**Jobbnorge ID:** 269835
**Deadline:** 11/24/2024
**Website:** http://www.ntnu.no
**Scope:** Fulltime
**Duration:** Temporary

The Department of Computer Science has a vacancy for a

# PhD in Deep Integration between Machine Learning Approaches and Renewable Energy Optimization

## 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 43,000 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 job

The Department of Computer Science (IDI), Norwegian University of Science and Technology (NTNU), Trondheim, Norway, has a vacancy for a full-time position as a PhD candidate. The candidate will be part of the Data and Artificial Intelligence (DART) research group.

This academic position will provide promising research recruits with the opportunity for professional development through studies toward a PhD degree. The PhD candidate will be employed at IDI, NTNU, and the workplace will be Trondheim.

The position is connected to the KSP InterOpt project—Deep integration between machine learning approaches and renewable energy optimization. The project is financed by the Norwegian Research Council and industrial partners, including ANEO AS, Hydro Energi AS, and Å Energy Fornybar Forvaltning AS. It is led by SINTEF Energy, with NTNU as the primary research partner. Three international universities and research institutes are also involved. They are Universidad Politécnica de Madrid (UPM, Spain), Université du Québec à Chicoutimi (UQAC, Canada), and the Brazilian Electrical Energy Research Center (CEPEL, Brazil). The primary objective of this project is to develop knowledge enabling deep integration between machine learning approaches and the renewable energy optimization problem. The renewable energy optimization addressed in this project is the short-term unit commitment problem in a deregulated power system, constituting the foundation for production scheduling.

Your immediate leader is the group leader of Data and artificial intelligence (DART).

## Duties of the position

The PhD candidate is expected to investigate suitable machine learning approaches to solve the renewable energy optimization problem at a much lower computational cost or include more complex constraints and uncertainty without sacrificing solution quality than the current practice. The optimization problem aims to optimize the operation of generators over a finite planning horizon under operational and market conditions. The generators are mostly hydro-turbine generators. New renewable energy, such as solar or wind power, will also be considered when necessary. The candidate will work closely with SINTEF researchers on this project.

Some of the duties that a PhD candidate would be expected to perform include:

- Contribute towards developing open datasets tailored for implementing machine learning approaches in real-world hybrid scheduling problems dominated by hydropower.
- Investigate proper machine learning approaches for prediction tasks.
- Attend and present the results at the annual workshop and seminars organized by SINTEF. The project's results are expected to be published in reputable scientific journals and conference proceedings.

The candidate may be involved in the supervision of master students and in teaching upon mutual agreement if required.

## Required selection criteria

- Applicants must hold an M.Sc. degree (or equivalent) within either Machine Learning, Physics or Mathematics, or Electrical Power Engineering.
- Applicants education must correspond to a five-year Norwegian degree program, where 120 credits are obtained at master's level
- Applicants must meet the requirements for admission to the faculty's doctoral program.
- Applicants must satisfy the requirements for admission to the PhD program in Department of Computer Science (IDI) at NTNU; please see the link for more information.
    - Applicants must have a strong academic record from their previous studies. The minimum grade requirement is a B or better for master's programs and a C or better for bachelor's programs, based on NTNU's grading scale, which ranges from A to E for passing grades (with A being the highest). Applicants without letter grades from previous studies must demonstrate an equivalent academic standard. In cases where an applicant has a weaker grade background, they may still be considered if they can provide evidence of exceptional suitability for a PhD program.
- Applicants must have good written and spoken English language skills. Applicants from non-English speaking countries outside the EU/EEA/Switzerland must provide preliminary documentation of English language proficiency in terms of an approved test. The following tests can be used: TOEFL, IELTS, and Cambridge Certificate in Advanced English (CAE) or Cambridge Certificate of Proficiency in English (CPE). Minimum scores are:
    - TOEFL: 600 (paper-based test), 92 (Internet-based test)
    - IELTS: 6.5, with no section lower than 5.5 (only Academic IELTS test accepted)
    - CAE/CPE: grade B or A.

Further assessment of both written and oral English language skills and the ability to communicate fluently will be conducted in the continued selection process and during any interviews for the shortlisted applicants.

