NTNU

Kunnskap for en bedre verden

Jobbnorge-ID: 89498
Søknadsfrist: Avsluttet
Nettside:
Omfang:
Varighet:

Five PhD research fellowships in Inertial Navigation, Sensor Fusion and Fault Tolerant Nonlinear Observer Design

The PhD positions at the Department of Engineering Cybernetics are funded by projects recently awarded by the Research Council of Norway. The PhD research projects will be coordinated with the Centre of Excellence (CoE) in Autonomous Marine Operations and Systems (AMOS), which was awarded by the Norwegian Research Council for the period 2013 to 2022.

The researchers will work on an international team and develop methods for sensor fusion, nonlinear observer design and strapdown inertial navigation. Targeted applications for low-cost MEMS-based strapdown inertial navigation systems are unmanned aerial vehicles, underwater vehicles and marine vessels. Research will be done in close cooperation with industrial partners. Experiments will be made using NTNU's experimental vehicles and laboratories, and in collaboration with industry and project partners.

Five PhD research fellowships in the following research areas are available:

- **Project 1: Integrated observer design with a North-seeking strapdown MEMS-based gyrocompass.** *The objective is to investigate if a low-cost North- seeking MEMS-based gyrocompass can be used together with magnetometers to replace conventional gyrocompasses onboard autonomous vehicles (AUV, USV and UAV) and marine craft using todays MEMS sensor technology.*

- **Project 2: Nonlinear tightly integrated filters for attitude, velocity and position.** *The objective is to develop nonlinear observers for integration of IMU and position measurements that can replace the EKF without performance degradation. The chosen approach should be modular and include options for feedback and feedforward and thus enable tight integration.*

- **Project 3: Model-based nonlinear integration filters for INS and position measurements.** *The objective is to develop low-cost integrated strapdown navigation systems (nonlinear observers) exploiting a dynamic vehicle model. Targeted features are dead reckoning, prediction during sensor failure, fault tolerance, and to obtain enhanced performance by combing the inertial measurements with model-based predictions.*

- **Project 4: Optimal sensor fusion for marine vessels using redundant inertial sensors and position reference systems.** *The objective is to optimally combine information from multiple and redundant sensors in order to minimize variance and errors. The sensor fusion algorithms are expected to be adaptive in order to account for non-stationary (time-varying) signal quality of the different sensors, e.g. due to hydro-acoustic noise or update frequency depending on water depth and noise levels.*

- **Project 5: Fault-tolerant sensor fusion by exploiting redundant inertial measurements.** *The objective is to develop reliable fault-detection algorithm for fault-tolerant sensor fusion, fully exploiting inertial sensors, redundancy and mathematical models for fault tolerance far beyond today's state-of-the-art in the maritime industry.*

We seek highly motivated students and researchers with an MSc degree in Engineering Cybernetics, Control Systems, Aeronautics & Astronautics, Navigation Systems, Electrical Engineering, Industrial Mathematics or other relevant disciplines. Prospective candidates should document expertise in one or more of the following fields: nonlinear control systems, sensor fusion, extended Kalman filters, nonlinear observers or navigation systems. Applications from master's students graduating by the end of June 2013 are accepted.

For more information, please contact:

- Professor Thor I. Fossen. Phone: +47 91897361, E-mail: Thor.Fossen@itk.ntnu.no
- Professor Tor Arne Johansen. Phone: +47 91722765, E-mail: Tor.Arne.Johansen@itk.ntnu.no

Excellent English skills, written and spoken, are required. Applicants from Non-English-speaking countries outsideEuropemust present an official language test report. The acceptable tests are TOEFL, IELTS, and Cambridge Certificate in Advanced English (CAE) or Cambridge Certificate of Proficiency in English (CPE). Minimum scores are:

- TOEFL: 600 / writing 4.5 (paper-based test), 92 / writing 22 (internet- based test)
- IELTS: 6.5, with no section lower than 5.5 (only Academic IELTS test accepted)
- CAE/CPE: grade B or A.

PhD candidates must fulfill the formal requirements to be accepted as a PhD candidate at NTNU and must agree to participate in organized doctoral study programs within the period of the appointment. Personal qualities and strong motivation for PhD studies will be taken into account. The successful applicants must agree to the conditions laid down for public employees. A contract will be drawn up regarding the period of appointment and work- related duties.

PhD candidates at NTNU are normally appointed for three years. An extra year may be offered to candidates that agree to have a 25 % assistant load, primarily linked to teaching.

The appointment will be at code 1017. PhD candidates are normally remunerated at wage level 50, gross NOK 416 300 before tax.

There will be a 2 % deduction to the Norwegian Public Service Pension Fund from gross salary.

The appointment will be made in accordance with current regulations with supplementary rules in force giving guidelines for scholarship appointments in universities and university colleges.

The position adheres to the Norwegian Government's policy of balanced ethnicity, age and gender. It is an objective to increase the number of females in scientific positions. Female applicants are therefore encouraged to apply.

The application should contain information of educational background and prior training, exams, and work experience. Certified copies of academic diplomas and transcripts, English language test scores and documents must be attached. Applicants from universities outside Norwayare 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: http://ec.europa.eu/education/policies/rec_qual/recognition/diploma_en.html

See http://www.ntnu.edu/ime/research/phd for more information about PhD studies at our Faculty.

Applications, including CV, diplomas, grade transcripts and other enclosures, should be submitted electronically through this page. Incomplete applications will *not* be taken into consideration.

Application deadline: January 28, 2013.

Applications should be marked: IME 003-2013.

Tilleggsinformasjon

Arbeidssted: