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Doctoral researchers in Robotics, Autonomy, Control, and Machine Perception
Aalto University

Direct Link: https://www.AcademicKeys.com/r?job=233021
Downloaded On: May. 9, 2024 4:00am
Posted Mar. 15, 2024, set to expire Dec. 30, 2024

Job Title	Doctoral researchers in Robotics, Autonomy, Control, and Machine Perception
Department	T410 Dept. Electrical Engineering and Automation
Institution	Aalto University , , Finland
Date Posted	Mar. 15, 2024
Application Deadline	Open until filled
Position Start Date	Available immediately
Job Categories	Graduate Student
Academic Field(s)	Robotics
Job Website	https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/PhD-Students-in-Robotics--Autonomy--Control--and-Machine-Perception_R39072-1
Apply By Email	

Job Description

Intelligent Work Machines (IWM) Doctoral Program is looking for PhD students (Doctoral Researchers).

The [url=http://www.tuni.fi/en/news/intelligent-work-machines-doctoral-programme-will-start-finland]IWM doctoral program educates new generations of professionals to the PhD level with multidisciplinary engineering knowledge needed for intelligent machinery development. The doctoral training connects academic research excellence with relevant industrial research and development challenges and accelerates industrial renewal in the machine industry.

The IWM doctoral program collects the leading departments and research groups in Finland. In the program there are 31 positions across five Finnish universities: Aalto University, Lappeenranta-Lahti University of Technology, Tampere University, University of Oulu, and University of Turku.

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Aalto University is now looking for

8 Doctoral Researchers in Robotics, Autonomy, Control, and Machine Perception

We offer: *
Fully funded research with high-quality supervision from experienced researchers *
Inspiring research environment with highly motivated peers *
Networking across university boundaries *
Collaboration opportunities with industry *
Access to high-end infrastructure, career training, and support services

Interested? Read more!
Research topics
We are looking for candidates for the following topics:

1. Autonomous manipulation of deformable and granular materials
The ability to manipulate deformable materials such as soil is vital for many robotic applications, including autonomous working machines, but presents great challenges because material dynamics are complex and vary between materials, and perceiving their high-dimensional continuously evolving state is difficult. This research aims to develop quasi-static and dynamic manipulation approaches that allow safe and efficient materials handling using autonomous machines.

2. Autonomous noncontact manipulation in 3D nonlinear stochastic energy fields
This research explores autonomous noncontact manipulation within 3D nonlinear stochastic energy fields, harnessing the invisible power of ambient air, water bodies, and various energy fields. As a candidate, you will develop intelligent algorithms and engage in hands-on experiments to achieve motion control of both individual and swarms of agents—rigid or soft—that may impact an array of applications from industrial machinery to aerospace engineering, metrology, environmental science, marine engineering, and beyond.

3. Drivable area segmentation in harsh conditions
Automated operation and functionalities of mobile machinery, including path planning and motion planning, are dependent on accurate and reliable evaluation of the traversability of the surrounding ground area. This research develops novel perception solutions for segmenting drivable area from the sensor view of a mobile machine in harsh and unstructured environments, such as ground surfaces featuring snow, vegetation, or gravel.

4. Generative design of model-based engineering systems

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This research is focused on revolutionizing the time-consuming and subjective engineering system architecture selection, which requires iterative evaluation and refinement, leveraging on past experiences. Generative design of engineering systems, employing AI for design space exploration to produce feasible and novel solutions for a given task, significantly enhances early architectural exploration, yet faces distinct challenges from the complexity of its models and data, differing from Generative AI applications involving text, images or audio.

5. Human-centred future of work with intelligent machines
Industry 5.0 aims for a human-centered and resilient industry with intelligent systems. This design research topic takes the employee perspective on designing intelligent machines for hybrid teamwork.

6. Learning for provably safe and robust robotic systems
Modern data-driven techniques have rapidly progressed beyond modelling and systems identification, with a growing interest in learning high-level dynamical properties of a system, such as safe-set invariance, reachability, input-to-state stability etc. In this project, we are interested in exploring Koopman Operator based representation along with physics informed machine learning towards learning safety and performance certificates for robotic systems in a manner that is interpretable, data efficient, and formally verifiable.

7. Machine perception in field Robotics for fleet operations
In a natural outdoor worksite, a fleet of autonomous machines are working supervised by a human operator in the master unit. How to develop and execute co-operative perception systems, in which modelling, on the basis of local perceptions, can be utilized, enhanced and updated in the fleet level by other autonomous machines in an efficient and safe way.

8. Optimizing intelligent autonomous multi-robot behavior based on offline data using reinforcement learning
Companies collect significant amounts of data of different kinds of robots such as heavy machines performing challenging earth moving, excavation, or cargo transfer tasks. This thesis topic focuses on the question of how to efficiently optimize robot behavior based on previously collected data sets using multi-agent offline reinforcement learning.

