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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.

Faculty of Information Technology and Electrical Engineering
Department of Engineering Cybernetics

Two Professorships/Associate Professorships in Big Data Cybernetics

In collaboration with KONGSBERG and Statoil, the Norwegian University of Science and Technology (NTNU) is establishing the world's first two professorships in Big Data Cybernetics, combining the fields of automatic control and multivariate data modelling. We seek ambitious candidates with complementary backgrounds and enthusiasm for merging these fields by working together. For the successful applicants, this represents a unique opportunity to play a central role in the development of a new interdisciplinary field.

In particular, we seek one candidate with a strong background in automatic control/cybernetics/system identification and one candidate with a strong background in multivariate data modelling/chemometrics/subspace modelling. The purpose is to bridge the gap between theory-driven and data-driven modelling, to provide better understanding, monitoring and control of complex dynamic systems.

The positions will be affiliated with the Department of Engineering Cybernetics at NTNU's Faculty of Information Technology and Electrical Engineering in Trondheim, Norway.

About the department

The Department of Engineering Cybernetics (Institutt for teknisk kybernetikk, ITK) has 22 professors, 15 adjunct professors, about 15 postdocs and researchers as well as 70 PhD candidates. Approximately 160 candidates graduate annually from the three MSc programs in cybernetics, which comprise over 700 students in total. Also, about 35 candidates graduate annually from the BSc study in electrical engineering with specialization in automation.

The research and educational activities at ITK include both fundamental and applied activities in areas such as automatic control and systems theory; estimation and optimization; cyber-physical systems; autonomous unmanned vehicles; robotics; ships and marine systems; process control; smart grids; offshore renewable energy; automated drilling; fisheries and aquaculture; biomedical technology; safety-critical systems; embedded and real-time systems; systems engineering; and instrumentation and measurement systems.

ITK has an international profile with a strong ambition to be a leading international research unit within its field. Specifically, the successful applicants will join a research community at ITK which was rated "excellent from an international perspective" in the Norwegian Research Council's evaluation of 53 ICT communities in Norway in 2012, as only one of three ICT communities to receive such a rating in the Norwegian university and college sector. Currently, two of ITK's professors are IEEE Fellows. The department is involved in numerous research projects and centers, including the Centre of Excellence for Autonomous Marine Operations and Systems (NTNU AMOS).

ITK's research and educational activities are growing and we wish to strengthen our capability and capacity in strategically important fields, in particular the new field of Big Data Cybernetics (BDC). At present, ITK's BDC group includes three part-time professors, one postdoc and one PhD student, as well as several MSc students. The group gives courses at both MSc and PhD levels in multivariate data modelling, including experimental design, PCA, PLSR, nonlinear modelling and metamodeling.

Job description

Understanding and safely controlling complex dynamic processes requires a strong combination of theoretical background knowledge and practical real-world measurements.

In today's science and technology, the spatial, temporal and property-profile domains are often handled by different academic disciplines. However, real-world systems have spatial extent, temporal dynamics and a variety of physical properties. Modern measurement devices increasingly allow us to link these domains, which can provide us with deeper understanding, better control and new opportunities. However, the rapid increase in the amount of data currently poses a major challenge which requires a corresponding increase in our ability to interpret and make sense out of this "big data".

Many approaches to handling big data are based on black-box methods which may not be intuitive or transparent for human interpretation. A major focus of Big Data Cybernetics is therefore the development and application of methods which give easily interpretable results, and consequently allow domain experts to play a central role in the data analysis and decision-making processes.

The main goal is to translate "big data" from a large number of sensor channels into "smart data" represented by a combination of theory-driven and data-driven models. The overlap between dynamic subspace identification (from cybernetics) and partial-least-squares modelling (from chemometrics) could for instance be a fruitful common ground for the desired high-dimensional, spatio-temporal modelling. Other types of suitable modelling techniques from physics, statistics, signal processing and machine learning may also be relevant, as long as they are multivariate, open to unexpected events, computationally fast, and their solutions are easy to interpret and validate.

The applicants' methodological background should include theory and tools for describing scientific knowledge in terms of both first-principles mathematical models as well as data-driven models based on large data sets. It is required to document solid competence in essential areas of automatic control and/or multivariate data modelling. Knowledge in system identification, nonlinear dynamics, feedback control, signal processing, image analysis, visualization or machine learning will be considered an advantage.

Research activities are expected to have a strong international profile and impact, with a long-term perspective and to be concentrated around basic challenges and enabling technologies with relevance and importance for applications and industry.

