UiT The Arctic University of Norway
Department of Technology and Safety

Jobbnorge ID: 268039
Deadline: 08.11.2024
Website: https://uit.no/startsida
Scope: Fulltime
Duration: Fixed Term

Faculty of Science and Technology

PhD fellow in “LLMs based Knowledge Graphs towards Digital Twin Development in Green Shipping"

The position

A PhD position is available at the Department of Technology and Safety (ITS), Faculty of Science and Technology with the research group Advanced Maritime Ship Operations.

ITS is organised under the Faculty of Science and Technology and is located at three campuses: Tromsø, Bardufoss and Harstad. The department has approximately 90 employees and approximately 600 students. It offers undergraduate, master’s, and PhD degree programmes as well as research in the areas of nautical science, aviation, societal safety, environment, and international preparedness.

The position is for a period of three years. The objective of the position is to complete research training to the level of a doctoral degree. Admission to the PhD programme is a prerequisite for employment, and the programme period starts on commencement of the position.

The workplace is at UiT in Tromsø. You must be able to start in the position within a reasonable time after receiving the offer.

The position’s field of research

Digital twin technology for ocean-going vessels is key to meeting the decarbonization goals set by the International Maritime Organization (IMO). The Advanced Maritime Ship Operations research group is dedicated to developing and showcasing digital twin models for selected vessels through extensive ship performance and navigation data. The position is funded by the TwinShip Horizon Europe Project (Twin-Ship.eu), where UiT is the project coordinator.

TwinShip Project:
The TwinShip consortium is spearheading an initiative to transform the maritime sector by creating an alliance of premier maritime technology, solution & service providers, ship design and shipping firms, classification societies, ports, software developers, and research and academic bodies. This collaboration is centered around a unique, open-source digital platform enriched with data and powered by domain knowledge-based advanced machine learning and artificial intelligence capabilities. By introducing a Digital Twin (DT) enabled Decision Support System (DSS) in the same digital platform, TwinShip is setting a course for the maritime industry's rapid digital and environmental transformation. The project sets ambitious benchmarks for reducing Greenhouse Gas emissions in international shipping, aiming for a 30-40% reduction by 2030, 80-90% by 2040, and achieving net-zero emissions by 2045, all relative to 2008 levels by utilizing its Pilot Vessels and Futuristic Unmanned Vessel Concept. This initiative focuses on leveraging both existing and emergent clean fuels and technologies, prioritizing renewable energy sources, and the implementation of unmanned vessels. The TwinShip DT-enabled DSS is crafted to navigate the industry toward achieving these significant environmental targets, demonstrating the consortium's dedication to fostering sustainability and pushing the boundaries of innovation.

UiT- The Arctic University of Norway will lead this largest European-level project on maritime digitalization supported by machine learning and AI applications toward achieving zero emission vessels under this initiative. The project consortium consists of SINTEF Digital, SINTEF Ocean, Wärtsilä-Finland, Wärtsilä-Voyage Germany, Wärtsilä-Voyage doo Beograd, Institute of Communication and Computer Systems, National Technical University of Athens, American Bureau of Shipping, Grimaldi Group, Stena Line, Stena AB-Teknik, KNUD E. HANSEN, Fundación Valenciaport, ASSIST Software, UBITECH, 52°North GmbH - and bound4blue.

The utilization of Large Language Models (LLMs) based Knowledge Graphs, associated with Ontologies, for digital twin development of ocean-going vessels, is the main objective of this position. The knowledge graphs will be developed by utilizing ship performance navigation domain knowledge through LLMs and data sets from selected vessels, on the VesselAI digital platform that has been developed under the VesselAI H2020 project (vessel-ai.eu). The same digital platform will adopted for the TwinShip Horizon Europe project, where one version of the Advanced VesselAI platform will be established at UiT. It is expected that the PhD candidate will implement the LLMs to develop Knowledge Graphs on the same platform to support extended digital twin development for the maritime industry.

The objective of the Ph.D. position is to develop:

- Large Language Models to support Knowledge Graphs for selected vessels and ship systems.
- Knowledge Graphs based on engine propeller combinator diagrams of the same vessels.
- Machine learning algorithms for data clustering and regressions of ship performance and navigation data sets as a part of digital twin development.
- Quantification of ship performance by digital twin applications in shipping.

