Engineering Doctorate programmes

4TU.SAI

TU Delft Delft University of Technology

TU/e Eindhoven University of Technology

University of Twente.

Wageningen University & Research

4TU.School for Technological Design STAN ACKERMANS INSTITUTE

"The programme's structure, including three shorter projects and a 10-month final project, appealed to me as a professional wanting to stay closely connected to industry."

Bilguun Bayarsaikhan

'I first heard about the EngD program at TU/e casually, but it wasn't until I researched extensively and spoke with alumni that I realized its potential to advance my career. The program's structure, including three shorter projects and a 10-month final project, appealed to me as a professional wanting to stay closely connected to industry. Through TU/e's Software Technology management, I secured a project with ASML, designing a new conditional diagnostics solution for their metrology machines. This hands-on experience, similar to using ring buffer logging for bug detection, has been invaluable in bridging theory with practice.

The support from TU/e's faculty and the collaborative environment have been outstanding, enhancing my skills and networking opportunities. I plan to stay and work in the Netherlands post-EngD to further apply my newfound expertise. For prospective EngD candidates, I recommend planning ahead and seizing every opportunity. The EngD program at TU/e has been transformative, equipping me with the tools and confidence to tackle complex engineering challenges.'

ENGD PROGRAM
Software Technology (ST)

PROJECT
Design of a new conditional diagnostics solution for ASML's metrology machines

Are you ready?

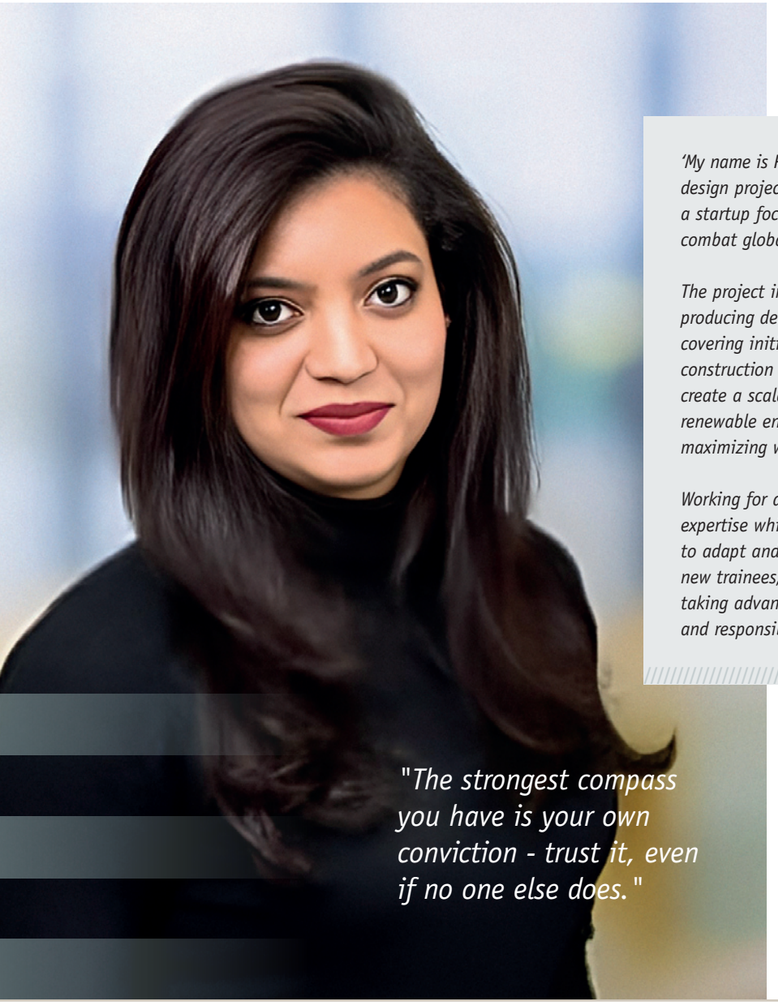
The two-year post-MSc programmes of 4TU.School for Technological Design, Stan Ackermans Institute, can become your passport to a faster successful career in industry or business. This passport is the degree Engineering Doctorate (EngD) which you will be awarded upon the successful completion of the programme.

