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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.

**Faculty of Information Technology and Electrical Engineering  
Department of Engineering Cybernetics (ITK)**

# PhD research fellowship position in Robotic Vision and Machine Learning on Autonomous Robotic Platforms

## **The position's field of research/research project**

The PhD position is related to a highly interdisciplinary project which targets fundamental research questions in the fields of Robotic Vision, Machine Learning, Artificial Intelligence (AI) and Control Theory for the use in microbiology and oceanography.

The project aims to image, process, analyze plankton images taken from the upper water column by a mobile autonomous underwater vehicle (AUV) thereby autonomously target specific microbiological taxa.

This PhD project will build upon state-of-the-art machine learning methods including Deep Convolutional Neural Networks (Deep Learning) and other machine learning techniques to enable optimal navigation decisions with an improved context awareness and the ability to classify microbiological images unsupervised and do so online onboard an AUV. Exploiting such relatively new concepts for which a huge amount of data is required and sufficient training data has to be generated with respect to an expected taxonomy is a significant challenge. Labelling of new classes may require augmented taxonomic classification capabilities from a biological expert. In the next step the autonomous control part of the process pipeline will bypass input from a biological expert exploiting new self guided Machine Learning methods. In addition, the project will explore how to train a neural network with image data not only along the spatial but also temporal domain for information evolution.

The successful candidate will be appointed for a period of 3 years, with possible extension to a fourth year if the candidate undertakes teaching related duties.

## **Qualification requirements**

Successful applicants must have a Master degree in computer science, artificial intelligence, mathematics, cybernetics, physics or similar with a solid background in mathematical modelling and machine learning. Education in robotics, computer vision, machine learning, and/or biological oceanography is an advantage. Applicants are required to justify their candidatedship by explicitly explaining their personal motivation and academic aptitude for pursuing a doctoral degree within this research field. Applicants that expect to complete their Master's degree by summer 2018 can apply. Applicants must have significant programming experience ideally in C, C++ and/or Python and should be willing and able to go to sea.

Academic results, publications, relevant specialization, work or research experience, personal qualifications, and motivation and a desire to make an impact on critical societal problems will be considered when evaluating the applicants.

It is a prerequisite that the PhD scholar applies for and is granted admission to the NTNU PhD studies as soon as possible after employment. NTNUs PhD-rules require a Master degree or equivalent with at least 5 years of studies and an average ECTS grade of A or B within a scale of A-E for passing grades (A best).

Excellent English skills, written and spoken, are required. Applicants from non-European countries where English is not the official language must present an official language test report. The following tests can be used as such documentation: TOEFL, IELTS or 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.

## **Formal regulations**

Appointments are made in accordance with the regulations in force regarding terms of employment for PhD candidates issued by the Ministry of Education and Research, with relevant parts of the additional guidelines for appointment as a PhD candidate at NTNU.

Applicants must undertake to participate in an organized PhD programme of study during their period of employment. The person who is appointed must comply with the conditions that apply at any time to employees in the public sector. In addition, a contract will be signed regarding the period of employment.

Applicants must be qualified for admission as PhD students at NTNU. See <http://www.ime.ntnu.no/forskning/phd> for information about PhD studies at NTNU. Together with the application, include a description of the research work that is planned for completion during the period of the grant.

**Salary conditions**

The position follows code 1017, salary grade 51 - 62 in the Norwegian State salary scale, gross NOK 449 400 - 544 400 per year, depending on qualifications. A deduction of 2% is made as a statutory contribution to the Norwegian Public Service Pension Fund.

**Contact:**

The main supervisor will be Associate Professor Annette Stahl ([annette.stahl@ntnu.no](mailto:annette.stahl@ntnu.no)) with co-supervisors Professor Kanna Rajan at the Department of Engineering Cybernetics, NTNU, Trondheim, Professor Geir Johnsen and Associate Professor Nicole Aberle-Malzahn at the Department of Biology, NTNU, Trondheim. The research activity will be associated with the Center of Excellence on Autonomous Marine Operations and Systems (AMOS) at NTNU (<https://www.ntnu.edu/amos>).

**General**

NTNU can offer an informal and friendly workplace with dedicated colleagues, academic challenges and attractive schemes for home loans, insurance and pensions in the Norwegian Public Service Pension Fund.

Further details about the position can be obtained from Associate Professor Annette Stahl, e-mail: [annette.stahl@ntnu.no](mailto:annette.stahl@ntnu.no).

The Faculty of Information Technology and Electrical Engineering wants to attract outstanding and creative candidates who can contribute to our ongoing research activities. We believe that diversity is important to achieve a good, inclusive working environment. We encourage all qualified candidates to apply, regardless of the gender, disability or cultural background.

The appointment is to be made in accordance with the regulations in force concerning State Employees and Civil Servants, and assessments regarding the legislations regulating export control.

Under Section 25 of the Freedom of Information Act, information about the applicant may be made public even if the applicant has requested not to have his or her name entered on the list of applicants.

Applicants are kindly requested to send a diploma supplement or a similar document, which describes in detail the study and grading system and the rights for further studies associated with the obtained degree.

The application with a CV and certified copies of diplomas and certificates must be sent electronically via this page ([www.jobbnorge.no](http://www.jobbnorge.no)) with information about education and relevant experience (all in one combined PDF file).

Mark the application IE 156-2018.

Deadline for applications: 2018-10-15.

Jobbnorge-ID: 156347, Søknadsfrist: Søknadsfristen er gått ut