Qualifications

This position requires a master's degree or equivalent in Information Technology, Computer Science, Cybernetics, Physics, Mathematics, Statistics, Nautical Science, Maritime Technology, or a similar field with some sea-going experience and stronger software development experiences, and any other requirements. If you are near completion of your master's degree, you may still apply.

Applicants must document fluency of in English and be able to work in an international environment. Nordic applicants can document their English capabilities by attaching their high school diploma. Working knowledge of Norwegian or a Scandinavian language is also beneficial.

It is preferable if the candidate has knowledge and experience within the following fields:

- Large Language Model-based application development.
- Knowledge Graph Development for Sensor Data.
- Deep Learning techniques, Data Engineering, and Semantic Technologies
- Open-source artificial intelligence, machine learning, statistical estimation methods, software tools, and big-data frameworks.
- Programming languages such as e.g. Python, C++, and LABVIEW.
- Emission control rules and regulations in the shipping industry.
- Ship navigation and operational knowledge & experiences.

Emphasis is strongly attached to the relevant background of the applicant, as demonstrated via their previous academic and professional work.

This PhD position will be a part of the student portfolio that is included in the joint national PhD programme in nautical operations. These positions will contribute to guest lectures and research results for further development of the course portfolio of the program.

In the assessment, the emphasis is on the applicant's potential to complete a research education based on the master's thesis or equivalent, and any other scientific work. In addition, other experience of significance for the completion of the doctoral programme may be given consideration.

We will also emphasize motivation and personal suitability for the position. We are looking for candidates who:

- Have good collaboration skills
- Have good communication and interaction with colleagues and students
- Wants to contribute to a good working environment

As many people as possible should have the opportunity to undertake organized research training. If you already hold a PhD or have equivalent competence, we will not appoint you to this position.

Contact

For further information about the position, please contact Professor Lokukaluge Prasad Perera:

- email: prasad.perera@uit.no

or Head of Department Bjørn-Morten Batalden:

- email: bjorn.batalden@uit.no

Admission to the PhD programme

For employment in the PhD position, you must be qualified for admission to the PhD programme at the National Joint PhD Program in Nautical Operations and participate in organized doctoral studies within the employment period.

Admission normally requires:

- A bachelor's degree of 180 ECTS and a relevant master's degree, or an integrated master's degree.

UiT normally accepts higher education from countries that are part of the Lisbon Recognition Convention.

A weighted grade average for the master's degree equal to B or better is normally required for admission. The candidate must also have a grade of B or better on the master's thesis. Exceptions to these admission rules can be considered if the candidate can document particular suitability for a PhD education.

A more detailed description of admission requirements can be found here.

If you are employed in the position, you will be provisionally admitted to the PhD programme. Application for final admission must be submitted no later than three months after taking up the position.

Applicants with a foreign education will be subjected to an evaluation of whether the educational background is equal to Norwegian higher education, following national guidelines from Norwegian Directorate for Higher Education and Skills. Depending on which country the education is from, one or two additional years of university education may be required to fulfil admission requirements, e.g. a 4-year bachelor's degree and a 2-year master's degree. UiT normally accepts higher education from countries that are part of the Lisbon Recognition Convention.

Inclusion and diversity

UiT The Arctic University of Norway is working actively to promote equality, gender balance and diversity among employees and students, and to create an inclusive and safe working environment. We believe that inclusion and diversity are a strength, and we want employees with different competencies, professional experience, life experience and perspectives.

If you have a disability, a gap in your CV or immigrant background, we encourage you to tick the box for this in your application. If there are qualified applicants, we invite at least one in each group for an interview. If you get the job, we will adapt the working conditions if you need it. Apart from selecting the right candidates, we will only use the information for anonymous statistics.