Innovation is the driving force behind the high-tech industry. Close collaboration between industry and universities is crucial for innovation. For this we need excellent engineers.
Our technological designer programmes train the most talented master graduates, engineers who want to further develop their skills in the field of technological design and who want to contribute to the needs of the high-tech industry by developing innovative solutions.

As you become an employee of one of our universities of technology in the Netherlands or will be employed by the company, you combine learning and earning throughout the programme. During the design project, which is done in and for industry and often takes place in the second year, you demonstrate your ability to apply your theoretical knowledge in solving a real-life, complex design problem. Many of our graduated EngD trainees joined the company where they carried out their design assignment and now fulfill management positions.

Are you ready to join our EngD community and boost your career?

Prof.dr Paul Koenraad
Director 4TU.School for Technological Design,
Stan Ackermans Institute



Poonam Ghodke

'My name is Poonam Ghodke, and as part of my EngD individual design project, I am collaborating with Rainmaker Holland B.V., a startup focused on innovative desalination solutions to combat global water scarcity.

The project involves designing an energy-efficient system for producing demineralized water for industrial and potable uses, covering initial system modelling, design optimization and the construction of a functional prototype. The ultimate goal is to create a scalable, sustainable solution with the integration of renewable energy that minimizes energy consumption while maximizing water output.

Working for a startup has allowed me to develop technical expertise while fostering an entrepreneurial mindset, learning to adapt and innovate in a fast-paced environment. For the new trainees, I'd suggest embracing the learning curve and taking advantage of the opportunity to explore multiple roles and responsibilities.'

ENGD PROGRAM
Process and Equipment Design (PED)

PROJECT
Advanced Demineralized Water Solutions: Innovative Desalination Modules for High-Purity Water for Rainmaker Holland B.V

4TU.School for Technological Design, Stan Ackermans Institute

As part of their increasing intensive cooperation, the Dutch universities of technology decided in 2006 to combine their technological designer programmes in the 4TU.School for Technological Design, Stan Ackermans Institute.

4TU technological designer programmes

The 4TU technological designer programmes offer you an opportunity to enhance your expertise and project management skills with an extensive hands-on assignment, supervised by experienced professionals. Each of the 19 programmes covers a different technological field, for example managing complex architectural construction projects, designing efficient and effective maintenance processes from a multi-disciplinary perspective, developing high-tech software systems for software-intensive systems. The focus of each programme is described further on in this brochure.

Engineering Doctorate

The two-year, full-time programmes all lead to an Engineering Docorate (EngD) degree. If you are accepted into one of the programmes, you are appointed as a trainee for the duration of two years and will receive a salary. Nearly all technological designer programmes are taught in English (exceptions: QME and CI). The structure of all programmes is basically the same: during the education part of the programme you gain extensive knowledge and experience of the latest design methods and their applications. You also learn to work in inter-disciplinary teams and further develop your professional skills. You apply what you have learned during the design project of the programme, when you design an innovative industrial product or process for one of many prominent high-tech or healthcare companies. The close cooperation between these companies and the technological designer programmes offers exciting career opportunities.

Professor Stan Ackermans, PhD

Professor Stan Ackermans, PhD, (1936-1995), professor and rector at TU/e, championed the introduction of the design educational programmes. Following his death, the institute was renamed Stan Ackermans Institute in his honor. Since 2006 it's called 4TU.School for Technological Design, Stan Ackermans Institute.

Boost your career!

Are you a graduated young professional or currently completing your Master of Science programme at a university (of technology)? Are you looking for an even faster successful career in industry or business? Then you should consider applying to one of our 2-year training programmes (with salary) and become a technological designer at the 4TU.School for Technological Design, Stan Ackermans Institute. You can choose from 19 different EngD programmes.

