

Elite Summer School Advanced Technologies for Designing Robotics Systems

We are inviting 50 elite robotic students from around the world to participate in this exclusive, life changing international summer school at University of Southern Denmark in advanced technologies for designing robotic systems for specific applications.

Join the best and brightest students from 5 world-leading robotics hubs from 28 July – 13 August 2021 in Odense, Denmark and expand your international outlook and build a valuable international network to elite students from prestigious universities around the world.

Denmark is a world leader in collaborative robots

Denmark's robotics and automation industry has grown significantly in recent years and is now home to global market leaders and high-growth start-ups such as Universal Robots, Mobile Industrial Robots and Blue Ocean Robotics. Currently 50+ robotics companies are centered in the hub surrounding the University of Southern Denmark and the city of Odense and are the result of nearly 30 years of dedicated research.

Denmark's global stronghold is shaped by its leading role within collaborative robots, mobile robots, food automation and professional service robots. With many high-growth, innovative startups, Denmark is internationally renowned for developing and commercialising new technologies.

Find more information about the Danish Robotics Industry here: [Forside - Odense Robotics](#)

Why should I attend the Summer School

- ✓ You will learn how to design a robotic system for a given task and will provide first-hand experience with building robotics systems for real applications.
- ✓ You will obtain deep knowledge of state-of-the-art technologies such as modelling, digital twins and simulation, computer vision, force based control and human-robot interaction.
- ✓ You will be taught in world class laboratories at the faculty of Engineering at the University of Southern Denmark
- ✓ You will expand your international network to elite students from prestigious universities around the world.
- ✓ You will be staying centrally in the City of Odense at City Hotel (<https://www.cityhotelnattergalen.dk/>) allowing you to explore the fairytale town city of Odense – the birthplace of Hans Christian Andersen and home to cobble stones, candy-colored cottages and a sprawling student life.
- ✓ You will be taken on trips around Denmark to explore the country and visit other universities with world class robotics laboratories.

What will you learn

The summer school will focus on **collaborative industrial robots** with special focus on advanced algorithms for mobile robots and robot manipulators, where Denmark has a special stronghold.

The overall goal is to enable the participants to design a robotic system for a given task. There will be a focus on industrial manufacturing tasks, but also tasks within service robotics and robotics for medical applications. Within each topic, participants are given exercises aimed at achieving hands-on experience with the technology.

During the summer school you will obtain knowledge of:

- Properties and types of virtual scenes
- Properties of digital twins
- Different kinds of simulations and simulation-based programming
- Algorithms for offline planning of collision-free and feasible robot motions
- Point-to-point robot planning algorithms
- Tool path planning in Cartesian space
- Offline programming
- The principles of robot kinematics and dynamics
- Approaches for programming by kinesthetic teaching
- Control techniques for selected processes
- Perceiving depth from space
- Object pose estimation and pose refinement
- The theory of Human-Robot-Interaction
- Multimodal Human-Robot Interaction
- Robotics for medical applications
- Clinical applications of medical robotics
- Collaborative robots and when to use them
- Challenges and opportunities for technology-based robotic startups

When you complete the summer school you will be able to:

- Create a digital twin and simulation setup, including creating a virtual scene for a given robotics problem
- Solve tasks involving motion planning and offline programming
- Solve tasks involving robot kinematics and dynamics, kinesthetic teaching and control techniques related to robotics
- Ability to solve 3D computer vision problems of pose estimation starting with the stereoscopic process
- Use multimodal Human Robotic Interaction in robotics application
- Design and build (part of) a robot system for a real-world robotics application using the technologies mentioned above.

Organisers

The summer school is developed by University of Southern Denmark (SDU), Aalborg University (AAU), and the Technical University of Denmark (DTU). SDU and the Danish Innovation Centres' in Silicon Valley, Boston, Munich, and Seoul will invite 50 elite robotic students from around the world to participate in this exclusive international summer school in Odense in advanced technologies for designing robotic systems for specific applications.

The summer school will be organized in close collaboration with some of the local robotics companies and students will be working on practical applications of robotics systems inspired by the challenges the industry face. The students will also visit some of the leading Danish robotics companies during the summer school.

World Renowned Lecturers

You will be taught by some of the world's leading scientists. The Summer School has been developed under the auspices of **Professor Henrik Gordon Pedersen**, who is Head of Unit at The Maersk Mc-Kinney Moller Institute and SDU Robotics and will be taught by the leading Danish scientist from University of Southern Denmark, DTU and AAU.

Professor Henrik Christensen, who is Director of the Contextual Robotics Institute at UC San Diego and the Qualcomm Chancellor's Chair of Robot Systems and **Professor Dr. Sami Haddadin**, who is the Director of the Munich School of Robotics and Machine Intelligence at the Technical University of Munich (TUM) and holds the Chair of Robotics Science and Systems Intelligence, are guest lecturers at the summer school.