We offer

- Involvement in an interesting research project
- Good career opportunities
- A good academic environment with dedicated colleagues
- Flexible working hours and a state collective pay agreement
- Pension scheme through the state pension fund
- PhD Fellows are normally given a salary of 532 200 NOK/year with a 3% yearly increase
- If you have to relocate to Tromsø then the Faculty of Science and Technology may reimburse your moving costs. Further details regarding this matter will be made available if you receive an offer from us.

Norwegian health policy aims to ensure that everyone, irrespective of their personal finances and where they live, has access to good health and care services of equal standard. As an employee you will become member of the National Insurance Scheme which also include health care services.

More practical information about working and living in Norway can be found here: https://uit.no/staffmobility

Application

Your application must include:

- Cover letter explaining your motivation and research interests
- CV
- Diploma for bachelor's and master's degree
- Transcript of grades/academic record for bachelor's and master's degree
- Explanation of the grading system for foreign education (Diploma Supplement if available)
- Documentation of English proficiency
- Documentation of proficiency in Norwegian or a Scandinavian language (if applicable)
- 2-3 references with contact information
- Master’s thesis, and any other academic works

Qualification with a master’s degree is required before commencement in the position. You may still apply if you are in the final stages of the master’s degree, but the master’s thesis must be submitted for evaluation within the application deadline. You must submit the thesis and transcript of grades for the master’s degree with your application.

All documentation to be considered must be in a Scandinavian language or English. Diplomas and transcripts must also be submitted in the original language, if not in English or Scandinavian. If English proficiency is not documented in the application, it must be documented before starting in the position. We only accept applications and documentation sent via Jobbnorge within the application deadline.

General information

The appointment is made in accordance with State regulations and guidelines at UiT. At our website, you will find more information for applicants.

The engagement is to be made in accordance with 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.

After the appointment you must assume that there may be changes in the area of work.

Remuneration for the position of PhD Fellow is in accordance with the State salary scale code 1017. A compulsory contribution of 2 % to the Norwegian Public Service Pension Fund will be deducted. You will become a member of the Norwegian Public Service Pension Fund, which gives you many benefits in addition to a lifelong pension: You may be entitled to financial support if you become ill or disabled, your family may be entitled to financial support when you die, you become insured against occupational injury or occupational disease, and you can get good terms on a mortgage. Read more about your employee benefits at: spk.no.

A shorter period of appointment may be decided when the PhD Fellow has already completed parts of their research training programme or when the appointment is based on a previous qualifying position PhD Fellow, research assistant, or the like in such a way that the total time used for research training amounts to three years.

We process personal data given in an application or CV in accordance with the Personal Data Act (Offentleglova). According to the Personal Data Act information about the applicant may be included in the public applicant list, also in cases where the applicant has requested non-disclosure. You will receive advance notification in the event of such publication, if you have requested non-disclosure.

Eallju - Developing the High North

UiT The Arctic University of Norway is a multi-campus comprehensive university at the international forefront. Our vision is to be a driving force for developing the High North. The Northern Sami notion eallju, which means eagerness to work, sets the tone for this motive power at UiT. Along with students, staff and the wider community, we aim to utilise our location in Northern Norway and Sápmi, our broad and diverse research and study portfolio and interdisciplinary advantage to shape the future.

Our social mission is to provide research-based education of high quality, perform artistic development and carry out research of the highest international quality standards in the entire range from basic to applied. We will convey knowledge about disciplines and contribute to innovation. Our social mission unites UiT across various studies, research fields and large geographical distances. This demands good cooperation with trade and industry and civil society as well as with international partners. We will strengthen knowledge-based and sustainable development at a regional, national and international level.

Academic freedom and scientific and ethical principles form the basis for all UiT’s activities. Participation, co-determination, transparency and good processes will provide the decision-making basis we need to make wise and far-sighted priorities. Our students and staff will have the opportunity to develop their abilities and potential. Founded on academic integrity, we will be courageous, committed and generous in close contact with disciplines, people and contemporary developments.

We will demonstrate adaptability and seek good and purposeful utilisation of resources, so we are ready to meet the expectations and opportunities of the future. We will strengthen the quality and impact of our disciplines and core tasks through the following three strategic priority areas.

Additional information

Place of service:

Hansine Hansens veg18 9019 Tromsø (Tromsø - Romsa Municipality)