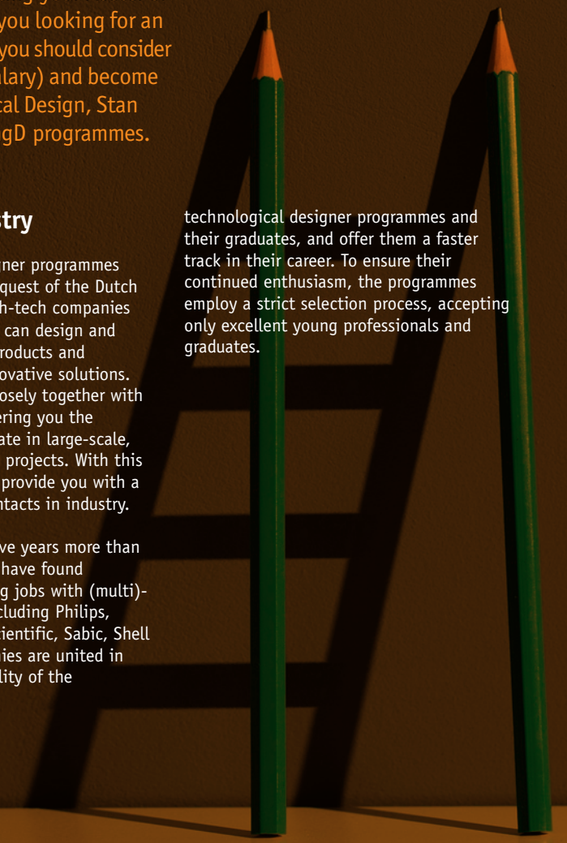
Two-year programmes

The four Dutch universities of technology - TU Delft, Eindhoven University of Technology, University of Twente and Wageningen University & & Research, as well as University of Groningen - offer a total of 19 two-year programmes that will put you on a faster track to a successful career in industry. In addition to broadening your technological expertise, you will gain more professional skills that will enhance your career opportunities. It is a paid position; usually you become an employee of the university. Industry offers graduated designers from our programmes excellent jobs, because of the strong reputation of our graduates.

High-tech industry

The technological designer programmes were initiated at the request of the Dutch high-tech industry. High-tech companies need professionals who can design and develop complex new products and processes and offer innovative solutions. All programmes work closely together with high-tech industry, offering you the opportunity to participate in large-scale, interdisciplinary design projects. With this unique cooperation we provide you with a valuable network of contacts in industry.

Over the past twenty-five years more than 4,500 of our graduates have found challenging and exciting jobs with (multi)-national companies, including Philips, ASML, Thermo Fisher Scientific, Sabic, Shell and TNO. These companies are united in their praise for the quality of the technological designer programmes and their graduates, and offer them a faster track in their career. To ensure their continued enthusiasm, the programmes employ a strict selection process, accepting only excellent young professionals and graduates.



Programs and tracks

TU Delft

Civil and Environmental Engineering (CEE)

Track: Sanitary & Environmental Engineering (SEE)
Sanitary & Environmental Engineering focuses on water management challenges related to, amongst others, water collection and conveyance, water treatment, and resource recovery from watery streams and sludges.

Track: Structural & Railway Engineering (SRE)
The section of Railway Engineering deals with the physical assets of the railway system, including track, embankment, rolling stock and catenary, as well as the interfaces and dynamic interactions between them. The research, innovation, development and education of the section concern the whole life cycle of the assets, from design, construction, degradation, monitoring, maintenance to retrofit, as well as the data-driven intelligent management of the assets, taking into consideration of the performance of the whole railway system.

Track: Subsurface Construction & Engineering (SCE)
Subsurface Engineering focuses on every aspect concerning the use of underground space. This includes infrastructure for traffic as well as utility systems, underground storage, multiple use of land and space, safety, legal aspects, trenchless technologies for the construction of utility systems and various building techniques (for example boring techniques, immersed tubes and trenchless techniques).

