



The University of Agder has more than 1400 employees and 13 000 students. This makes us one of the largest workplaces in Southern Norway. Our staff research, teach and disseminate knowledge from a variety of academic fields. Co-creation of knowledge is our common vision. We offer a broad range of study programmes in many fields. We are situated at two modern campuses in Kristiansand and Grimstad respectively.

We are an open and inclusive university marked by a culture of cooperation. The aim of the university is to further develop education and research at a high international level.

Two PhD Research Fellows - Machine Learning and Autonomous Control for cyber-physical systems

The University of Agder (UiA), Faculty of Engineering and Science, Department of Information and Communication Technology, WISENET Lab, invites applications for two PhD positions, each of three-year duration. These positions are located at the UiA campus in Grimstad, Norway.

The PhD students will be supervised by researchers from the Intelligent Signal Processing and Wireless Networks (WISENET) Lab, Faculty of Engineering and Science, UiA. Information about why UiA provides an excellent environment for PhD studies can be found [here](#)

The candidates will work in the area of Networked Cyber-Physical Systems, Data Analytics and Distributed control for Autonomous Smart Water Networks.

Brief Information about the WISENET Lab at University of Agder

The herein announced positions will be part of a recently established Lab, namely, the [Intelligent Signal Processing & Wireless Networks](#) (WISENET) Lab, led by Prof. Baltasar Beferull-Lozano, and whose activities span across both the Department of Information and Communication Technology and the Department of Engineering. The WISENET Lab has a strong expertise in a range of areas, among them, Data Analytics, Machine Learning, In-Network Processing and Distributed Intelligence, Wireless Communications, Networked Cyber-Physical Systems and Embedded Systems, having led a number of large research projects, funded by the Research Council of Norway, the EU research Programmes FP7 and H2020, as well as national and international industries. The WISENET Lab is now in full expansion phase, having at the present seven PhD students, three postdoctoral researchers, working on different cutting-edge research projects, such as FRIPRO TOPPFORSK, SFI, PETROMAKS, INFRASTRUCTURE and IKTPLUSS Projects, among others. The WISENET Lab is committed to achieving international research excellence; please see the [notes about prospective PhD students](#) at WISENET before applying.

Research Topic and Application Domain - Smart Water Networks (SWN)

The open PhD positions are offered in the area of Networked Cyber-Physical Systems and Data Analytics for Autonomous Smart Water Networks, advancing both theoretical aspects and algorithm designs, and considering also several application use cases in the domain of Smart Water Networks (SWN), which is of high importance in Norway, such as Aquaponics, pollution monitoring in the processing industry involving water and drinking water distribution networks (WDN).

Ever increasing pressures on natural and controlled water resources requires the need for effective management including legislative compliance in order to uphold water quality, is also growing. As water issues will continue to be a major challenge in the coming decades, especially in the light of climatic changes, the relevance of and need for SWN have never been more apparent. To this end, the concept of environmental diagnostics and autonomous control, which encompasses not just measurement of parameters (symptoms) but automated understanding (diagnosis) and appropriate automated actions (treatment), is emerging.

SWNs have emerged as a key engineering field that addresses the blend of networked data technologies with water infrastructures in order to solve many of the current challenges. By definition, SWN has an inherited dependence on networked Cyber-Physical Systems, since the latter provides the technological suite to deliver responsible, scalable, and secure architectures in dynamic environments. These networked systems are composed of a large number of interconnected control units over large geographic areas or with high spatial densities. Unfortunately, currently existing scientific and engineering methods do not consider a really multidisciplinary approach involving smart sensing/control components, distributed intelligence and data analytics to offer timely warning, detection, and control, and are in general, very conservative and sub-optimal. The envisioned networked CPS will ensure: a) a highly reliable health protection with respect to both chemical and microbiological contamination, predicting and reacting through actuation (e.g. component dosages, smart valves and pumps), ensuring that the water quality and other ambient parameters are within corresponding limits adapting to the corresponding application demands; b) improved decision making and future planning for service operations and better condition monitoring of infrastructure.

The main topics for the PhD positions will be:

- Mathematical modelling of space-time evolution of the physical phenomena in relation to the application domains
- In-network and cooperative signal/data processing (distributed acquisition, local inference, local control and learning strategies). This includes sensing, data fusion and aggregation methods, statistical inference, storage algorithms, and machine learning tools, including deep learning, among others. We will also take into account the heterogeneity of the devices, and evaluate the implications of the

cooperation in this heterogeneous framework, considering the constraints imposed by the communication medium, as well as the properly modelled spatiotemporal dynamics associated to the scenarios for each use case

- High-level data analytics and multi-objective autonomous control algorithms. This includes methods capable of dealing with a large amount of heterogeneous multi-source data, including both data from sensors and subjective data obtained from the quality assessment of end-users (e.g. water utilities, water and food consumers). The data analytics will directly support the control algorithms, but also the situation-aware operation and derivation of good operational patterns, providing information for setting the parameter values for in-network data processing and network resource allocation. The optimal systems design will also consider the end-user demands and requirements, and the overall water quality management costs and constraints.

In addition to the theoretical and algorithm design work, the research work will also involve the demonstration and validation of a real system solution for spatiotemporal dense monitoring and control in one or several of the application domains, showing several gains: (a) the early detection and warning when different types of pollutants are present in WDNs or industrial effluents, (b) improved management of the WDN by correlating pollution distribution with other events, such as leakages or degradation in the WDN, or production parameters for the industrial case (c) optimal balance between fish and plant ecosystems in Aquaponics, so that the water parameters are tuned to maximize the production while guaranteeing quality and minimizing resources, (d) increase of end-user satisfaction and increased benefits of the exploitation of WDN and Aquaponics industrial plants.

