary

The Academy of Architecture and Urban Studies at Tallinn University of Technology (TalTech) invites applicants for a 4-year PhD position in the field of architecture and urban studies. The PhD candidate will join the GreenTwins project (2021–23). The PhD project will continue after the GreenTwins project is finalised in May 2023. This PhD position is full-time and fully funded as part of the GreenTwins pilot project, which is developed as part of the establishing of FinEst Centre for Smart Cities and carried out in the framework of the project "Smart City Centre of Excellence" financed by the European Regional Development Fund and the Estonian Ministry of Research and Education. GreenTwins is a collaboration between TalTech, Aalto University, City of Tallinn, City of Helsinki and High-Performance Computing Center Stuttgart. The four-year PhD position will make it possible to conduct research under the supervision of experienced professors and in a multidisciplinary team of motivated researchers.

Research field:	Building and Civil Engineering and Architecture
Supervisor:	Prof. Dr. Fabian Dembski
Availability:	This position is available.
Offered by:	School of Engineering Department of Civil Engineering and Architecture
Application deadline:	Applications are accepted between September 01, 2021 00:00 and September 30, 2021 23:59 (Europe/Zurich)

Description

The GreenTwins project

The GreenTwins project contributes to the development of participatory urban planning, which relates to one of the global Sustainable Development Goals (SDG 11) provided by the United Nations. The on-going development of urban digital twins (UDT) is creating new opportunities for better citizen engagement and the improvement of democratic processes in the civic society.

This project builds upon the internationally recognised research excellence on digital participatory planning practices at Aalto University and the cutting-edge knowledge of High-Performance Computing Center Stuttgart in applying UDTs in participatory planning processes in Central Europe.

GreenTwins works on a knowledge gap recognised in UDTs: the representation of environment in UDTs is limited concerning the green infrastructure, which is one of the most important quality factors of urban environment.

The GreenTwins project develops a layer of green infrastructure in urban digital twins of Helsinki and Tallinn, and produces new user interfaces in order to harness the potential of urban digital twins in advancing planning processes and democratic decision-making.

Applications are also welcome from other disciplines. A strong interest in urban (green) environments is a prerequisite.

Thee preliminary research questions for this PhD project are:

- How can heterogenous urban data including the green infrastructure be comprehensively integrated into urban digital twins and how can this "living" layers be extended to include analyses, simulations and their visualization?
- How can this and other data be integrated for participative and collaborative processes in urban digital twins and how can it be used for interaction in the sense of "computer-human-computer interfaces" (e.g. hubs for participation and collaboration, application software or visualisation in VR/AR);
- How can data and properties of plants — such as species, age, characteristics and location — be collected and updated (automatically) and thus applied as a data basis for digital twins (for example by citizen science, sensor networks, airborne surveying, EO and others)?
- How can the impact of plants on the built environment and vice-versa be measured and modelled and what factors need to be taken into account?

Glowbase Graduate Recruitment Platform - http://www.glowbase.com - © Glowbase GmbH - 2021-09-24 13:33:06

- How can the effects of plants on their environment (surfaces, soil, sealing, weather and climate) be measured and simulated at different scales?
- How can future projections be made using digital twins, algorithms and simulations?

Please apply if you can identify with two or more of these questions. A detailed research plan will be created during the first months of the PhD project.

Requirements

- Master degree in architecture or urban studies or other thematically relevant disciplines;
- Proven ability to carry out independent research and to work as a part of a broader team. In addition, the PhD candidate is required to have a strong interest in the presentation and publication of scientific results in high-quality scholarly journals;
- Communicative skills and courage to engage in an inter- and transdisciplinary team;
- Very good proficiency in English language (at least B2, preferably C1);
- Experience in (urban) data analysis and integration;
- Practical experiences with at least one programming language like Python, C++, JavaScript or others.

Experience and skills on the following topics will be appreciated:

- Simulation of climate, weather or processes;
- Knowledge of relevant technologies such as machine learning, image recognition and evaluation, implementation of sensor networks and their data;
- Knowledge of geographic information systems (GIS);
- Computing, 3D-modelling and visualisation skills related to the modelling of urban environments;
- Processing and/or application of urban data and city model sources;
- Understanding the complexity of cities as ecosystems;
- International experience and willingness to work and live in Estonia.

The successful PhD candidate is expected to work full time for a duration of 4 years as a part of the Academy of Architecture and Urban Studies and the PhD program of the School of Engineering (Buildings and Civil Engineering and Architecture).

To get more information or to apply online, visit https://taltech.glowbase.com/positions/403 or scan the the code on the left with your smartphone.

Glowbase Graduate Recruitment Platform - http://www.glowbase.com - © Glowbase GmbH - 2021-09-24 13:33:06