Designer in Bioprocess Engineering (BPE)

The two-year Designer in Bioprocess Engineering programme develops MSc graduates in (Bio-) chemical Engineering or related academic backgrounds into multidisciplinary specialists with a strong background in Biosciences and Engineering subjects required for innovative bioprocess design, in preparation for their career in the industry. In this way, students can boost their career by following deepening and broadening courses in the area of bioprocess design in close relation to industry. As a result, the EngD trainees become a valuable asset for biotech industry by translating academic knowledge into industrial application.

Process & Equipment Design (PED)

The PED programme trains MSc graduates to become qualified designers capable of designing 'fit for purpose' and 'first of a kind' sustainable (chemical) products, processes, equipment and systems. These innovations are of high demand in the chemical, energy, food, health and wider industries for the energy transition, circular chemistry, and novel food and health products. Industrial partners co-operate with this EngD programme by providing real-life challenges that will be addressed by the EngD trainees supported by TU Delft scientific and design experts. The EngD trainees are trained to apply appropriate design methodologies and tools, in an international setting, and with ample attention for developing their business, personal and teamworking skills.

Eindhoven University of Technology

Automotive Systems Design (ASD) / Mechatronic Systems Design (MSD)

ASD focuses on systems architecture and design for modern high-tech automotive systems in the context of Smart and Sustainable Mobility. The programme aims at a systems approach to problems around mobility and fuel efficient automotive systems, including communication systems and electrical driving, with emphasis on the multidisciplinary design aspects of project based research and engineering and the challenges that are faced by the automotive industry.

The MSD programme aims at system synthesis and design of complex equipment, instruments, robotic and manufacturing systems and systems-of-systems, by combining in-depth understanding of the classical engineering fields, with multi-disciplinary, model-based systems engineering to conceive, predict and verify cutting-edge system functionalities and architecture. The programme is closely connected to the TU/e High Tech Systems Center. Officially, MSD is positioned as a sub-track of ASD. After success-fully completing the programme, you will receive

a diploma of ASD mentioning that you specialized in MSD.

Clinical Informatics (CI)

The Clinical Informatics programme is geared towards the design and implementation of information systems in healthcare. IT knowledge, but also knowledge of clinical and business processes is crucial to the design of optimal solutions, which really support the professionals in healthcare. The programme is provided by the School of Medical Physics and Engineering (SMPE/e) and the department of Industrial Engineering & Innovation Sciences (IE&IS). It is carried out in close cooperation with hospitals and other care institutions all over the Netherlands. All trainees in the programme are required to be fluent in Dutch.

Data Science

The EngD program Data Science prepares professionals to tackle complex industrial and business challenges by combining expertise in statistics, mathematics, and computer science with practical design thinking. Trainees learn to develop advanced data science tools and solutions, with a focus on real-world application. The program also emphasizes working in multi-disciplinary teams, fostering professional growth, and ensuring ethical and legal awareness. Graduates are equipped to deliver impactful data-driven solutions in dynamic, ever-evolving environments. The EngD program Data Science is located at Jeronimus Academy of Data Science in 's-Hertogenbosch.

Design of Electrical Engineering Systems (DEES)

The DEES programme trains designers in specifying, designing, building, testing and evaluating complex multidisciplinary systems in the discipline of electrical engineering. More recently, we have also taken the trainees from applied physics on board, and we have welcomed the occasional trainee from mechanical engineering. Our trainees develop an in-depth understanding of the technical, stakeholder and user requirements so as to bridge the gap between state-of the art technology and commercial (or societal) applications.

A DEES trainee carries out a 15-month industrial design/development project that runs concurrently with a tailor-made 9-month curricular training programme. Our trainees work on projects in such diverse fields as healthcare systems, well-being devices, wireless and electro-optical communication, embedded software, integrated (opto-)electronic circuits, flexible electronics, optical and electromagnetic sensing, molecular biosensing, AI-assisted image analysis, pulsed-power plasma generation and plasma cleaning, EV charging, electric motor design, nano-scale wear particle generation, automotive radar systems, antenna array design, material characterization, electromagnetic compatibility, and control systems.