Pilot-scale facilities for demonstration will be provided directly by existing and planned projects/infrastructure in the portfolio of other institutions collaborating with the WISENET Lab, namely, the Norwegian Institute for Water Research (NIVA), the Norwegian Institute of Bioeconomy Research (NIBIO) and the Kristiansand Municipality Water Infrastructure network.

[More about working at UiA.](#)

Requirements

To be regarded as an eligible applicant, the candidates must have:

- A solid academic background with a MSc.-degree in Electrical Engineering, Electronics Engineering, Communications Engineering, Industrial Engineering, ICT or equivalent, is required. It is also possible to apply if the applicant is in the last year of the master's studies and in this case, if the applicant is selected, she or he will start the PhD position once the master's degree is finished
- Substantial knowledge of all or most of the following:
 - advanced optimization techniques
 - stochastic processes
 - wireless sensor networks and cyber-physical systems.
 - statistical signal processing
 - algebra
 - machine learning techniques
 - processing of data streams
 - programming in Matlab, C/C++, Python and Java

Experience in Testbed implementation and previous knowledge in data analytics is also welcome.

Candidates should also have:

- Scientific ambition
- Motivation and strong interest in cutting-edge research
- Good analytical and problem-solving skills
- Capacity for goal-oriented work and ability to concentrate
- Good communication and team-working skills, inventiveness and a proactive attitude
- Strong academic credentials, written and spoken English proficiency

Previous participation in national and European projects related to the areas of these positions will also be considered as a plus, as well as the publication of scientific papers in first class international conferences related to these topics.

In return, we offer the opportunity to contribute to the strategic capabilities of a world-class research organisation, along with intensive supervision. You will collaborate with top scientists in your field and have excellent prospects for personal development in an innovative working environment for aspiring researchers.

Subject to a positive performance evaluation of the first year, the candidates must also be admitted to the PhD Programme in Technology, with ICT as specialisation, within the first three months of the second year. More information about the programme and a complete list of admission requirements can be found [here](#).

The following admission requirements apply to the PhD Programme:

- The average grade for courses included in the bachelor's degree (or equivalent) must be C (or equivalent) or higher
- The average grade for courses included in the master's degree (or equivalent) must be B (or equivalent) or higher
- The master's thesis (or equivalent) must have a grade B (or equivalent) or higher when the candidate is admitted to the PhD programme

The successful applicant must have written and spoken English proficiency. Applicants from some countries must document their English proficiency through one of the following tests or certificates:

- TOEFL - Test of English as a Foreign Language with a minimum score of 600 on the Paper-based Test (PBT), or a minimum of 92 on the Internet-based Test (iBT)
- IELTS - International English Language Testing System, with a result of at least 6.5, with no section lower than 5.5. (only Academic IELTS test accepted)
- CEFR (Common European Framework of Reference for Languages) certificate of at least Level B2

Please check this [website](#) to see if an English test is required. Please note that the English test requirement applies to applicants from most countries according to the list mentioned above. No other English tests or certificates will be approved, and certifications/statements cannot replace an English test.

Short-listed applicants will be invited for interviews. UiA will also conduct a reference check before the appointment.

Further provisions relating to the position as PhD Research Fellow can be found in the [Regulations Concerning Terms and Conditions of Employment for the Post of Post-Doctoral Research Fellow, Research Fellow, Research Assistant and Resident](#)

Remuneration

Each PhD position is remunerated according to the state salary plan 17.515, code 1017 Research Fellow, salary NOK 449 400 gross per year. A 2 % compulsory pension contribution to the Norwegian Public Service Pension Fund is deducted from the pay according to current statutory provisions.

The Norwegian public service is committed to reflecting the diversity of society, and the personnel policy of the University of Agder aims to achieve a balanced workforce. All qualified persons are therefore encouraged to apply for these positions, irrespective of cultural background, gender, age or disability.

Women are especially encouraged to apply.

The appointment is made by the University of Agder's Appointments Committee for Teaching and Research Positions. The successful applicants will have rights and obligations in accordance with the current regulations for the public service.

Application

Submit your application and CV online. Please click on the link "**Apply for this job**". The following documentation should be submitted as attachments to the online application:

- Justification (maximum five pages) of the background of the candidate for each of the requirements of the position (see description above about the knowledge areas that a candidate should have)
- Certificates and/or grades for all post-secondary education, up to and including the bachelor's level
- Master's degree/higher degree certificate, with a summary of the courses/subjects included in the degree
- Applicants with a foreign higher education must attach an official description of the grading system used at the issuing institution
- Summary (approximately 1-2 pages) of the master's thesis, if any
- Applicants who are required to document their English proficiency must submit their TOEFL or IELTS test results (these may be forwarded after the closing date) or their CEFR certificate
- Publication list and links to applicant's scientific publications (if any)
- A description of the candidate's research interests, motivation and background for the PhD position. Please, indicate clearly in your application your preferred topic/topics
- A list with the names and contact information of reference persons that would be willing to be contacted by telephone

The applicants are fully responsible for submitting complete documentation. Without complete documentation we cannot, unfortunately, include you in the assessment process.

Closing date: 27.05.19

For further information, please contact Professor Baltasar Beferull-Lozano, tel. +47 37 23 31 59, e-mail baltasar.beferull@uia.no, Professor Jing Zhou, tel. +47 37 23 31 91, e-mail: jing.zhou@uia.no or Head of Department Folke Haugland, tel. +47 37 23 31 12, e-mail: folke.haugland@uia.no

In accordance with §25(2) of the Freedom of Information Act, applicants may request that they are not identified in the open list of applicants. The University, however, reserves the right to publish the name of applicants. Applicants will be advised of the University's intention to exercise this right.

Jobbnorge ID: 158715, Deadline: Monday, May 27, 2019