# Yaolin Ge

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## PERSONAL INFORMATION

Date of Birth: October 20, 1996
Place of Birth: Shaanxi, China
Citizenship: Chinese
Gender: Male

## EDUCATION

| | |
|---|---|
| Aug. 2019 – Present | **KTH Royal Institute of Technology, Stockholm, Sweden**<br>**M.S. Maritime Engineering** |
| Aug. 2018 – Jun. 2019 | **Norwegian University of Science and Technology, Trondheim, Norway**<br>**G.P.A. 3.93/4.00**<br>**M.S. Marine Technology** |
| Sept. 2017 – Jan. 2018 | **University of Strathclyde, Glasgow, United Kingdom**<br>**G.P.A. 3.85/4.00**<br>**B.S. Naval Architecture & Ocean and Marine Engineering** |
| Sept. 2014 – Jun. 2018 | **Jiangsu University of Science and Technology, Zhenjiang, China**<br>**G.P.A. 3.89/4.00**<br>**B.S. Naval Architecture & Ocean Engineering** |

## RESEARCH EXPERIENCE

| | |
|---|---|
| Aug. 2019 – present | **Research on the underwater navigation system (M.S. Degree Project)**<br>KTH & Swedish Maritime Robotics Centre (SMaRC), Stockholm, Sweden |

- Reviewed the common navigation system for underwater vehicles such as LBL, USBL, SBL, INS etc.
- Investigated the core components of the long-baseline system for underwater communication system as well as navigation system
- Studied the advanced estimation algorithms such as EKF, UKF, CMF & QMF for active sonar detection and range estimation purposes
- Planned to conduct field trips to evaluate the performance of the model

Supervisors: Martin Ludvigsen, Professor; Peter Sigray, Professor

| | |
|---|---|
| Jan. 2019 – Jun. 2019 | **Research on the acoustic sensing seabed survey of a virgin wreck site**<br>AURLab & Dept. of Marine Technology (NTNU), Trondheim, Norway |

- Studied the seabed sensing survey equipment, such as LAUV Fridtjøf with sensors like SSS (side-scan sonar), CTD profiler, DVL, GPS, Camera etc.
- Planned the appropriate preliminary underwater survey paths considering the bathymetry & topology of the seabed, and designed control schemes
- Conducted the field trip on board R/V Gunnerus to collect data
- Post-processed and documented the acoustic images for further research

Supervisor: Martin Ludvigsen, Professor

| | |
|---|---|
| Jan. 2019 – Jun. 2019 | **Project on the design and analysis of underwater robotics**<br>KTH & Swedish Maritime Robotics Centre (SMaRC), Stockholm, Sweden |

- Designed a new generation underwater robotics based on Eelume
- Investigated the MPC & LQR performance on the trajectory simulation
- Conducted the manoeuvring simulation and hardware-in-the-loop testing
- Delivered the presentation to the clients including professors & fellows

Supervisor: Ivan Stenius, Associate Professor

## PROFESSIONAL QUALIFICATIONS
**Personal Skills:**
Programming language with C, C++, Python & MATLAB; CAD modelling with Solidworks/AutoCAD; Embedded system programming with MPLAB X IDE; Simulation with Simulink (Simscape Electrical/ SimEvents/DSP); Computer Vision with OpenCV; Robotics development with ROS; 3D FDM printing; Microsoft Office; Latex

**Languages:**
English (fluent)
Chinese (native)

## AWARDS
| | |
|---|---|
| 2019 | Intel® Edge AI Scholarship, Intel |
| 2019 | Best Popular Prize, AI + Art in Robot Dancing Competition, PKU |
| 2017 | Merit Student, MOE |
| 2017 | First Prize, Academic Competition in Mechanics Knowledge, JUST |
| 2016 – 2017 | National Scholarship, MOE |
| 2016 | Second Prize Scholarship, CSSC Huangpu Wenchong |
| 2015 – 2016 | First Prize, Renmin Scholarship, MOE |
| 2015 | National Encouragement Scholarship, MOE |
| 2015 | Second Prize, Decelerator Assembly & Disassembly Contest, JUST |
| 2014 | Honourable Mention, CMIH Simulation Model Design Contest, JUST |
| 2014 | First Prize, Diesel Engine Assembly & Disassembly Contest, SIYANG |

## PROFESSINOAL MEMBERSHIPS
The Royal Institute of Naval Architects (RINA)
Kongl. Skeppssällskapet

## EXTRA-CURRICULAR
**Jan. 2020 – Present** — **Sensor Fusion NanoDegree Graduate, Udacity**
- Applied Ransac and KD-Tree based Euclidean clustering algorithms for detection and tracking of autonomous vehicles using Lidar data
- Studied common sensors for machine perception such as Radar/Camera etc.
- Worked with simulators to merge all sensing data