Designing Human-System Interaction (HSI)

The mission of the new HSI programme is to train professionals to develop competences in designing and evaluating interactive intelligent and innovative systems, services, and products. The HSI programme pays special attention to the frontier of the complex systems enabled by artificial intelligence, data science and other emerging technologies in high-tech systems, health applications and smart mobility, and its impact on individuals, organizations, and society. The goal is to ensure positive user experiences that support their values and needs.

Qualified Medical Engineer (QME)

The Qualified Medical Engineer programme trains engineers to become effective designers in a clinical/ healthcare environment. Of course, engineering skills and clinical knowledge are relevant. But also adequate communication with both healthcare professionals and medical technology professionals is crucial to really get clear what the needs in healthcare are and to determine how design and implementation of existing and new technologies can improve patient care. The programme is provided by the School of Medical Physics and Engineering Eindhoven (SMPE/e) and carried out in close cooperation with healthcare institutions and medical companies all over the Netherlands. All trainees in the programme are required to be fluent in Dutch.

Smart Buildings and Cities (SBC)

The Smart Buildings & Cities programme is educating engineers with different backgrounds (architecture, mechanical engineering, electrical engineering, building physics and services and ICT) to become technological designers, who excel in their own discipline and who can work in multidisciplinary design teams. SBC trainees contribute to the development of intelligent and energy efficient building components and concepts, renewable energy generation and storage in the built environment, designing buildings and cities that mitigate the effects of climate change, are based on the principles of circular economy, promote healthy living and improve quality of life in the built environment.

Software Technology (ST)

The development of software for advanced systems has many different aspects. The ST programme focuses on the project-based design and development of software for software-and data-intensive systems from the high-tech industry. The trainees get acquainted with the important concepts from diverse knowledge domains such as System Design, AI, Model Driven Engineering and Networked Embedded Systems, and learn how to use these to solve the actual industrial problems that our industry partners present to us.

University of Twente

Business & IT (BIT)

The Business and IT programme aims to raise the level of competence in IT of professionals to empower them to deal with the opportunities and challenges posed by IT-based innovations. Technology is changing fast, and professionals need to keep themselves up to date. At the same time, some of the problems of business-IT misalignment, legacy software and global cooperation remain relevant, so that modern IT professionals need to work in multidisciplinary teams to manage these problems. The mission of this programme is to deliver professionals who are able to understand and design robust and economically sustainable IT-enabled networks, such as social networks, online markets, business networks and public service networks, which balance economic opportunities and online IT risks to attain business goals.

Civil Engineering (CE)

The civil engineering industry requires highly skilled designers with expertise in technical areas like design, construction, and maintenance, as well as non-technical fields such as project management, economics, policy, and business. As the profession evolves with new technologies, sustainability demands, and more complex projects, future civil engineers will need a broad range of skills to succeed. They must be prepared to tackle modern challenges and work effectively in multidisciplinary teams, playing key roles in solving complex problems that involve both technical and management aspects.

Energy and Process Technology (EPT)

The Energy and Process Technology programme shapes the innovative technological future for energy, process, and material industry by applying multidisciplinary and intersectoral approach. The EngD trainees skilled within the EPT programme deliver high quality designs with in-depth understanding of the requirements given by the professional market and impact to the society. Functionality of the solutions, their quality, innovative and groundbreaking character combined with environmental friendliness, sustainability, and recyclability are the key features of designs implemented within the EPT.

Maintenance (MT)

The programme Maintenance educates designers who create efficient and effective maintenance processes from a multi-disciplinary perspective. The design has to comply to technical, financial, logistics and organizational specifications. A sound understanding of the physical mechanisms is key, as the basis for failing systems and components is in nature physical. By addressing both technical and operations aspects during the programme, a necessary link is established between these two fields of expertise.

