2025 Summer Jobs at the Department of Information and Communications Engineering
Aalto University

Job Title	2025 Summer Jobs at the Department of Information and Communications Engineering
Department	T412 Department of Information and Communications Engineering
Institution	Aalto University , , Finland
Date Posted	Jan. 23, 2025
Application Deadline	Open until filled
Position Start Date	Available immediately
Job Categories	Graduate Student
Academic Field(s)	Electrical and/or Electronics Computer Science
Job Website	https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/XMLNAME-2025-Summer-Jobs-at-the-Department-of-Information-and-Communications-Engineering_R42038-1
Apply By Email	

Job Description

The Department of Information and Communications Engineering (DICE) is now looking for Bachelor or Master students for several

SUMMER JOB POSITIONS

How to apply?

Please submit your application through our recruitment system by using the "Apply” link on this

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page.

If you are currently employed by Aalto University: Please submit your application directly in the Workday system, using your existing user account (by writing “Find jobs” in the Workday search field).

Please include the following documents in your application: * CV * Application letter - please include a brief introduction of yourself and preferred start and end dates for employment * Transcript of study records

You can apply for min. 1 and max. 3 of the open positions. You will be asked to prioritize your choices, using the position codes. You will find each position code after the name of the position in the list below - please remember your choices when you move forward with your application.

Depending on the position, the summer job can last for max. 4 months and is carried out between May and September 2025. Please note that these positions are available for Bachelor and Master level students only. The salary will be 2125 €-2500 € per month depending on the level of education. Since our research groups are highly international, good English skills are required.

If you are interested in any of the positions, we are really looking forward to hearing from you - please submit your application as soon as possible, but latest on 28.02.2025. We will start reviewing candidates immediately, and the positions will be filled as soon as suitable candidates are found. Aalto University reserves the right for justified reasons to leave the positions open, to extend the application period and to consider candidates who have submitted their application outside the application period.

In any recruitment process related questions, please contact HR Advisor Hanna Koli (hr-elec@aalto.fi) including “DICE Summer Jobs 2025” in the email title. In case of questions regarding a specific position, please contact the marked academic personnel.

Please find detailed descriptions of our open positions below:

Improving software radio transceiver for SDR course and converting the course material to web environment [DICESUMMER 01_RUTTIK]

In this summer work, we are looking for a candidate who helps to create laboratory works measurement system using software radio transceiver for software defined radio course. That contain of helping to convert the course material to a web based environment and developing new medium access control related exercise. In the latter part your work will be to create medium access control functionality in C/C++ for real hardware platform and laboratory work exercises around it. We

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would also like to explore how the machine learning/AI radio receiver algorithms can be implemented and integrated into course content. This summer job is a good possibility to learn basics of software defined radio and how it is programmed. This position is applicable both for B.Sc. and M.Sc. level students.

For more information, please contact Senior University Lecturer Kalle Ruttik, [url=mailto:kalle.ruttik@aalto.fi]kalle.ruttik@aalto.fi

Automatic speech recognition [DICESUMMER 02_KURIMO]

Good skills in Python, machine learning and mathematics are required. Speech and language processing, experience with LLMs and particularly a success in Aalto's speech recognition course are merits.

The student will work on experimenting new speech and language modeling methods that aim to improve the performance of the current speech recognition architectures and applications.

Only BSc and MSc students at Aalto University who could in future do their MSc thesis in this area at Aalto will be taken for this project.

For more information, please contact Prof. Mikko Kurimo, [url=mailto:mikko.kurimo@aalto.fi]mikko.kurimo@aalto.fi

Backscatter communications - Devices and antennas [DICESUMMER 03_JÄNTTI]

Backscatter communications enable ultra-low-power wireless data transmission by reflecting ambient radio waves and modulating them with information, removing the need for a dedicated transmission power source. We are seeking enthusiastic B.Sc. or M.Sc. students to work on backscatter device development and performance measurements. Students with an interest in printed electronics, RF design, embedded systems, or software-defined radio implementation are encouraged to apply. Familiarity with topics such as electromagnetics, materials science, or embedded programming is a plus but not essential, as we will provide training on the required skills.