**Jul. 2019 – Aug. 2019** — **Summer campus program in Robotic Dancing, PKU, China**
- Studied the deep learning principles and applied openpose algorithm
- Conducted the motion capture technique for the robotics and converted the 2D motion to 3D skeletons for further mapping to robotic motion
- Programmed Yanshee Robot to dance following human motions

**Oct. 2014 – Jun. 2018** — **Team Member**
Student Volunteer Association, Zhenjiang, China
- Participated in local and on-campus volunteering activities regularly

## REFEREES:
| | | |
|---|---|---|
| Hedvig Kjellström | Dept. of Intelligent Systems, KTH | |
| Professor | hedvig@kth.se | +46 8 790 69 06 |
| | | |
| Ivan Stenius | Dept. of Aeronautics and Vehicle Engineering, KTH | |
| Associate Professor | stenius@kth.se | +46 70 288 82 63 |
| | | |
| Martin Ludvigsen | Dept. of Marine Technology, NTNU | |
| Professor | martin.ludvigsen@ntnu.no | +47 91897272 |

## INTERESTS
Running, bicycling, swimming, fitness training, cross-country skiing

# Letter of Motivation

Dear Dr. Vasso Reppa and Prof. R.R. Negenborn,

This is Yaolin GE, a final year master student from Maritime Engineering subject at KTH Royal Institute of Technology, currently applying for the doctoral programme in "Robust and Adaptable Control Systems for Effective Ship Automation" at TU Delft. I would like to explain as follows my motivation for my application, and my previous experiences related to this field for your consideration.

Thanks to the swift progress of my bachelor's degree, it is glaring that studying and doing research are endeavours I would like to engage in even more. While studying for my BSc in Naval Architecture and Ocean Engineering at Jiangsu University of Science and Technology (JUST), not only did I develop a systematic way of solving existing problems in the marine field, but also I did step forward to pursue unsolved problems to reflect on. For instance, the most memorable thing that I have done in this period is that I did spend a whole month to design and fabricate a small robotic drone individually in my spare time inspired by a DIY workshop when I was still a sophomore, which allured me to dive into the world of smart things. It has defeated me many times in the beginning, but I stepped it over eventually, which led to a huge sense of achievement. I did also push myself hard to explore as much as I can, that dedication brought me a national scholarship and an opportunity to take an exchange study in the UK. That exchange study program at the University of Strathclyde, which I consider did bring great advantages to me from the perspectives of both academic and personal improvements. The courses I have undertaken there covers diverse aspects of naval architecture and marine engineering, of which my favourite ones are *Seakeeping* and *Manoeuvring*, where the seakeeping part gave me the background on the seastate-relevant knowledge, while the manoeuvring part provoked me about the power of the human brain and the computer brain. For example, how the equations of motion can be formulated, in which plenty of hydrodynamic derivatives need to be sorted out via either numerical ways or experimental ways, eventually what surprised me deeply was that it could predict the motion the vessel in a satisfactory way, although heavy mathematics was required. Meanwhile, the study atmosphere there which greatly encouraged independent research and innovative ideas had brought me more confidence on my success in a higher level of study and research abroad.

As a result of the strong interest in exploring at a higher level, I urged myself to learn more under an advanced study environment, for which I then pursued my master's study within Marine Technology at NTNU. The interdisciplinary study and research environment rewarded me a lot in terms of research skills and personal growth. Thanks to the freedom of choosing any optional courses I like. I did follow my passion to brush up my understanding in the field of smart maritime technology. Power electronics and underwater technologies have been undertaken. They did definitely not let me down, I did gain more valuable skills. Namely, I did design a bi-directional DC-DC power converter using IGBTs for an automated power management system which needs to boost up the output voltage level when the energy source (e.g. battery, fuel cell or supercapacitor) is discharging while it needs to step down the voltage level when the energy source is charging. The promising result showed the full capability of the power management system to do its peak shaving job, which is useful when it comes to energy efficiency. That experience enhanced my ability to utilize power electronics to solve practical problems. On the other hand, underwater robotic technologies enriched my underwater robotic control and sensing toolbox, in which the techniques of MBES (multi-beam echo sounder), SSS (side-scan sonar), DVL (doppler-velocity log), CTD profiler, IMU, GPS