The department has strong relationships to Norwegian and international industry, with numerous joint research projects including applications in the maritime, offshore, energy, process, aquaculture and medical industries. The research activities of the department rely crucially on external funding, and the development of educational programs may also receive external funding. The successful applicants are expected to engage extensively in applications for external funding, e.g. from the Research Council of Norway, European research and educational agencies, the industry sector, and other available sources.

MSc and PhD candidates from the cybernetics study programs are expected to be competitive in an international job market. The professors/associate professors will play a leading role in developing an educational profile and ensuring an excellent learning environment, in collaboration with colleagues, students and external stakeholders. As such, the professors/associate professors are expected to teach relevant courses at all levels and supervise both MSc and PhD candidates.

The professors/associate professors are also expected to disseminate their research results to a wider audience, as well as participate in the formal management of research, education and other relevant areas of activity in agreement with the department.

Qualifications

The applicant is required to have a doctoral degree or equivalent in a relevant area as described above, and document solid scientific expertise in essential areas of automatic control/cybernetics/system identification and/or multivariate data modelling/chemometrics/subspace modelling.

For a position as associate professor, the applicant should have a good publication record in terms of papers in peer-reviewed journals and other relevant international publication channels. Documented external funding, experience with research leadership and relevant collaboration with industry will be rated positively. The candidate should have a research potential which makes it likely to qualify for a full professorship within five years of employment, even with normal teaching duties.

For a position as professor, the applicant should demonstrate international experience and have a strong publication record in terms of papers in peer-reviewed journals and other relevant international publication channels. The applicant should document the ability to obtain external funding from relevant sources, be internationally recognized and be able to initiate and lead research at a high international level.

For both position categories, the applicant should demonstrate the ability to develop educational activities and the learning environment. He or she should have experience in the supervision of students or similar experience qualifying for such work.

The applicant should demonstrate communicative skills that qualify for excellent teaching, supervision and dissemination, and have good collaboration skills necessary for joint interdisciplinary projects.

Application requirements

The application should contain:

- CV including information relevant for the qualifications and a full list of publications with bibliographical references
- Diplomas and references
- The most important publications that are relevant for the evaluation of the applicant’s qualifications (maximum 10 publications)
- A brief description of the scientific/technological relevance of the candidate's research
- Research proposal for the first five years of employment (maximum 10 pages)
- Information about educational experience, including development of study programs, curricula, teaching experience, and development of teaching methods and the learning environment. See “Documentation of an applicant’s pedagogical qualifications”: http://www.ntnu.edu/vacancies/pedagogical-qualifications
- Information about dissemination activities
- Other documents which the applicant would find relevant

Joint works will also be evaluated. If it is difficult to identify the contributions from individuals in a scientific collaboration, applicants are to enclose a short summary of his/her contribution.

Following the application deadline, a shortlist of applicants will be drawn up, and all applicants will be informed whether they are placed on the shortlist. Shortlisted applicants will be evaluated by an international expert committee. The top candidates from this evaluation will be invited for interviews and trial lectures. The evaluation will take into account not only the accumulated academic production but also the applicant’s potential for scientific development and personal qualities.

Formal regulations

If the candidate does not have prior formal pedagogical qualifications in university-level teaching, the candidate must complete a recognized course which gives a pedagogical qualification within the first two years of employment. NTNU offers such courses.

Proficiency in the English language should be documented. New members of the academic staff who do not already master a Scandinavian language are expected to achieve proficiency in Norwegian or another Scandinavian language within three years of employment. This proficiency should correspond to level three in the “Norwegian for Foreigners” courses provided at NTNU.

Diversity is important to achieve a good, inclusive working environment. We encourage all qualified applicants to apply, regardless of gender, disability or cultural background.

The appointment is to be made in accordance with the regulations for State Employees and Civil Servants in Norway. The candidate must adhere to regulations that concern changes and developments within the discipline and/or the organizational changes concerning activities at NTNU.

Further details about the position can be obtained from Head of Department Morten Breivik, e-mail: morten.breivik@ntnu.no .

The position as professor is remunerated according to the wage levels 69 -101 on the Norwegian government state salary scale, with gross salary from NOK 605 800 to NOK 1 274 100 a year. The position as associate professor is normally remunerated according to the wage levels 57 - 77 with gross salary from NOK 486 100 to NOK 722 400 a year. 2% of the salary will be deducted as an obligatory premium to the Norwegian Public Service Pension Fund.

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.

Applications are to be submitted electronically through this page. Preferably, all attachments should be combined into a single file.

Reference no: IE 114-2017.

Application deadline: 2017-10-30.

Jobbnorge-ID: 142924, Søknadsfrist: Søknadsfristen er gått ut