For more information, please contact Senior University Lecturer Kalle Ruttik, [url=mailto:kalle.ruttik@aalto.fi]kalle.ruttik@aalto.fi or Prof. Riku Jäntti, [url=mailto:riku.jantti@aalto.fi]riku.jantti@aalto.fi

Developing Internet Traffic Measurement and Analysis Course [DICESUMMER 04_PEUHKURI]

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Internet Traffic Measurement and Analysis course (ELEC-E7131) is one of courses where students are handed large, real-world size volumes of data (hundreds of gigabytes) to be work on. Based on the course feedback, there has been a steep learning curve to many if tools are not familiar to start with. You can help them to avoid BDS! (Big Data Shock)

The course assignments have been extended in 2024 to include also measurements within Aalto's 5G network. These tasks can be developed further to provide more comprehensive approach for mobile data measurements.

In addition, other course assignments can be improved, including developing and/or finding introductory material and study different tools (e.g. python, R). One topic to explore would be introduction material (written or screencasts) for many tools used in the course as many have their first experience from those.

Ideally, the applicant is a master's student who has taken the course, has experience on big data analysis, knows his/her way around Linux and can write clear instructive texts. Most importantly one can think outside of existing box.

For more information, please contact Markus Peuhkuri,
[url=mailto:markus.peuhkuri@aalto.fi]markus.peuhkuri@aalto.fi

Optimization of Reinforcement Learning Agents for Design [DICESUMMER 05_OULASVIRTA]

We invite master's students to join our summer internship, focused on optimizing Reinforcement Learning (RL) agents for interface design through Computational Rationality [1]. You'll work on developing a robust, user-friendly system architecture that streamlines frontend, backend, and database communication for efficient optimization processes [2].

Your responsibilities will include refining the backend to manage complex RL-agent interactions, optimizing API performance, and enhancing our browser-based frontend to provide clear and intuitive feedback on trials and parameters. Additionally, you'll play a key role in experimenting with a new optimizer based on Transformers and Large Language Models, integrating cutting-edge AI capabilities into our optimization framework.

Required Skills: * Proficiency in Python, backend frameworks (e.g., Flask, FastAPI), and frontend development (e.g., JavaScript, React). * Experience with database management and optimization (e.g., SQL, ORM tools). * Background in Machine Learning, with knowledge of RL and optimization methods. * Familiarity with Transformers and Large Language Models (LLMs) is a plus.

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This is an exciting opportunity to advance your skills in AI and software engineering while contributing to innovative design optimization solutions.

For more information, please contact Francisco E. Fernandes Jr., [url=mailto:francisco.fernandesjunior@aalto.fi]francisco.fernandesjunior@aalto.fi

References:
[1] S. Chandramouli et al., “A Workflow for Building Computationally Rational Models of Human Behavior,” Comput Brain Behav, vol. 7, no. 3, pp. 399-419, Sep. 2024, doi: 10.1007/s42113-024-00208-6.
[2] F. E. Fernandes Junior and A. Oulasvirta, “AgentForge: A Flexible Low-Code Platform for Reinforcement Learning Agent Design,” Oct. 25, 2024, arXiv: arXiv:2410.19528. Accessed: Oct. 28, 2024. [Online]. Available: http://arxiv.org/abs/2410.19528

Simulator-based computational design [DICESUMMER 06_OULASVIRTA]

Want to be part of the next generation of human-centered technology? Simulation-based methods offer a radical paradigm shift in the design of human-centered technology [1]. Before conducting empirical studies with human participants, designs can be tested and optimized in simulators. Simulations can be used to predict task performance, identify unsafe conditions, optimize interfaces and working environments, train collaborative robots, and more. While companies like Kone [2] and Meta [3] already use simulation to develop products, HCI education has been lagging behind. The ambitious goal of this project is to create a new simulator-based learning environment for the Computational Design & Interaction course. Working with the course instructors, your task will be to help set up Python scripts and notebooks for targeted exercises in the course.