have been investigated extensively. The data post-processing of MBES, SSS, DVL as well as CTD were evaluated massively as well. Other than that, underwater vehicles' navigation and positioning together with their related signal processing systems were also studied broadly, such as dead-reckoning and USBL system, EKF, QMF, CMF etc... Furthermore, I was also invited to inspect a virgin wreck site to conduct a seabed survey using LAUV Fridtjøf to collect acoustic images of that wreck to be able to support further researches on the goal of confirming the identity of that wreck. I feel much more confident about my research and analytical skills thanks to the experience gained at NTNU. I am now conducting my research by collaborating with the Swedish Maritime and Robotic Centre (SMaRC) to do the signal processing of underwater beacons for AUVs, which is mainly about designing an underwater beacon to satisfy the requirement of underwater navigation and positioning system as well as the requirements for corresponding signal processing systems. It again rekindles my mindset in the autonomous underwater robotics and signal processing field. Through this research experience, I feel more ready and confident in seeking this doctoral program.

As for my passion for robotic control systems, I believe that the summer campus of computer science experience at Peking University might have a say in that. In that training programme, I worked day by day with fellows from all over the world on the same competition which had the objective of letting robots dance with humans. Computer vision, Motion Capture, OpenCV, Deep Learning, Robotics, Cybernetics, again rejuvenate my motivation to a higher level. To summarise what I have done, I applied openpose algorithm to capture the motion of a human dancer, the resultant 2D captured frames were then converted to 3D skeleton frames, which were then mapped to a 17-DOF (degrees of freedom) multi-joint robot dancer named after Yanshee. The performance of the robot dancer was awkward but adorable due to the fact that it has only 17 DOF compared to 27 DOF for just one human hand. This training programme did not only give me a few hands-on experiences on robotics and machine learning, but also expand my horizon and lead a new perspective of solving problems. Although at this moment, I may be remaining a beginner in this area, at least they have bred a seed in my head as the similar one that the small drone did.

With this wide range of experiences, I have gradually developed a liking taste in smart maritime field. In the past year, I have had some interactions with some Ph.D. students within these field, and it has given me a tantalizing glimpse into the life of a graduate student – and it is a life I want to lead. It is also a life I believe I am ready and able to manage. I develop the motivation from the level of responsibility and independence required of a graduate student and relish the opportunity to prove myself at this level. I believe that pursuing a doctoral programme within the Faculty of Mechanical, Maritime and Materials Engineering at TU Delft, will allow me to learn from professors at the top of this exciting field. This doctoral programme will also enable me to pursue my research interests to a much greater depth while also expand my future career opportunities. It is also worth mentioning that joining a community of other like-minded individuals will be a valuable chance for collaboration and personal development. I believe that I am a diligent and highly motivated student and also a well-qualified applicant.

To conclude, I expect to contribute to the practical researches with my professional knowledge and practical skills obtained from this doctoral programme at TU Delft. With full confidence in me as well as the professional training you provide in the program, I believe that my plan will be realized any time soon. Thank you very much for your time and consideration.

Applicant: Yaolin Ge                    Application Ref. No. 3mE20-17

# Norwegian University of Science and Technology

# Transcript of records

Name: **Ge, Yaolin**

Date of Birth: 1996-10-20

The student has completed the following examinations at Norwegian University of Science and Technology:

| Course | | Semester | Credits | Grade | Grade [1] distribution A B C D E |
|--------|--------|----------|---------|-------|----------------------------------|
| TMR4115 | Design Methods | 2018 autumn | 7.5 | B | |
| TMR4190 | Finite Element Methods in Structural Analysis | 2018 autumn | 7.5 | A | |
| TMR4305 | Advanced Analysis of Marine Structures | 2018 autumn | 7.5 | A | |
| TMR4320 | Simulation-Based Design | 2018 autumn | 7.5 | A | |
| TMR4120 | Underwater Engineering, Basic Course | 2019 spring | 7.5 | A | |
| TMR4217 | Hydrodynamics for High-Speed Marine Vehicles | 2019 spring | 7.5 | B | |
| TMR4220 | Naval Hydrodynamics | 2019 spring | 7.5 | A | |
| TMR4290 | Marine Electric Power and Propulsion Systems | 2019 spring | 7.5 | A | |
| | | Total: | 60.0 | | |

# **Norwegian University of Science and Technology**
# **Transcript of records**

## Credit system and grading

The academic year normally runs from mid-August to mid-June and lasts for 10 months. Courses are measured in "studiepoeng", considered equivalent to the European Credit Transfer System standard (ECTS credits). The full-time workload for one academic year is 1500 - 1800 hours of study / 60 "studiepoeng".