Join exciting activities and trips

Summer School should also be fun, right? It is after all during the summer holidays. The summer school will allow you to experience the best of Denmark and get a glimpse of our rich culture, history and most impressive landmarks.

You will visit other parts of Denmark and other leading Danish universities during the first three days of the summer school (28-30 July 2021). Trips will include sightseeing in Odense, the Islands of Funen, Copenhagen and Northern Jutland. The visits will include visits to the Robotics Research Labs at the Technical University of Denmark (DTU) and University of Aalborg (AAU).

Denmark is a small country with a population of approximately 5,5 million. Denmark is a kingdom of thriving cities and idyllic landscapes; an innovative society with a green lifestyle. It is practically an island nation, as it consists of 406 islands (although only about 70 are populated). Even the capital Copenhagen is situated on an island. Nowhere in Denmark is more than 50 km from the sea. And just a few kilometres from Denmark's major cities of Aarhus and Copenhagen you find idyllic villages and pristine woodlands and lakes.

SDU is located in the City of Odense. Odense is a cultural and historical city with a long history. Hans Christian Andersen was born in Odense, and his lively imagination continues to inspire the city. In Odense you can go walking in H.C. Andersen's footsteps through the historic district and sense the life of the city 200 years ago.

Read more about Denmark at <https://www.visitdenmark.com/> and <https://www.visitodense.com/>

Target Group

The summer school is targeted at top performing senior students from the leading Danish universities and UC San Diego, UC Berkeley, University of Southern California, MIT, Harvard University, Northeastern University, Seoul National University (SNU), Korea Advanced Institute of Science and Technology (KAIST) and The Technical University of Munich (TUM).

50 students will attend the summer school each year. 25 Danish students and 25 international students.

The participating students will become part of an exclusive network of elite students from the leading collaborative robot hubs around the world.

Scholarship

The summer school is fully funded by the Danish Ministry of Higher Education and Science, Odense Municipality as well as private partners. Tuition, airfare and accommodation for the international students from the target universities will be covered by Innovation Centre Denmark and the partners.

Life in Denmark

The Danes are known to consistently be ranked as the happiest people on the planet. A cornerstone in the Danish welfare system are free and equal rights to benefits such as healthcare and education for all citizens. The strong welfare state ensures economic equality in society and virtually no corruption and low crime rates.

Free education for all is a key priority in Denmark in order to ensure growth, welfare and competitiveness. Combining high academic standards with innovative learning approaches, Danish institutions are preparing their students to play an active role in today's globalised knowledge-based world.

If a good work-life balance is important to you, you should really consider coming to Denmark to study and work, because Denmark has one of the best work-life balances in the world!

A standard working week consists of 37 hours working week. Flexible working hours are common, since the majority of both men and women work.

Parents have the right to 52 weeks leave with maternity subsistence allowance, of which 36 weeks can be divided between the mother and the father according to individual wishes.

See more at <https://studyindenmark.dk/why-denmark/quality-of-life-1>

Practical details

The summer school will take place each year in August at the University of Southern Denmark in the city of Odense with support from the Danish Ministry of Higher Education, Odense Municipality as well as private partners.

This year the summer school will take place from 28 July – 13 August 2021. All teaching will be in-person and in English.

The summer school will give the participants five ECTS-points.

Arrival and departure

For international students the easiest travel arrangements will be to fly into Copenhagen Airport. Currently, you will need to be tested for Covid-19 before arriving in Denmark and before leaving the airport. The rules are subject to change.

From Copenhagen airport you will need to take the train or rent a car to get to Odense. Travel cost in Denmark is not covered by the scholarship. All students will need to arrive in Odense on the morning of Wednesday July 28. Find more information about travelling by train from Copenhagen Airport to Odense here: [DSB Train | Discover Denmark by train](#)

Currently international travelers from select countries need to quarantine upon arrival in Denmark for 5 days. If this is still the case in August, students' needs to quarantine before the summer school starts.

Covid-19 restrictions

The Danish Government has a set of rules and regulations governing entry into Denmark and how and when negative COVID tests are required. Note that there may also be recommendations from your own country about travel to Denmark that you need to know.

Currently, Danish citizens have a 'corona passport' system, where they can access cafes, restaurants and cultural offerings if they can show that they have had a negative corona test in the past 72 hours or have been vaccinated.

There may be different restrictions in place in different parts of Denmark, so check before travel in case they affect your trip. People are expected to keep their distance from each other, and face masks are mandatory in all indoor public spaces, including shops.

It is your responsibility to keep up to date with the latest travel guidelines and to make sure you follow them. Visit the Coronasmitte website (<https://en.coronasmitte.dk/>) to understand the guidelines for travelers and what you need to bring.

How to apply

For more information or questions please contact research attaché Ulrik Kjølsten Olsen, Innovation Centre Denmark, Munich at ulkjol@um.dk.

Students from the target universities should submit the following information to Ulrik Kjølsten Olsen to apply:

- Letter of Motivation
- Academic Transcript
- CV

The application process is competitive and participation is capped at 25 international and 25 Danish students.