Postdoctoral Researcher in Distributed Machine Learning and Optimization for Multi-Agent Wireless Networks
Aalto University

Job Title	Postdoctoral Researcher in Distributed Machine Learning and Optimization for Multi-Agent Wireless Networks
Department	T412 Department of Information and Communications Engineering
Institution	Aalto University , , Finland
Date Posted	Feb. 10, 2025
Application Deadline	Open until filled
Position Start Date	Available immediately
Job Categories	Post-Doc
Academic Field(s)	Engineering - Other
Job Website	https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/Postdoctoral-Researcher-in-Distributed-Machine-Learning-and-Optimization-for-Multi-Agent-Wireless-Networks_R42254
Apply By Email	

Job Description

Aalto University is where science and art meet technology and business. We shape a sustainable future by making research breakthroughs in and across our disciplines, sparking the game changers of tomorrow and creating novel solutions to major global challenges. Our community is made up of 13 000 students, 400 professors and close to 4 500 other faculty and staff working on our dynamic campus in Espoo, Greater Helsinki, Finland. Diversity is part of who we are, and we actively work to ensure our community’s diversity and inclusiveness. This is why we warmly encourage qualified candidates from all backgrounds to join our community.

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[url=https://www.aalto.fi/en/department-of-information-and-communications-engineering]The Department of Information and Communications Engineering is looking for outstanding Postdoctoral Researcher in Distributed Machine Learning and Optimization for Multi-Agent Wireless Networks.

Are you a highly motivated researcher with a strong mathematical background in distributed optimization and machine learning? Do you want to develop novel distributed learning algorithms for multi-agent wireless networks that address key challenges such as privacy, resource constraints, and adversarial robustness? If so, we invite you to apply for a two-year postdoctoral position at the Department of Information and Communications Engineering (DICE), Aalto University, Helsinki, Finland.

The position is part of the project PLEDGE: Personalized Online Learning on the Edge in IoT/CPS, funded by the Research Council of Finland (2023-2027).

About the Project
The PLEDGE project develops theoretical foundations and algorithms for distributed and federated learning in large-scale, multi-agent networks, such as the internet of things (IoT) and cyber-physical systems (CPS). These systems require scalable and efficient learning methods that can function under limited communication, computation, and energy constraints while ensuring privacy and security from adversarial manipulation. The project focuses on decentralized optimization techniques that can accommodate heterogeneous and intermittent data availability, addressing challenges such as asynchronous updates, Byzantine resilience, and privacy-aware learning mechanisms, including differential privacy and secure aggregation.

The research focuses on theoretical advancements, emphasizing algorithmic analysis, convergence guarantees, and mathematical models for distributed learning. While the primary focus is on developing rigorous optimization frameworks, methods will also be applied to real-world scenarios relevant to IoT and wireless networks. The project involves international collaboration with leading institutions, offering opportunities for research visits and joint projects.

Your role and goals
As a postdoctoral researcher in PLEDGE, you will work at the intersection of distributed learning, optimization, and wireless systems, focusing on developing efficient decentralized learning algorithms. Your research will involve designing scalable optimization methods that ensure robust performance under communication and computational resources constraints. A major focus will be developing theoretical foundations for federated and decentralized learning, including the mathematical analysis of privacy-preserving mechanisms and adversarial robustness. The position provides an opportunity to contribute to the fundamental understanding of decentralized decision-making and optimization in multi-

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agent environments, emphasizing provable guarantees and rigorous analysis.

The role will require independent research and collaboration with faculty and Ph.D. students at Aalto University and international partners. While the research is largely theoretical, concepts relevant to distributed and edge-based learning in wireless networks will be evaluated in practical settings.

Your experience and ambition
We are looking for a highly motivated and skilled researcher with a strong background in optimization, machine learning, and distributed algorithms. Candidates should have expertise in mathematical optimization, statistical learning, or decentralized computation, with a demonstrated ability to develop and analyze provable guarantees for distributed learning methods. A Ph.D. in Electrical Engineering, Computer Science, Mathematics, or a related field, along with a strong track record of high-quality research, is required.

