

## Personal Statement

To whom it may concern,

This is Yaolin GE, a final year master student from the major of Maritime Engineering at KTH Royal Institute of Technology, currently applying for the doctoral program with the topic of *Condition Monitoring of Drivetrains in Offshore Wind Turbines* at NTNU. 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. During my undergraduate study at Jiangsu University of Science and Technology in China, I was provoked to participate in several undergraduate research projects. One of the most interesting projects that I still remember is the investigation of the offshore wind power system. I spent four months to study the offshore wind farm maintenance vessels and apropos technologies. After this, I presented the report from my investigation including the past research and current developed technologies of the offshore wind power system such as the mooring system for floating wind turbines, as well as the outlook of the future trends. It is a rewarding and fruitful experience that reshaped my view as a student and also cultivated me a research perspective. 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 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 Ship Structural Dynamics, which mainly investigates the dynamic behaviour of marine structures that provoked me to step further within the wind turbine dynamics field. In addition, 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.

Stimulated to discover more in the marine field, I then accomplished my bachelor's degree project within the topic of Vortex-induced Vibration (VIV) response of marine risers. Throughout the project, I gained a comprehensive overview of the principles and concepts regarding VIV as well as other relevant structure-fluid dynamic interactions. To investigate the dynamic behaviour considering added mass effect, I studied and applied the semi-empirical model to analyse the response of the low mass-ratio systems such as rigid cylinder as well as slender catenary riser in the crossflow direction, all hydrodynamic coefficients were derived from the forced oscillation experiment of the rigid cylinder conducted by Gøpalkrishnan in 1993. Eventually, I performed the sensitivity analysis for 40 different cases in terms of different current, tension forces and mass-ratio systems to verify the numerical model. The project was interesting and rewarding, which surely paved the way for future research.

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. I did follow my passion to polish my understanding in the field of marine dynamics. I have taken Advanced Structural Analysis and Marine Power System from which I gained valuable skills. Namely, I enhanced my numerical analysis skills through several course-related projects such as designing local structures such

as a cruise balcony; analysing the dynamic response of a slender riser using different techniques including mode superposition and frequency response methods; performing FEA static analysis for jacket structures and designing a propeller, etc. Moreover, developing a dynamic response model for a slender riser undergoing different wave conditions expanded my horizon to an enormous extent in terms of solving structural problems in a more advanced way. Thankfully, those experiences enhanced my ability to a deeper level to utilize numerical methods to solve practical problems in the marine dynamics field. I feel much more confident about my research and analytical skills thanks to the experience gained at NTNU.

At present, I am doing my master's degree project within the marine autonomous system at KTH, particularly marine robotics. It involves the signal processing of underwater beacons for AUVs, which is mainly for underwater navigation system. It again rekindles my mindset in the marine and signal processing field. Through this research experience, I feel more ready and confident in seeking this doctoral program.

As for my passion for machine learning, 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.

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. I believe that pursuing a Ph.D. degree at NTNU with the project's diversity of research in offshore wind turbine technology and its strong reputation, will allow me to learn from professors at the top of this new and exciting field. The 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 highly motivated student and also a well-qualified applicant.

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: 

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