Robotics (ROB)

The technological designer in Robotics creates innovative robotic solutions for medical, industrial and safety purposes. The programme focuses on mechatronics and control design aspects of robots (for example rehabilitation, welding or inspection robotics) as well as system-level design of industrial robotics and automation environments. Therefore, a multi-disciplinary approach is required with components from mechanical, electrical, computer and control engineering. The EngD programme in Robotics allows the trainee to deepen and broaden their knowledge and to gain advanced application experience through a challenging assignment in industry.

Wageningen University & Research

Design for AgriFood and Ecological Systems (DAES)

DAES trainees will be able to create high-value, creative, and innovative designs to improve sustainability in an independent and multi/ interdisciplinary way under the supervision of the university and experts outside academia. At WUR, the EngD programme is tailor made, so DAES trainees select most of the courses themselves, fitting their individual background and specific design assignment. The final result will be a design that will, directly or indirectly, contribute to increasing the sustainability of agri- or horticulture, livestock farming, or the living environment in general.

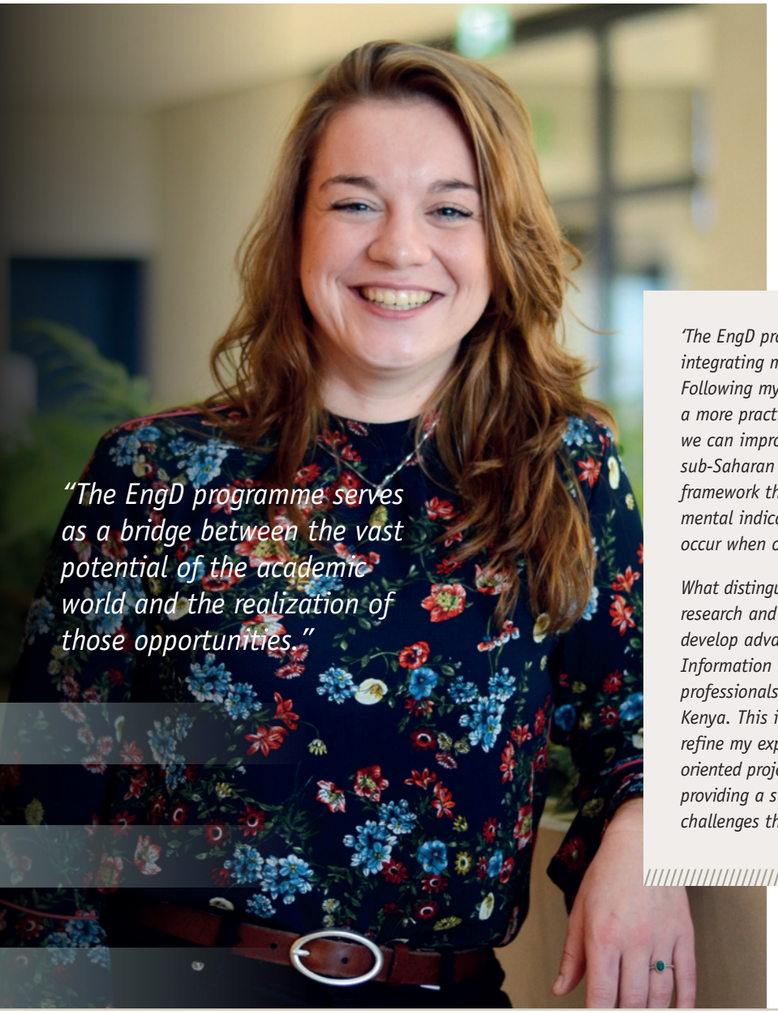
University of Groningen

Autonomous Systems (AS)

The EngD program Autonomous Systems focuses on the integration of technologies and classic techniques of model-based engineering to create autonomous systems. This includes areas of mechanical engineering, robotics, computing science, AI, among others. It aims to strengthen the design methods and tools for development of high-tech software-intensive systems (such as mechatronics, smart manufacturing systems, Internet of Things (IoT) and robotics systems).

Sustainable Process Design (SPD)

Sustainable process design describes concepts or strategies for the replacement of non-efficient and non-renewable production processes. The goal of this EngD programme is to develop sustainable solutions for the industry, such as new process techniques and/ or materials that significantly minimise the ecological footprint (transition to sustainable production.



ENGD PROGRAM
Design for Agrifood & Ecological Systems (DAES)

PROJECT
Modelling permaculture: Landscape level co-design of agroecological farming systems in Kenya for CGIAR

Eveline Massop

'The EngD programme has provided an invaluable platform for integrating my academic knowledge with real-world impact. Following my studies in International Development, I sought a more practical approach. My EngD project focuses on how we can improve the livelihoods of smallholder farmers in sub-Saharan Africa. There I am developing a comprehensive framework that incorporates both socio-economic and environmental indicators, and the trade-offs and/or synergies that occur when optimizing for a sustainable landscape design.

What distinguishes the EngD is its balance between applied research and continued learning. The programme allows me to develop advanced technical skills in modelling and Geographic Information Systems (GIS), while engaging with experienced professionals, fellow candidates, and the local communities in Kenya. This interdisciplinary environment has enabled me to refine my expertise while contributing to impactful, solutions-oriented projects. The EngD advances my professional capabilities, providing a strong foundation for addressing complex global challenges through innovative, data-driven approaches.'

Application, selection and degree

Application

Application to an EngD programme is open to university graduates from the Netherlands and other countries. You will at least need a Master of Science degree or equivalent, preferably in the exact sciences. There will be an assessment and selection procedure before you can enter the programme. The programmes of the Stan Ackermans Institute use strict selection criteria to ensure the required high quality. Excellent marks, motivation and a design-oriented attitude are vitally important. You should also have an excellent command of the English language. For (only) the CI and QME programme, C1 level command of the Dutch language is required.

Selection

You can apply by sending your letter of application with a complete curriculum vitae and at least two letters of recommendation (in English). Suitable candidates will be invited for an interview with the selection committee of the relevant programme. Please note that each programme has different starting dates, as well as its own specific admission requirements and selection procedure. The exact requirements and selection procedure for each programme are listed on www.4tu.nl/sai. Click on 'education' and visit the individual website of the programme. You can also contact the coordinator of the programme.

Appointment

If you are selected for the programme, you are appointed as a trainee for the duration of the programme, up to two years. You will be a member of the scientific staff and will receive a salary in accordance with government regulations. Because you are a trainee, you will receive a salary for your work. No tuition fees apply to the EngD traineeship.

Diploma and degree

On succesfull completion the programma, you will receive a certified diploma and you will be entitled to use the academic degree of Engineering Doctorate (EngD degree).

Tom Tijink

'In my current job at Saxion, an entrepreneur and I initiated the minor 'Managing Technology Innovation Projects (TIP)'.

This minor is further developed with a team of colleagues. During this development, and even now, there has been constant contact and collaboration with the University of Twente. That's where the CLIC-IT project emerged, with a position for an EngD trainee. The opportunity was given by my employer to pursuit an Engineering Doctorate combined with a part of my daily job. Combining these activities is quite intensive but through the EngD, I get the opportunity to apply the experience and insights I have gained about innovation, to deepen it and to develop it into a concrete design that can be applied more widely.

What is learned during the EngD trajectory helps to connect science and practice. In my project new methods and tools are developed to support working, learning and innovating in Learning Communities. A platform is to be designed for the availability of these methods and tools for use in practice.

As a professional, I would like to encourage other professionals to consider an Engineering Doctorate. Prepare yourself for an intensive period in which you learn a lot in an environment with enthusiastic people.'

ENGD PROGRAM
Design for Business & IT (BIT)

PROJECT
A platform and toolbox design for Learning Communities working on innovations related to digital transformation

Parties and universities involved

4TU

The four leading universities of technology in the Netherlands - TU Delft, Eindhoven University of Technology, the University of Twente and Wageningen University & Research have joined forces in the 4TU.Federation. This federation maximizes innovation by combining and concentrating the strengths of all four universities in research, education and knowledge transfer. As per September 2024, the University of Groningen is offering two additional EngD programmes within the collaboration. **www.4TU.nl**

The Association of Engineering Doctorates (AEngD)

The Stan Ackermans Institute is an affiliate member of the Association of Engineering Doctorates (AEngD) – the UK-based organisation which promotes the value of the Engineering Doctorate (EngD) to government, industry and commerce. The affiliation between Stan Ackermans Institute and AEngD establishes a wider and more strategic industrial research collaboration and builds international links across the engineering research community.

TU Delft

TU Delft (TUD) is an entrepreneurial university at the forefront of technological development. As such it is constantly involved in furthering technological advances in the interests of society. By means of its fundamental and applied research and educational programmes, TU Delft trains the engineers of tomorrow. **www.tudelft.nl**

Eindhoven University of Technology

Eindhoven University of Technology (TU/e), founded in 1956 and situated strategically in the heart of the Brainport region in the southern part of the Netherlands, is a research-driven, design-oriented university of technology, with the primary objective of providing young people with an academic education within the engineering science & technology domain. **www.tue.nl**

University of Twente

University of Twente (UT), founded in 1961, is one of Europe's finest educational resources encouraging research and entrepreneurship in both technology and social sciences. A young and innovative institute, UT is internationally respected in areas ranging from public policy studies and applied physics to biomedical technology. **www.utwente.nl**

Wageningen University & Research

Wageningen University & Research (WUR) is the only university in the Netherlands to focus specifically on the theme 'healthy food and living environment'. They do so by working closely together with governments and the business community. **www.wur.nl**

University of Groningen

The University of Groningen (UG), a broad university in the north of the Netherlands, has entered this joint initiative and offers an Engineering Doctorate (EngD) as per September 1, 2024. The UG started in 1958 with engineering degrees like chemical engineering, applied physics and applied mathematics. **www.rug.nl**

ENGD PROGRAM
Design of Electrical Engineering Systems (DEES)

PROJECT
Developing robust AI solutions for radar signal processing in autonomous vehicles for NXP

Ted Manders

'After completing my Master's in Data Science and Society at Tilburg University and running my own web development company for nearly a decade, I joined TU/e's EngD programme. Initially seeking a PhD, I found an ideal EngD opportunity, leading to a collaborative project with TU/e and NXP.

Working on AI solutions for radar signal processing in autonomous vehicles at NXP has provided me with invaluable practical experience and expanded my professional network. The EngD programme's structure, which includes hands-on projects at NXP and relevant courses at TU/e, has deepened my expertise in signal processing and machine learning. The combination of industry experience and academic training has been incredibly rewarding.

For future EngD candidates, I recommend leveraging the opportunity to engage with diverse colleagues and experimenting with new approaches. Post-EngD, I plan to pursue a role that maintains strong ties to academia.'

Why our EngD are programmes unique

Earning and learning

Paid position with no tuition fees, bridging the gap between academia and work.

Career prospects

Excellent kick-start for a career in the industry or healthcare. Strong connections with the industry, especially in the Brainport region.

Valorisation

Apply your theoretical knowledge directly in practice: make a real-life, practical contribution to a company or science in general.

Professional supervision

Support from experienced scientific design professionals.

Multi-disciplinary way of working

Freedom to explore intercultural working in various roles and teams.

Skill development

Broadens your technical experience and professional skills, helping you to discover your strenghts and interests.

The 4TU.School for Technological Design, Stan Ackermans Institute offers offers a total of 19 two-year post-master technological designer programmes.

4TU.SAI is a joint initiative of the four universities of technology in the Netherlands:

TU Delft, Eindhoven University of Technology, University of Twente and Wageningen University & Research. 4TU.SAI collaborates with University of Groningen.

sai@4tu.nl

www.4tu.nl/sai

TU Delft Delft University of Technology

TU/e Eindhoven University of Technology

University of Twente.

Wageningen University & Research

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