

## Statement of Purpose

### **Dual Doctoral Degree Program- Cavitation Bubble Dynamics, IIT Kharagpur & University of Manchester**

Learning is an experience, everything else is just information. - Albert Einstein

Growing up in the verdant valleys of villages, I have enjoyed nature's beauty a lot. I cherish those childhood memories, playing in the river, paddy field, and hilltops with my friends. As to when my fascination for machines started sprouting, I could picture myself working on agro- machinery and sometimes attending to the overhauling of pumps, maybe tiller or compressor as part of providing support to my parents in agricultural activities. What started as typical routines at home accompanied by informative classes, instilled in me a change in how I perceived the world. For this, I express my gratitude to dedicated science teachers who taught us to observe, experiment and then learn, a methodology that I still try to practice. This enabled us to relate and study most of the scientific laws at their conceptual level. My passion for science grew all along and inclined towards Physics and Mathematics, as they helped me find answers for my reasonable doubts while exploring nature.

Driven by my curiosity towards the domains of Fluid mechanics and Heat and Mass Transfer, I knew it was perfect for me to pursue my tertiary level education in Mechanical Engineering specializing in Thermal Sciences. Guidance from profound professors along with better lab infrastructre of prestigious institutions chosen, allowed me to understand the fundamentals and complexities of engineering problems, which opened up new arenas and kindled my research competencies. The well-structured courses provided an opportunity to explore the physics of nature opening a new dimension of conceptual understanding when modules on Differential relations of fluid flow involving mathematical interpretation of flow characteristics were studied. During postgraduate studies, my incessant passion kept me an active research group member of the Micro/Nanofluidics Laboratory working on multiphase problems confined to Droplet impact dynamics on the coated surface under the supervision of some eminent professors. The research demanded extensive studies in the field of Advanced fluid mechanics and Computational Fluid Dynamics to deal with the complexities involved in experimental and numerical investigations. For aiding my research, I required improvements in programming skills and had to practice autodidactism on Python, OpenFOAM, and Scilab tools. The academic performance that I displayed fetched me excellent grades as the topper of the institution, also a Certificate of excellence by the University during my undergraduate and postgraduate courses. Apart from academics, I showed active participation in sports and social service activities which contributed in moulding my temperament. With all the collective knowledge and skills acquired during my postgraduate studies, I realized that the real-time industrial experience will add more value in the quest for the answers to my inquisitiveness.

On a self-introspection note, the career trajectory from Graduate Apprentice, Vikram Sarabhai Space Center to Assistant Manager, Hyundai Motors India Limited steered the transition from notebook calculation to the real scientific world, also nurturing the leader inside me to thrive in such a competitive environment. The meticulous accuracy and aspects of creativity that I was exposed to during my professional career positively impacted shaping me as a better engineer. Long healthy discussions with designers to understand critical functioning parts and working principles gave me further insights into the realm of Fluid mechanics and Heat and Mass Transfer. My dedication

and professional excellence benefited me with several opportunities to work on challenging projects. Some of which require special mention, viz. Resonance-based acoustic protection system for Launch Vehicles and Front floor orbit manufacturing systems, which demanded high technical expertise and innovative solutions for its timely completion. Overall, the projects taught me so much to work around interdisciplinary fields with some of the experts from diverse cultures. Such industrial exposures, made me cognize that real-life engineering problems demand equal weightage to technical and managerial aspects. Learning to approach problems not only with applications of high analytical and problem-solving skills but a holistic treatment considering economics and time restrictions made me evolve into the engineer I am. Experiences gained made me realize I have a long walk ahead in the field of science, hence I decided to pursue higher studies.

With the penchant for research, I started with attending seminars and online courses by testing time management skills to indulge in independent research while continuing in the industry. With the ecstasy and satisfaction gained by successfully converting my Master's Thesis work into a publication in a reputed journal after some extensions, the researcher within me decided to continue research on a full-time basis. Thus, my hunt for a suitable Ph.D. program tailored to my interests was set in motion. On searching several portals and University websites I was delighted to find a Dual Doctoral position offered by IIT Kharagpur & University of Manchester that could satisfy my inherent desires as a researcher. I did extensive research by diagnosing the pros and cons of what both universities could offer me, and to my understanding, both the Universities offer a plethora of resources and opportunities to excel in my domain. Skimming through the resources, I understand a position with the potential research group here shall make me a benefactor by working with a culturally diverse and rich team, having an exceptional research record. Topic entitled: Cavitation Bubble Dynamics- experimentation and numerical modelling using smooth particle hydrodynamics (SPH), befits my choice, accounting to my interests in the experimental and computational research of multiphase problems and challenges that it possesses. Additional factors to back my decision were that the expected outcome promises to add value for industrial applications. Accentuating my inquisitive and tenacious nature, I firmly believe that I have the ability, passion, and motivation to exceed the requirements and excel at the University. Even though I realize the highly competitive demands of the program, I am positive that this program at your esteemed universities will be a great path to achieve my dream and will be an excellent place for me to find better answers for my curiosities. If allowed to be part of the research group, I shall put my knowledge and skills to the test, in turn contributing to the team by delivering promising results for the upliftment of the scientific community. Therefore, I would be very happy and honoured if I were to receive admission to this program.

Thank you for your time and consideration.

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