Requirements: * Strong Python programming skills * Some machine learning skills * Familiarity with simulator software or game engines, such as (but not limited to) MujoCo, Habitat, Carla, IsaacGym, or Unity * Interest toward HCI education

For more information, please contact Prof. Antti Oulasvirta, [url=mailto:antti.oulasvirta@aalto.fi]antti.oulasvirta@aalto.fi

[1] https://dl.acm.org/doi/pdf/10.1145/3564038
[2] https://www.kone.com/en/products-and-services/people-flow-experience.aspx
[3] https://aihabitat.org/habitat3/

Simulating human behaviour in traffic [DICESUMMER 07_OULASVIRTA]

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Recently, autonomous driving technology has become increasingly popular. However, most autonomous driving models primarily focus on drivers, surrounding vehicles, and the overall road environment factors that are relatively predictable. They struggle to deal with pedestrians, who represent a highly unpredictable element along with their real-world behaviors.

This project aims to leverage computational rationality, reinforcement learning, and computer vision to develop a more realistic and accurate pedestrian behavior model in traffic, providing valuable insights for future autonomous driving and traffic design.

Requirements:(Even if you are interested in this project and don’t fulfill all requirements , we also encourage you to apply for it.) * Knowledge in reinforcement learning, machine learning, computer vision and human computer interaction.. * Proficiency in Python and Pytorch programming. * Familiarity with carla or scenic.

For more information, please contact Ruofeng Wang,
[url=mailto:ruofeng.wang@aalto.fi]ruofeng.wang@aalto.fi

Some references could let you know more about this project.
[1]Oulasvirta, Antti, Jussi PP Jokinen, and Andrew Howes. "Computational rationality as a theory of interaction." Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems. 2022.
[2]Wang, Yueyang, et al. "Pedestrian crossing decisions can be explained by bounded optimal decision-making under noisy visual perception." arXiv preprint arXiv:2402.04370 (2024).

Renewing the Laboratory Course in Networking and Cloud Technologies [DICESUMMER 08_PEUHKURI]

Student laboratory at DICE provides opportunities for students to have their hands dirty with real networking hardware. To get the best learning opportunities for our students, we both develop new tasks and improve existing ones. We would like you to be a master’s student and have a good knowledge of networking technology (at least courses ELEC-E7310, ELEC-C7240 or equivalent knowledge). You should be able to work with real and virtual devices (routers, other network devices, Linux, FreeBSD, Windows) and produce good documentation. Previous experience of laboratory courses ELEC-E7330/ELEC-E7331 and different cloud technologies are also valued highly.

Last academic year (2023-2024) Laboratory Course in Networking and Cloud Technologies was among the best 10 master courses at ELEC, welcome aboard to make the course even better! And more importantly, this is a great opportunity to show your skills and extend your knowledge in the area

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of networking!

For more information, please contact Markus Peuhkuri,
[url=mailto:markus.peuhkuri@aalto.fi]markus.peuhkuri@aalto.fi

Developing a laboratory work for the radio communication laboratory works [DICESUMMER 09_RUTTIK]

In this summer work your task is to develop new laboratory works for radio communication. Our intention is to update the laboratory work about remote control of measurement equipment and to develop new laboratory work about spectrum usage measurement. The work contains developing the measurement system, testing the setup and writing measurement instructions together with the background information. Currently the laboratory works cover various subjects, like measurements of WLAN link, measurement of synchronous serial protocol, channel measurements with channel simulator and over the air, development of physical layer protocol and measurement system. Detailed tasks can be adapted for a suitable candidate. This position is applicable both for B.Sc. and M.Sc. level students.

For more information, please contact Senior University Lecturer Kalle Ruttik,
[url=mailto:kalle.ruttik@aalto.fi]kalle.ruttik@aalto.fi

Simulation and Visualization of Networked Systems: Game of Random Access [DICESUMMER 10_MÄHÖNEN]

In this project, you will develop and integrate software to simulate and visualize some of the key ingredients of modern communications networking. Depending on your background and interests, you can focus on:

a) Developing a simulation and visualisation capabilities for selected Medium Access Control (MAC) algorithms and protocols. The protocols could be, for example, different CSMA and S-ALOHA methods and may include various extended effect (e.g. the so called capture effect). The topic is particularly suitable for a student in B.Sc (or M.Sc.) program, who has passed the Computer Networks (Tietokoneverkot) course.

b) Developing a simulation and visualisation tool that can be used to study different game theoretical concepts, particularly in the context of communications engineering. Time permitting work would also include the simulation capability to generate and study different network topologies, e.g. small-world networks, and their integration into games-over-networks concepts. The theme would be best suited

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for a M.Sc. student, particularly one who has passed Networked Systems course, or similar.

