Personal Statement

To whom it may concern,

This is Yaolin GE, a final year master student from the major of Maritime Engineering at Norwegian University of Science and Technology, applying for the doctoral program within the topic of online risk management and modelling, maintenance and operational constraints of autonomous ships at NTNU AMOS. I am currently conducting my master thesis project on the topic of an underwater communication system for rescue purposes with the main focus on sensing technology at KTH Royal Institute of Technology. I would like to explain as follows my motivation for my application, and my advantages among the potential candidates for your consideration.

Thanks to the swift progress of my bachelor's degree, it is glaring that studying and doing research are endeavors 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, not only did I develop a systematic way of solving existing problems in the marine field, but also I did step forward to pursue research related problems to think. I pushed 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 one is *Seakeeping*. It provoked me about the seakeeping ability which is the main factor contributing to onboard safety. Meanwhile, the study atmosphere there which greatly encouraged independent research and innovative ideas had brought me more confidence in 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 autonomous marine systems. Some relevant courses I did take including design methods, simulation-based design and underwater technology, stirred me to a more opening horizon, enhanced my utility toolbox when considering a design problem in a multi-perspective. I investigated a deep-sea mining system from value proposition, concept selection and transportation analysis as well as uncertainty perspectives to carry out detailed design. When deciding the transportation problem, a certain fleet size as well as ship size need to be established, which was tackled using Genetic Algorithm to find the optimal one both satisfying the design requirements as well as safety factors. It provided me a comprehensive overview of all relevant design aspects when treating a design problem particularly considering the safety and risk considerations. On the other hand, I also inspected a balcony deck design problem for the design project of course simulation-based design, in which I applied the PSO code to optimize the stiffener thickness taking the risk of ice effects on the mechanical properties of the steel plate into account, while the structural analysis was conducted using ANSYS APDL to yield the FEA results, it rejuvenated my thinking into a more in-depth view. Equally important, underwater technologies led me to another advanced field which might need to take care of more risks since more uncertainty would come out due to less-effectiveness of

underwater perception. A field trip was also conducted with AURLab to carry out a seabed survey in Skøgen wreck site, the field experience I gained was much practical in terms of risk management such as safe job analysis and risk analysis beforehand the project mission and FMECA (failure mode effects and criticality analysis), HAZIP and HAZOP. The previous experiences have prepared me to choose the current research topic about the underwater communication system of underwater beacons for AUVs, since it is a crucial part of the rescue system and also important to avoiding risks. 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), where multidisciplinary researchers work on the same project – the next generation of underwater marine systems. Since new systems certainly bring some new risks such as control failure of an AUV which I encountered during the new hydrobatic manoeuvring test, it again reminds the importance of risk management of the marine system. Through this research experience, I feel more ready and confident in seeking a further doctoral program.

The industry experience I have gained from both my bachelor study and the Joint Nordic Five Tech (N5T) Program seems valuable to me as well. During my bachelor's study, I was invited to stay in Hudong-Zhonghua Shipyard for one month as an intern, I visited all essential manufacturing centres such as welding centre, stock management centre and ship design centre, at the same time, some field testing on board was also carried out. Also, I was invited to visit several shipyards and attended several forums within the safety aspects of ice-breakers in Finland via N5T program. I acquired most of my engineering background necessary to ship design through past experiences. While my research and internship experiences have largely been outside my proposed field of study, they demonstrate my work ethic, intellectual curiosity, communication skills, and capacity for both independent and teamwork. Besides, my extracurricular activities support my leadership ability and responsibility.

With this wide range of experiences, I have gradually developed a liking taste in the maritime industry. Over the last year, I have had some interactions with some Ph.D. students within the maritime field at NTNU, 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, as evidenced by my success in my previous graduate coursework and commitment to research. I develop motivation from the level of responsibility and independence required of a graduate student, and relish the opportunity to prove myself at this level. Pursuing a Ph.D. degree at NTNU, with the department's diversity of research in marine technology and its strong reputation, will allow me to learn from professors at the top of this new and exciting field. A Ph.D. program will enable me to pursue my research interests to a much greater depth while also expanding 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.

As mentioned at the beginning, I have been aiming to devote myself into the studies and research on the autonomous marine system as a research goal. To sum up, I expect to contribute to the practical researches with my professional knowledge and practical skills obtained from the Ph.D. career at NTNU. 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. 176480