The appointment is to be made in accordance with Regulations on terms of employment for positions such as postdoctoral fellow, Phd candidate, research assistant and specialist candidate 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

- Demonstrate research ability in hydropower scheduling, energy system modeling, optimization, and machine learning
- Excellent programming and modeling skills, preferably in Phyton, Julia, C++ or a similar programming language
- Proficiency in Norwegian language skills or another Scandinavian language will be rated positively
- The presented ideas and/or originality of the draft research proposal

## Personal characteristics

- Communicates information with clarity and ease, both orally and in writing
- Sets challenging goals and works hard to achieve them
- Self-driven with a strong ability to work independently when required
- Share information and expertise to achieve the desired result
- Structured, targeted and solution-oriented

A good working environment is important to us at the Department of Computer Science. Our working environment is characterized by an informal and friendly tone and good employee cooperation. We, therefore, want you to be a person who

- works from campus and participates in joint activities such as lunch, and takes the initiative in academic and social activities in the scholarship group
- participates in professional discussions with colleagues
- has a friendly and positive attitude

Emphasis will be placed on personal and interpersonal qualities.

## 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

As a PhD candidate (code 1017) you are normally paid from gross 532 200 NOK 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 employment contract is for three years without teaching duties or four years with teaching duties.

Appointment to a PhD position requires that you are admitted to the PhD program in Computer Science (in the field of AI) within three months of employment and that you participate in an organized PhD program 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.

The position is subject to external funding.

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 your application will be considered based solely on information submitted by the application deadline. You must, therefore, ensure that your application clearly demonstrates how your skills and experience fulfill the criteria specified above.

The application must include:

- A cover letter where the applicant describes the personal motivation, summarising scientific work and how the applicant sees her/his background as suitable
- CV (summarising education, positions, pedagogical experience, administrative experience, and other qualifying activity).
- A draft research proposal (1 or 2 pages) for the PhD study, where the candidate presents her/his own ideas for the PhD work and how they can be applied based on the project description given in this advertisement. This proposal will be neither final nor binding for the project.
- Copies of educational certificates, academic transcripts of records (bachelor's and master's degrees), and letters of recommendation.
    - Applicants from universities outside Norway are kindly requested to send a diploma supplement or a similar document describing the study program and grading system in detail.
- A copy of the master's thesis.
- The required documentation of English language proficiency.
- Academic works - published or unpublished - that you would like to be considered in the assessment.
- Names and contact information of at least three references (name, relation to candidate, e-mail, and telephone number).

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 Norwegian Directorate for Higher Education and Skills, please attach this as well.

We will take joint work into account. If it is difficult to identify your efforts in the joint work, you must enclose a short 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

NTNU believes that inclusion and diversity is our strength. We want to recruit people with different competencies, educational backgrounds, life experiences and perspectives to contribute to solving our social responsibilities within education and research. We will facilitate for our employees' needs.

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

NTNU is working actively to increase the number of women employed in scientific positions and has a number of resources to promote equality

**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.

A public list of applicants with name, age, job title and municipality of residence is prepared after the application deadline. If you want to reserve yourself from entry on the public applicant list, this must be justified. Assessment will be made in accordance with current legislation. You will be notified if the reservation is not accepted.

If you have any questions about the position, please contact Professor Zhirong Yang, email zhirong.yang@ntnu.no. If you have any questions about the recruitment process, please contact HR at NTNU IDI, email: hr@idi.ntnu.no.

If you think this looks interesting and in line with your qualifications, please submit your application electronically via jobbnorge.no with your CV, diplomas and certificates attached. Applications submitted elsewhere will not be considered. Upon request, you must be able to obtain certified copies of your documentation.

**Application deadline: 24.11.24**

# NTNU - knowledge for a better world

**NTNU - knowledge for a better world**

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

**Department of Computer Science**

We are the leading academic IT environment in Norway, and offer a wide range of theoretical and applied IT programmes of study at all levels. Our subject areas include hardware, algorithms, visual computing, AI, databases, software engineering, information systems, learning technology, HCI, CSCW, IT operations and applied data processing. The Department has groups in both Trondheim and Gjøvik. The Department of Computer Science is one of seven departments in the Faculty of Information Technology and Electrical Engineering .

## Additional information

### Contact person:

Zhirong Yang, Professor
Phone: | E-mail: zhirong.yang@ntnu.no

### Place of service:

Høgskoleringen 1 7491 Trondheim (Trondheim Municipality)