The tools are planned to support our teaching, but they should be developed in such a way that they could also be used as research tools. The precise tools, topics, and goals will be discussed in the beginning, and the summer student’s interests will be taken into account, too.

For more information, please contact Prof. Petri Mähönen, [url=mailto:petri.mahonen@aalto.fi]petri.mahonen@aalto.fi or University Lecturer Pasi Sarolahti, [url=mailto:pasi.sarolahti@aalto.fi]pasi.sarolahti@aalto.fi

Simulation environment development for 5G and O-RAN [DICESUMMER 11_MÄHÖNEN]

In this work you will support our ongoing research on next generation wireless networks by studying and further developing NS-3 simulation extensions for 5G networks and Open Radio Access Network (O-RAN) system. Your tasks include getting familiar with the existing implementations, and then setting up an easy-to-use and automated simulation environment to support our research and teaching activities. Of particular focus are the building framework for realistic simulation workloads to support our research, particularly on multipath network scenarios for wireless devices. You will also develop solutions for analysis and visualization of simulation results. You should be familiar with C++ and Python programming. Familiarity with Linux (especially networking) and containerization and virtualization technologies (e.g. Docker) will be helpful in this work. The specific scope of work can be agreed based on your interests and skills. This position will be an excellent opportunity to learn about state-of-the-art network simulation and emulation development and modern wireless network technologies.

The work can be easily extended (in the future) to include use of the developed NS-3 extension in conjunction of Aalto University’s live 5G cellular network.

For more information, please contact University Lecturer Pasi Sarolahti, [url=mailto:pasi.sarolahti@aalto.fi]pasi.sarolahti@aalto.fi or Prof. Petri Mähönen, [url=mailto:petri.mahonen@aalto.fi]petri.mahonen@aalto.fi

Improving online material for Advanced Networks course [DICESUMMER 12_SAROLAHTI]

Advanced Networking (ELEC-E7321) is a new course focusing on computer networks on the Internet. The course consists of hands-on programming and experimentation exercises that are done in Mininet network emulator in Linux system. We are in progress of implementing open access network materials for the course, as currently available at https://pasisa.github.io/AdvancedNetworking/ . The material is

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currently quite rough and static and would need technical improvements for more modern style and better usability with better user interaction. One part of this job is to implement improvements on the web presentation of the course.

The Mininet emulator is a useful tool for protocol development and testing in different network scenarios. Unfortunately, it is not actively maintained and has some outdated components. The second part of this job is therefore to do a thorough update on Mininet in such way that it better supports the purposes of this course and runs more robustly in different system installations.

For the first part, we would expect you to have some experience in web development, for example implementing different web styles and JavaScript. The second part requires knowledge of Python and Linux networking tools. The course exercises use Rust, or optionally C or C++. The balance between these two tasks, and other specifics can be negotiated based on your skills and interests. Ideally, if you have knowledge of all the mentioned technologies you are likely to be a strong candidate.

For more information, please contact University Lecturer Pasi Sarolahti,
[url=mailto:pasi.sarolahti@aalto.fi]pasi.sarolahti@aalto.fi

Trustworthy speech interfaces [DICESUMMER 13_BÄCKSTRÖM]

We collaborate with the city of Espoo, researching how speech interfaces and chatbots can be used at the service desk for migrants. The key questions are how such digital services can be designed to be objectively trustworthy and whether migrants subjectively feel that the service can be trusted. The two interns will study speech interfaces from an LLM or user-interface design point-of-view. Possible specific projects include 1. quantifying the objective accuracy of LLM answers, 2. designing LLM-based user interfaces for natural speech interaction, 3. User-Centred Design for AI Summaries, and 4. Privacy-Preserving Data Collection and Analysis in AI Systems.

The two positions are for a duration of maximum of 4 months, and both must finish by 31.8.2025 at the latest.

Alternatively, the topics can be merged into a single master’s thesis of 6 months (starting ASAP).

For more information, please contact Prof. Tom Bäckström,
[url=mailto:tom.backstrom@aalto.fi]tom.backstrom@aalto.fi

More about Aalto University:
[url=https://www.aalto.fi/en/open-positions]Aalto.fi

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[url=https://www.youtube.com/user/aaltouniversity]

Contact Information

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

Contact

Finland