

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.

# PhD Research Fellow in ICT - Smart Sensing and Communications for UAVs

The University of Agder (UiA) invites applications for a full-time fixed-term appointment as PhD candidate in Information and Communication Technology (specifically low-altitude UAV communications and tracking) for a period of three years. The position is currently located in Grimstad, Norway. The starting date is as soon as possible or to be negotiated with the Faculty.

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 the WISENET Lab, the University of Agder, and Norway provide an excellent environment for PhD studies can be found [here](#) and also [here](#).

## Brief Information about the WISENET Lab

The herein announced position will be part of the Intelligent Signal Processing & Wireless Networks (WISENET) Lab. The Lab activities span across the Department of Information and Communication Technology and the Department of Engineering. WISENET Lab is in rapid expansion, having at present seven PhD students and three postdoctoral researchers working on cutting-edge research projects. WISENET Lab is committed to achieving international research excellence.

## PhD Program and Supervision

The goal of the PhD program is to train students to become autonomous researchers. This means that; Students need to complete a coursework component of 30 ECTS intended to provide the necessary background for conducting research. In WISENET, we teach courses on those areas that are most relevant for the research we conduct at the lab. Students need to become familiar with the research methodology in our areas. Thus, a close supervision model is generally pursued at the beginning, whereas more independence is gradually granted to the student as she/he becomes more mature. Ideally, the student must be able to conduct research independently after graduation. Students need to develop their communication skills, both oral and written. Strong communication skills constitute a prerequisite for working at most companies and institutions. The PhD program and the supervision at WISENET intensively promotes and assists in the development of these skills.

## Research Topics

A large number of unmanned aerial vehicles (UAVs) are expected to serve millions of people worldwide for construction, agriculture, surveillance, search-and-rescue, food delivery, and grocery shopping. Both the private and public sectors have been investing billions of dollars in the past few years, and it is expected that these investments will keep increasing exponentially in the future. But before the era of UAVs can commence, numerous technical challenges need to be addressed. The applicant's research goals will focus on wireless communications for UAVs as well as detection and tracking of possibly non-cooperative UAVs.

Specifically, the present PhD position is offered in the areas of precise detection, localization, and tracking of UAVs through mmWave sensors, classification of objects in low-altitude corridors, and smart electronic system design using mmWave sensors. This covers both theoretical research and prototype implementation aspects of systems based on mmWave sensors for UAVs detection, localization and tracking in low-altitude corridors. In addition, the candidate is expected to work in 2D and 3D spectrum cartography for UAV communication, advanced signal processing, and data analytics algorithms for detection and tracking, spectrum cognizant communications, low-latency communications, wireless prototyping using software-defined radios, and testbed design for spectrum-cognizant UAV communications. The main goal is two-fold: first, the conducted research must contribute to the development of UAV technology. Second, the PhD candidate must acquire the necessary training to obtain a research position in academia or in the emerging industry of UAVs. Spin-off initiatives will also be encouraged and supported by UiA.

## Selection Criteria

To be selected, the applicant must have:

A solid academic background with a master's degree in a related area (e.g. Electrical Engineering, Electronics Engineering, Communications Engineering, Control Engineering, Aeronautics Engineering, Industrial Engineering, Information and Communication Technology, Mathematics, Computer Science) completed by the position starting date

Background and/or experience in some of the following areas of interest:

mmWave sensors.

Signal processing for mmWave sensors, possibly with (sparse) FFTs.

Machine learning and deep learning.

PCB design for mmWave sensors.

UAV control modules. interfacing external sensors to UAV controllers and software.

Interfaces with sensors, actuators, and signal processing blocks.  
Communication interfaces: SPI, I2C, UART, PCI-X, Ethernet, and USB.  
Analog, digital, and mixed signal circuit design for embedded systems (especially if related to mmWave sensors).  
Circuit design using FPGAs (LabView, Verilog or VHDL).  
Experience with USRPs, mote-like IoT devices, and/or Testbed setup.  
Static, dynamic and nonlinear systems modeling.  
Mathematical analysis and linear algebra.  
Simulation and control of systems using Simulink.  
Programming in Java, MATLAB, Python and/or C/C++.  
Further relevant areas of interest such as:  
Device-to-device wireless communications.  
Radio resource management, interference management.  
Cognitive radio, dynamic spectrum access, and spectrum sensing.  
Localization and navigation techniques.  
RF measurements.  
Simulation of network protocols and implementation in real network scenarios.  
Curiosity for understanding, enthusiasm for discovery, and motivation for conducting relevant research. Creativity, and a proactive attitude.  
Strong analytical, problem-solving, communication, and team-working skills. Written and spoken English proficiency.  
Additionally, prior participation in research projects related to the areas of this position will also be considered a plus, as well as the publication of scientific papers on international conferences or journals related to these topics.

### **Admission to the PhD Programme**

The PhD Research Fellow will be admitted to the PhD Programme in Engineering and Science with ICT as specialization within three months of the starting date. More information about the programme and a complete list of admission requirements can be found [here](#).

The following admission requirements apply to the PhD Program:

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 Thesis (or equivalent) must have a grade B (or equivalent) or higher when the candidate is admitted to the PhD program  
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.

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

### **Selection Procedure**

Applicants will be evaluated based on their academic background, experience, and attitude. Preselected applicants will be invited for one or more skype interviews and may additionally be requested to complete written tests and/or programming assignments. UiA will also conduct a reference check on the selected candidate with her/his consent.

### **Remuneration**

The position is remunerated according to the State salary scale, salary plan 17.515, code 1017, 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 the position, irrespective of cultural background, gender, age or disability.

Women are especially encouraged to apply.

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

### **Application**

The application is submitted online by following the link "**Apply for this job**". The following documentation should be attached in pdf format: Justification (maximum 1 page) of the experience and background in the areas of interest listed in the section "Eligibility". Example: "1.

Experience in PCB design: I designed a PCB for [briefly describe purpose] in the bachelor's course [course name]. 2. Experience in programming: I took two bachelor's courses with names [course names] where we had to program in C, and one master's course with name [name] where we learned Python. 3. Background in machine learning: I took a bachelor's course with name [name] where we learned the basics of supervised and unsupervised learning, and a master's course with name which focuses on deep learning. And so on".

Up-to-date curriculum vitae. It would be a plus to provide a diagram or briefdescription of the main activities carried out by the applicant in all periods after graduating in the high-school.

Official transcripts of all post-secondary academic degrees, up to and including both the bachelor's and master's degrees. When attaching a non-Norwegian academic transcript that does not include a description of the grading system (e.g. maximum grade and minimum passing grade) used by the issuing institution, a (preferably official) description should also be attached. The description may simply contain a link to an

official website where the grading system is explained.

Applicants that are not originally from a country with English as the official language must submit their TOEFL, IELTS, or CEFR certificate (may alternatively be emailed after the closing date).

Publication list or links to the applicant's scientific publications (if any).

A description of the candidate's research interests, motivation, and preferred topic/topics.

All documents must be in English. Otherwise, they must be accompanied by an official translation. Applications with missing documentation or applications after the deadline will be automatically disregarded. Original documents must be presented for verification to UiA upon arrival.

Additional measures may be adopted by UiA to verify the authenticity of the documentation.

**Closing date: 27.05.19**

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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.

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