The Norwegian grading system consists of two grading scales: one scale with the grades pass or fail and one graded scale from A to E for pass and F for fail. The graded scale has the following qualitative descriptions:

| A | Excellent | An excellent performance, clearly outstanding. The candidate demonstrates excellent judgement and a very high degree of independent thinking. |
|---|---|---|
| B | Very good | A very good performance. The candidate demonstrates sound judgement and a high degree of independent thinking. |
| C | Good | A good performance in most areas. The candidate demonstrates a reasonable degree of judgement and independent thinking in the most important areas. |
| D | Satisfactory | A satisfactory performance, but with significant shortcomings. The candidate demonstrates a limited degree of judgement and independent thinking. |
| E | Sufficient | A performance that meets the minimum criteria, but no more. The candidate demonstrates a very limited degree of judgement and independent thinking. |
| F | Fail | A performance that does not meet the minimum academic criteria. The candidate demonstrates an absence of both judgement and independent thinking. |

The assessment is criterion referenced.

## Grade distribution

The distribution of grades is shown by the percentage for courses using the graded scale A – F. Fail (F) is not included in the distribution. All results from the last five years are included in the calculation. The distribution is also shown for courses that have been active for less than five years. There has to be at least 10 approved results during the period.

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# Official Transcript of Records

**Yaolin Ge**
19961020-5537                                                                      2020-02-29

| Completed courses | | Scope | Grade | Date | Note |
|---|---|---|---|---|---|
| **SD2709** | **Underwater Technology** | 7.5 hp | A | 2019-10-18 | 1 |
| PRO1 | Project | (7.5 hp) | A | 2019-10-18 | 1 |
| **DD2325** | **Applied Programming and Computer Science** | 7.5 hp | A | 2020-01-10 | 1 |
| LAB2 | Laboratory Work | (1.5 hp) | P | 2019-12-18 | 2 |
| LAB1 | Laboratory Work | (1.5 hp) | P | 2019-12-18 | 2 |
| LAB3 | Laboratory Work | (1.5 hp) | P | 2019-12-18 | 2 |
| TEN1 | Examination | (3.0 hp) | A | 2020-01-10 | 1 |
| **EQ2300** | **Digital Signal Processing** | 7.5 hp | C | 2020-01-11 | 1 |
| PRO1 | Project Assignment | (1.0 hp) | P | 2019-12-01 | 2 |
| LAB1 | Laboratory Work | (0.5 hp) | P | 2019-12-11 | 2 |
| TEN1 | Examination | (6.0 hp) | C | 2020-01-11 | 1 |
| **SD2711** | **Small Craft Design** | 10.0 hp | B | 2020-01-14 | 1 |
| PRO1 | Project | (10.0 hp) | B | 2020-01-14 | 1 |

60 credits (hp) represent a full academic year.

Notes
1      Grading scale: Excellent (A), Very Good (B), Good (C), Satisfactory (D), Sufficient (E)
2      Grading scale: Pass (P)

The above is an excerpt from the register of student records.

# Letter of recommendation

To whom it may concern

Yaolin Ge, was studying Underwater Technology at KTH Royal Institute of Technology in 2019. I am pleased to recommend Yaolin Ge for further studies at Ph.D. on autonomous marine systems.
Ge followed our courses for SD2709 Underwater Technology in the autumn semester in 2019 and has shown high level of motivation and performance. He has taken good responsibility for his work and has shown interest for the given tasks. His knowledge and systematic mind set has impressed me.

As Mr. GE's lecturer, I strongly support his application. He has potentials and talent in his professional field, and it would be greatly appreciated if you could give him your favourable consideration.

Kindest regards

Ivan Stenius

# NTNU

Norwegian University of Science and Technology
Faculty of Engineering Science and Technology
Department of Marine Technology

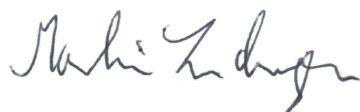| Date | Our reference |
|------|---------------|
| 2019-10-27 | M Ludvigsen |
| Your letter dated | Your reference |

Whom it may concern

Dear sir

## Letter of recommendation for Yaolin Ge

Yaolin Ge, was an exchange M.Sc. student of Department of Marine Technology. I'm pleased to recommend Yaolin Ge for further studies at PhD on autonomous marine systems.

Ge followed our course for Underwater Technology TMR4120 in 2018 and is currently doing MSc level project work for signal processing of underwater beacons for AUVs and has been showing high level of motivation and performance. He has taken good responsibility for his work and has shown interest for the given assignments. His knowledge and systematic mind set has been reflected in the results of his tasks.

Best regards

Professor Martin Ludvigsen
Applied Underwater Robotics Laboratory (AUR-Lab)
E-mail: martin.ludvigsen@ntnu.no
web: http://www.ntnu.no/aur-lab