Jobbnorge ID: 219183
Deadline: 2/15/2022
Website: http://www.ntnu.no
Scope: Fulltime
Duration: Temporary

PhD Candidate on developing innovative digital twins for improved landslide predictions.

This is NTNU

NTNU is a broad-based university with a technical-scientific profile and a focus in professional education. The university is located in three cities with headquarters in Trondheim.

At NTNU, 9,000 employees and 42,000 students work to create knowledge for a better world.

You will find more information about working at NTNU and the application process here.

Video: https://youtu.be/Xt-yHCN5QS0

About the position

The Department of Civil and Environmental Engineering has a vacancy for a PhD Candidate on developing innovative digital twins for improved landslide predictions.

Dig2Gov project in the Center for Green Shift in the Built Environment

Centre for Green Shift in the Built Environment (GREEN 2050, https://www.ntnu.edu/green2050) is newly established center at NTNUs Faculty of Engineering. The center aims to be an arena of networking and collaboration between academia and the industry. A hub for accelerating existing, planned, and new projects. The goal is to transition into a carbon neutral built environment within 2050. GREEN 2050 will provide research of excellence and educate candidates with high digital- and sustainability competence ready to take on the green shift. Digital Transformation for Governance (Dig2Gov) is a project under the center which aim to develop new mechanisms to model the information that is needed in various applications of smart governance together with 3D digital geographic data and enable real-time interaction among people, the built environment, and decision-makers, in order to avoid the time-consuming process of linking and (re)organizing data for simulations and calculations in a decision-making process. Dig2Gov project so far involves two PhD positions; one related to innovative digital twins for improved landslide predictions and the another related to developing new mechanism of modelling domain knowledge into 3D city models.

This PhD topic aims to address the scientific and technical challenges related to increasing landslide risks due to more intensive and frequent rainfall events in a changing climate. Developments of enabling technologies during the last decades facilitated access to a wide range of data on parameters controlling landslides through landslide monitoring systems, meteorological forecasts, experimental and field data, remote sensing, and drones. In order to fully utilize all the available information and provide reliable landslide predictions, there is a need to develop efficient algorithms to assimilate the data into landslide prediction models. Data assimilation is one of the application domains of digital twins and it represents a process that aims to optimally integrate theory with observations. Implementation of landslide digital twins as a virtual representation of a physical asset will provide a basis for improved decision making and development of improved measures to mitigate future landslide risks.

This PhD topic will investigate the implementation of novel digital twins based on physical or data-driven landslide models and their application to data assimilation problems. The landslide models will be capturing the coupled mechanical, thermal, and hydrological processes in soils and conditions typical for seasonally cold climate of Norway. The implementation of landslide models will rely on the use of existing or the development of novel physical and data-driven approaches and their validation on available landslide inventories. The implemented landslide models will be central in the development of landslide digital twins that will be based on hybrid analysis and modelling framework that combines physics-based modelling, data-driven modelling, and big data. The framework utilizes the interpretability and robust foundation of physical-based models with the accuracy and efficiency of advanced data-driven statistical or machine learning algorithms to provide improved landslide prediction capacity and accuracy.

Close collaboration will be established with a parallel PhD study in the domain of geomatics to define the requirements for data standards, data inputs and outputs, and 3D visualization of model predictions. Additional data sources with monitoring, geological, meteorological, hydrological data and landslide inventories will be made available from ongoing and finished research projects and national and international databases.

You will report to Associate Professor.

Duties of the position

- Conduct scientific research relevant to the research topic above
- Disseminate research findings using typical academic channels (e.g., presentations at conferences/workshops and peer-reviewed publications)
- Draft project documents, academic paper under the supervision of Associate Professor

Required selection criteria

- You must have a professionally relevant background in geotechnical engineering
- Your education must correspond to a five-year Norwegian degree programme, where 120 credits are obtained at master's level
- You must have a strong academic background from your previous studies and an average grade from the master's degree program, or equivalent education, which is equal to B or better compared with NTNU's grading scale. If you do not have letter grades from previous studies, you must have an equally good academic basis. If you have a weaker grade background, you may be assessed if you can document that you are particularly suitable for a PhD education.
- You must meet the requirements for admission to the faculty's doctoral program (www.ntnu.edu/ibm/phd)
- **Relevance**: The candidate should have proven research qualification/experience of Geotechnical engineering. Experience in landslide modelling and data analysis (statistics or machine learning) will be an advantage
- **Capability**: The candidate should have a good track record of publications (academic paper and/or degree thesis) of relevant topics (geotechnical engineering). Coding capability and experience with data analysis will be an advantage
- **Communication skills**: Excellent communication skills, both oral and written are important, and the applicant must speak and write English with a high level of proficiency
- **Others**: Ability to work independently and in a team. Ability to work in an inter- and cross-disciplinary environment

The appointment is to be made in accordance with the regulations in force concerning State Employees and Civil Servants and Regulations concerning the degrees of Philosophiae Doctor (PhD) and Philosodophiae Doctor (PhD) in artistic research national guidelines for appointment as PhD, post doctor and research assistant