9. Physics-informed AI for estimation and control
The aim of the project is to develop physics-informed machine learning and more general artificial intelligence methods especially for problems involving estimation and control. Potential target applications are, for example, the perception and guidance problems arising in autonomous systems, distributed control systems, and robotics.

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10. Reliable control through reinforcement learning
Robustness and reliability are weaknesses of current state-of-the-art reinforcement learning algorithms but are crucial when learning controllers for real-world systems. In this project, we aim to address key issues causing this unreliability and develop novel algorithms that learn provably robust controllers.

11. Robotic introspection for a safe robot adaptation
To enable robots to robustly operate for extended periods of time in challenging environments it is necessary to enable them to automatically assess their internal sate (both hardware and software). In this project the focus is put on developing learning algorithms capable to detect anomalies in the data streams characterizing the robots actions.

12. Swarm intelligence based safety at the factory floor
Investigate a fully decentralized approach to achieving safety at the flexible factory floor based on multi-agent architectures, AI, and connected and IT-enabled human.

13. Tactile feedback systems for robotic teleoperations
Integrating realistic haptic feedback enables human operators to sense remote objects, including their shape, texture, and temperature, in real time, enhancing their ability to delicately grasp and manipulate objects. This project is dedicated to the creation of wearable tactile feedback systems, such as haptic gloves, designed for human-like robot hands.

Requirements and conditions

- You need to have: *
a Master’s degree in an area applicable to one of the topics listed above *
sufficient proficiency in English, Finnish, or Swedish (typically demonstrated with an official certificate, e.g., IELTS/TOEFL)

- The expected starting date in the position is either on 1st August 2024 or 1st January 2025. Presence in Finland for the duration of the contract is compulsory.
- Employment contracts will be made for three years with the funding from the Finnish Ministry of Education and Culture. Employment contract includes a prerequisite to apply, receive and accept doctoral study right within the probation period of the first 6 months.
- If you already have a study right for a doctoral degree at Aalto University, it needs to be awarded 1 November 2023 or thereafter for you to be eligible for these positions.
- The annual workload of research and teaching staff at Aalto University is 1612 hours.
- Aalto University follows the salary system of Finnish universities. The starting salary is approximately 2700 €/month (gross), and it increases as the Doctoral Researcher progresses in the research and

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studies.
- The contract includes Aalto University occupational healthcare.
- The working language is English.

Applicants must fulfill the admission criteria of the Aalto Doctoral Programme and, if chosen for a position, apply for, obtain and accept the right to pursue doctoral studies at Aalto University. For more information on the general requirements and the application process for doctoral studies, please visit [url=http://www.aalto.fi/en/doctoral-education/how-to-apply-for-doctoral-studies]https://www.aalto.fi/en/doctoral-education/how-to-apply-for-doctoral-studies.

To Apply

To apply, please submit the following application materials through the Aalto recruitment site by 5th April 2024 (23:59 EEST / UTC +3). To begin the submission process, click on “Apply now!” on the bottom of this page. In the application form, please specify which of the research topics you are primarily interested in (up to 4 topics).

Please note: Aalto University’s employees should apply for the position via internal HR system Workday (Internal Jobs) by using their existing Workday user account (not via the external webpage for open positions). Aalto University’s students and visitors should apply as external candidates with personal (not aalto.fi) email.

All material should be submitted in English as PDF. Application material should include:

1. Letter of motivation (1-2 pages). Please describe your background and future plans, and in particular the reasons for selecting the topic(s).

2. A curriculum vitae and possible list of publications with complete study and employment history, contact details of referees from 2 senior academic people. We will contact your referees, if recommendation letters are required. (please see [url=http://tenk.fi/en/advice-and-materials/template-researchers-curriculum-vitae]CV example of TENK)

3. A study transcript provided by the applicant’s university that lists studies completed and grades achieved.

4. A copy of the M.Sc. degree certificate or equivalent. (for doctoral study application it will need to be officially translated into Finnish, English or Swedish).

Please note that our recruitment system allows at most 5 attachments, so please combine the copies of certificates and transcripts into one PDF, if necessary.

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Any questions?
For additional information, please contact Prof. Ville Kyrki (ville.kyrki@aalto.fi). Aalto University reserves the right to leave the position open, extend the application period, reopen the application process, and consider candidates who have not submitted applications during the application period.

For questions about applying, please contact HR partner Camilla Hanganpää (camilla.hanganpaa@aalto.fi).

About Aalto University and Finland
For more information about living in Finland: [url=http://www.aalto.fi/en/careers-at-aalto/for-international-staff]https://www.aalto.fi/en/careers-at-aalto/for-international-staff and [url=http://www.aalto.fi/en/careers-at-aalto/living-in-finland]https://www.aalto.fi/en/careers-at-aalto/living-in-finland. Read more about working at Aalto: [url=http://www.aalto.fi/en/careers-at-aalto]https://www.aalto.fi/en/careers-at-aalto.

Contact Information

Please reference Academickeys in your cover letter when applying for or inquiring about this job announcement.

Contact

Finland