Your expertise should be demonstrated through high-impact publications, including at least one IEEE Transactions paper or an equivalent publication in a top-tier ML venue such as ICML, NeurIPS, or ICLR. A solid foundation in mathematical modeling, algorithmic analysis, and privacy-preserving methods is expected. Strong programming and numerical optimization skills and fluency in written and spoken English are essential. A proactive and collaborative attitude and excellent communication skills will be key to successfully contributing to the research team.

In summary, the ideal candidate has: * A Ph.D. degree in Information and Communications Engineering, Electrical Engineering, Computer Science, Mathematics, or a related field. * A strong research background with expertise in at least one or more of the following areas: mathematical optimization, statistical machine learning, distributed machine learning, or applied mathematics. * A proven track record of academic excellence demonstrated through high-quality research publications, including at least one IEEE Transactions paper or an equivalent publication in a top-tier ML venue. * Strong mathematical and programming skills, with experience in numerical optimization and algorithm development. * A collaborative and proactive attitude, with excellent communication and problem-solving skills. * Fluency in written and spoken English.

Don't miss out on this exciting opportunity - apply now! The best-qualified candidates will be invited for an interview.

What we offer
The expected starting salary is approximately 4000€/month, depending on experience and qualifications. The contract includes occupational health care services, and Finland has a comprehensive social security system. As an employer, Aalto University provides excellent learning

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and development opportunities, and a commuter ticket benefit. Unisport offers versatile sports facilities and exercise services with a staff discount.

Discover exciting possibilities at DICE, the Department of Information and Communication Engineering. Engage in world-class research across various ICT aspects. Collaborate with esteemed scholars, including several IEEE Fellows, and thrive in our dynamic, interdisciplinary environment. As a postdoctoral researcher, gain advanced training, develop essential skills, and present groundbreaking findings at conferences. Elevate your career and make a lasting impact in the realm of ICT. Join us for a rewarding and transformative journey of research excellence.

At Aalto University, we foster an inspiring and purposeful environment, shaping a sustainable future through research-based knowledge, creativity, and an entrepreneurial mindset. Our inclusive culture, guided by the values of responsibility, courage, and collaboration, promotes equality and curiosity, driving innovation and collaboration. As a postdoctoral researcher at Aalto, you'll have a meaningful role, making a true impact on our University's success and society's well-being. We provide comprehensive support and coaching to help you thrive, empowering your growth and continuous learning. You'll have numerous opportunities for professional development, actively participating in training projects aligned with your interests and needs. Our flexible working culture prioritizes work-life balance and overall well-being.

We work in a hybrid way, and the primary workplace is Otaniemi, Espoo. The Otaniemi campus is a thriving and connected community of 100 nationalities, 13,000 students, and 4,500 employees. Life at the transformed campus is vibrant and filled with amazing architecture, calming nature, and a variety of cafes, restaurants, services, and good connections along the metro line.

Join us!
To apply, please share the following application materials with us through our recruitment site ("Apply now!”): * Letter of motivation expressing your interest in the postdoctoral position and highlighting your relevant expertise * CV outlining your academic background, research experience, and publications * A copy of the Ph.D. thesis (or a link) * Degree certificates and academic transcripts * Contact details of at least two referees

Join us in shaping the future of personalized online machine learning in wireless networks. Apply now to propel your research career to new heights at Aalto University! Please apply as soon as possible, at the latest March 11th, 2025. For further inquiries, please contact: Adjunct Prof. Stefan Werner ([url=mailto:stefan.werner@aalto.fi]stefan.werner@aalto.fi). In recruitment process relating questions, please contact: HR Advisor Monika Mäkinen ([url=mailto:hr-elec@aalto.fi]hr-elec@aalto.fi). We will go through applications, and we may invite suitable candidates to interview

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already during the application period. Aalto University reserves the right for justified reasons to leave the position open, to extend the application period, reopen the application process, and to consider candidates who have not submitted applications during the application period.

Please note: Aalto University’s employees and visitors should apply for the position via our internal system Workday à 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) email.

About Finland
Finland is a great place for living with or without family - it is a safe, politically stable and well-organized Nordic society. Finland is consistently ranked high in quality of life and was just listed again as the happiest country in the world: [url=https://worldhappiness.report/news/its-a-three-peat-finland-keeps-top-spot-as-happiest-country-in-world/]https://worldhappiness.report/news/its-a-three-peat-finland-keeps-top-spot-as-happiest-country-in-world/.

Contact Information

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

Contact

Finland