Preferred selection criteria

- Experience and strong research interest in landslides and numerical modelling in geotechnical engineering will be considered an advantage
- Experience with data analysis and programming (e.g., Python, MATLAB) will be considered an advantage
- Experiences in publications on international scientific journals and conferences will be considered an advantage
- Knowledge in processing spatiotemporal GIS data is not a requirement but will be beneficial

Personal characteristics

- Highly motivated for research work
- Challenges the status quo and promotes new initiatives
- Is good at anticipating problems and identifying logical solutions as well as contradictions and inconsistencies
- Acquires new knowledge quickly, and can use existing knowledge in new ways
- Works together with others across established reporting lines

We offer

- exciting and stimulating tasks in a strong international academic environment
- an open and inclusive work environment with dedicated colleagues
- favourable terms in the Norwegian Public Service Pension Fund
- employee benefits

Salary and conditions

PhD candidates are remunerated in code 1017, and are normally remunerated at gross from NOK 491 200 per annum before tax, depending on qualifications and seniority. From the salary, 2% is deducted as a contribution to the Norwegian Public Service Pension Fund.

The period of employment is 3 years.

Appointment to a PhD position requires that you are admitted to the PhD programme in **Civil Engineering** (www.ntnu.edu/ibm/phd) within three months of employment, and that you participate in an organized PhD programme during the employment period.

The engagement is to be made in accordance with the regulations in force concerning State Employees and Civil Servants, and the acts relating to Control of the Export of Strategic Goods, Services and Technology. Candidates who by assessment of the application and attachment are seen to conflict with the criteria in the latter law will be prohibited from recruitment to NTNU. After the appointment you must assume that there may be changes in the area of work.

It is a prerequisite you can be present at and accessible to the institution daily.

About the application

The application and supporting documentation to be used as the basis for the assessment must be in English.

Publications and other scientific work must follow the application. Please note that applications are only evaluated based on the information available on the application deadline. You should ensure that your application shows clearly how your skills and experience meet the criteria which are set out above.

The application must include:

- CV, certificates and diplomas
- transcripts and diplomas for bachelor's and master's degrees. If you have not completed the master's degree, you must submit a confirmation that the master's thesis has been submitted.
- A copy of the master's thesis. If you recently have submitted your master's thesis, you can attach a draft of the thesis. Documentation of a completed master's degree must be presented before taking up the position.
- Name and address of three referees
- If you have publications or other relevant research work

If all, or parts, of your education has been taken abroad, we also ask you to attach documentation of the scope and quality of your entire education, both bachelor's and master's education, in addition to other higher education. Description of the documentation required can be found here. If you already have a statement from NOKUT, please attach this as well.

Joint works will be considered. If it is difficult to identify your contribution to joint works, you must attach a brief description of your participation.

In the evaluation of which candidate is best qualified, emphasis will be placed on education, experience and personal and interpersonal qualities. Motivation, ambitions, and potential will also count in the assessment of the candidates.

NTNU is committed to following evaluation criteria for research quality according to The San Francisco Declaration on Research Assessment - DORA.

General information

Working at NTNU

A good work environment is characterized by diversity. We encourage qualified candidates to apply, regardless of their gender, functional capacity or cultural background.

The city of Trondheim is a modern European city with a rich cultural scene. Trondheim is the innovation capital of Norway with a population of 200,000. The Norwegian welfare state, including healthcare, schools, kindergartens and overall equality, is probably the best of its kind in the world. Professional subsidized day-care for children is easily available. Furthermore, Trondheim offers great opportunities for education (including international schools) and possibilities to enjoy nature, culture and family life and has low crime rates and clean air quality.

As an employee at NTNU, you must at all times adhere to the changes that the development in the subject entails and the organizational changes that are adopted.

In accordance with The Public Information Act (Offentleglova), your name, age, position and municipality may be made public even if you have requested not to have your name entered on the list of applicants.

If you have any questions about the position, please contact Prof. Ivan Depina, telephone +47 40389387, email ivan.depina@ntnu.no. If you have any questions about the recruitment process, please contact Tone Måsøval Arntzen, e-mail: tone.m.arntzen@ntnu.no

Please submit your application electronically via jobbnorge.no with your CV, diplomas and certificates. Applications submitted elsewhere will not be considered. Diploma Supplement is required to attach for European Master Diplomas outside Norway. Chinese applicants are required to provide confirmation of Master Diploma from China Credentials Verification (CHSI).

If you are invited for interview you must include certified copies of transcripts and reference letters. Please refer to the application number **SO IV-22/22** when applying.

Application deadline: 15.02.2022

NTNU - knowledge for a better world

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The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life.

Department of Civil and Environmental Engineering

We conduct research and teaching in civil and transportation engineering, technical planning, structural engineering, water and wastewater engineering and hydraulic engineering. Graduates from our programmes become employees - in both the public and private sectors - with a sustainability mindset combined with competitive knowledge and skills. The Department of Civil and Environmental Engineering is one of eight departments in the Faculty of Engineering.

Additional information

Place of service: