



NVAO  THE NETHERLANDS

# PEER REVIEW NEW PROGRAMME

MASTER ROBOTICS

University of Twente

SUMMARY REPORT

4 April 2022



## 1 Peer Review

The quality of a new programme is assessed by means of peer review. A panel of independent peers including a student reviews the plans during a site visit to the institution. A discussion amongst peer experts forms the basis for the panel's final judgement and the advisory report. The focus is on the curriculum, the teaching and learning environment, and student assessment.

The Accreditation Organisation of the Netherlands and Flanders (NVAO) takes a formal decision on the quality of the new programme based on the outcome of the peer review. This decision can be positive, conditionally positive or negative. Following a positive NVAO decision with or without conditions the institution can proceed to offer the new programme. Upon completion of the programme graduates are entitled to receive a legally accredited degree.

This summary report contains the main outcomes of the peer review. A full report with more details including the panel's findings and analysis is also available. NVAO bases an accreditation decision on the full report.

Both the full and summary reports of peer reviews are published on NVAO's website [www.nvao.net](http://www.nvao.net). There you can also find more information on NVAO and peer reviews of new programmes.

Because of COVID-19 temporary measures apply for this peer review.

## 2 Panel

### Peer experts

1. Prof.dr. Ming Cao (*chair*), full professor with tenure of Networks and Robotics, Faculty of Science and Engineering, University of Groningen;
2. Dr. Felipe Nascimento Martins, lecturer and researcher at the Institute of Engineering, member of the research group Sensors and Smart Systems, Hanzehogeschool Groningen;
3. Prof.dr.ir Hans Butler, technical expert (mechatronics) dynamics & control architect at ASML and full professor in control systems at the High precision Mechatronics lab, TU Eindhoven;
4. Willem Gommans (*student*), student wo-ma Construction Management and Engineering, TU Eindhoven. Graduated from bachelor Werktuigbouwkunde.

### Assisting staff

- Drs. Riekje de Jong, secretary;
- Drs. Jona Rovers, NVAO policy advisor and process coordinator.

Site visit (online)

1 March 2022



### 3 Outcome

The NVAO approved panel reaches a positive conclusion regarding the quality of the Master Robotics offered by the University of Twente. The programme complies with all standards of the limited NVAO framework.

The panel values the choice of the programme to work with a limited number of broadly formulated Intended Learning Outcomes (ILO's) on programme level that have been specified by the ILO's of the specializations, profiles and courses. The attainment levels are nicely aligned with (inter)national frames of references and meet the expectations of the professional field. Graduated students will very easily find jobs in the field of robotics.

The panel concludes that the curriculum is well thought-through and reflects the level and content as reflected in the end level of the programme. The structure of the curriculum is rather complex with three specializations and three graduation profiles. It is therefore important to provide students with clear information and guidance in making their choices.

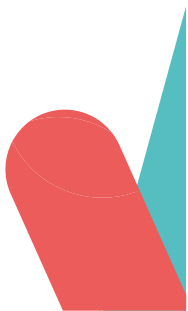
The panel has met a committed management and very well qualified development and teaching team in the field of research, design and innovation of robotics. The setting up of a Robotics Research Centre offers added value in the field of robotics. In the centre researchers in the field of robotics from different faculties can collaborate, offer internships and supervision of students and can meet the industry. The ambition of the Robotics Research Centre is to function as a linking pin between robotics education and the needs of lifelong learning of the industry.

The overall quality of the examinations and the evaluation of the quality of assessments are safeguarded in the assessment policy of the master and well embedded in the faculty's assessment policy. The panel advises the examination board to support the development team in safeguarding the PILO's of the Master Robotics and in supporting a well-integrated assessment of Ethical, Legal, Social and Economic aspects and Challenge Based Learning.

### 4 Commendations

The programme is commended for the following features of good practice.

1. **Unique personal profile** - the Master Robotics offers students unique options to start in a specialization, work in mixed teams and choose a profile directed to research, design or innovation and entrepreneurship.
2. **Strong relationship with field of Robotics** - the committed Advisory Board gives feedback on course development, will offer students research problems to work on in mixed teams and will provide supervision to students in internships.
3. **Challenge Based Learning (CBL)** - in CBL small teams of students from the different specializations re-define a problem in the field of robotics that is challenging for everyone, supplemented with a personal challenge that has to be



resolved. The multidisciplinary CBL approach adds professional capacity to the robotics industry.

4. **Research Centre Robotics** - the overarching Research Centre Robotics is a (virtual and physical) centre in which researchers in the field of robotics cooperate in developing new knowledge. The centre will be a bridge between robotics education and lifelong learning in the industry.

## 5 Recommendations

For further improvement to the programme, the panel recommends a number of follow-up actions.

1. **Clear information and guidance to students** - develop clarifying information about goals, content and learning tracks and offer students good guidance in making choices to enable them to take full advantage of all options the Master Robotics offers. Otherwise, students may get lost in the rather complex programme set-up.
2. **Role of student-assistants in CBL** - student-assistants will be coaching CBL groups. By giving students feedback the student-assistants will indirectly play a role in assessment. Offer student-assistants a mandatory, tailor-made professional development programme.
3. **Realize constructive alignment of electives** - the alignment of electives is still unclear. Because electives could inspire and help students in choosing a profile, better alignment of the electives in the specializations and profiles is needed.

## 6 What comes next?

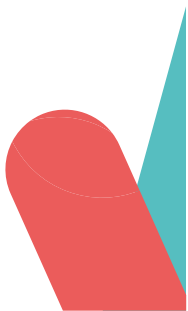
NVAO grants initial accreditation to a new programme on the basis of a panel's full report. The decision is valid for a maximum of six years. For conditional accreditation other regulations apply. Upon accreditation the new programme will follow the NVAO review procedures for existing programmes. NVAO publishes the accreditation decision together with the full report and this summary report.<sup>1</sup>

Each institution has a system of quality assurance in place ensuring continuous follow-up actions and periodic peer-review activities. Peer reviews help the institution to improve the quality of its programmes. The progress made since the last review is therefore taken into consideration when preparing for the next review. The follow-up activities are also part of the following peer-review report. For more information, visit the institution's website.<sup>2</sup>

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<sup>1</sup> <https://www.nvao.net/nl/besluiten>

<sup>2</sup> <https://www.utwente.nl/>



## 7 Summary in Dutch

Het panel oordeelt positief over de kwaliteit van de master Robotics van de Universiteit Twente. Dit is de uitkomst van de kwaliteitstoets uitgevoerd door een panel van *peers* op verzoek van de Nederlands-Vlaamse Accreditatieorganisatie (NVAO). Voor deze beoordeling heeft het panel gesprekken gevoerd met de opleiding op 1 maart 2022.

Afgestudeerde studenten van de master Robotics zijn experts op het gebied van het ontwerpen en maken van intelligente robots die zowel in een gestructureerde als ongestructureerde omgeving kunnen functioneren en met hun omgeving en de mensen daarin in interactie gaan. Bij aanvang van de studie kiezen studenten één van de drie specialisaties: Mechatronics and Physical Artificial Intelligence (AI), Algorithms and Software AI, of Human-Robot Interaction and Social AI. Tevens kiezen studenten hun profiel in onderzoek, ontwerp of innovatie en ondernemerschap.

De specialisaties hebben een gezamenlijke opbouw die bestaat uit verplichte cursussen, waaronder een gemeenschappelijke cursus Systems Engineering, en keuzecursussen. Ook wordt aandacht besteed aan ethische, juridische, sociale en economische aspecten. In Challenge Based Learning (CBL) werken de studenten in teams samen met studenten van ten minste twee van de drie specialisaties. De teams lossen praktijkproblemen op die aangereikt zijn door het werkveld en ontwikkelen zo een brede kennis van robotics.

Sterke punten van de opleiding zijn dat de Master Robotics de studenten gelijk de mogelijkheid biedt om zich te profileren met de keuze van een specialisatie, het werken in gemengde teams en het afstudeerprofiel onderzoek, ontwerp, of innovatie en ondernemerschap. Ook is het werkveld sterk betrokken bij de ontwikkeling van de opleiding, onder andere door praktijkproblemen voor CBL aan te reiken en studenten te begeleiden bij stages in het werkveld.

Het is belangrijk dat studenten goed de weg kunnen vinden in alle mogelijke opties die de master Robotics biedt. Daarom beveelt het panel aan om te zorgen voor heldere informatie over doelen, inhoud en leerroutes en goede ondersteuning voor studenten bij hun keuzeproces, zodat zij optimaal gebruik kunnen maken van de geboden mogelijkheden.

Naast docenten zullen ook student-assistenten de CBL teams begeleiden. De kwaliteit van de begeleiding is belangrijk omdat die mede zal bijdragen aan het resultaat van de CBL teams. Daarom is het advies om de studenten-assistenten verplicht te laten deelnemen aan een op hun taak afgestemde scholing.

Meer informatie over de NVAO-werkwijze en de toetsing van nieuwe opleidingen is te vinden op [www.nvao.net](http://www.nvao.net). Voor informatie over de Universiteit Twente verwijzen we naar de website van de instelling.<sup>3</sup>

Als gevolg van de beperkende omstandigheden door COVID-19 geldt voor deze kwaliteitstoets een tijdelijke procedure.

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<sup>3</sup> <https://www.utwente.nl/>

