

Statement of Purpose

When I was in middle school, I used to sit next to my uncle on long road trips and it struck me how remarkable it was that some oil that is extracted from deep underground gives energy to this complex contraption on four wheels that my uncle is somehow commanding with his feet and hands to help us move effortlessly from place to place at great speeds. All the marvellous engineering that goes into extracting that oil, making it consumable, constructing a machine that could make use of the potential in the oil, coming up with a design that would use that potential to move as we wanted, the ingenuity of all this drew me into the fascinating world of Mechanical Engineering. I cannot pinpoint a particular instant as being the inception for my love for Mechanical Engineering. Rather, it was seeded with that fascination, and it only kept growing as I delved deeper into it. It has not stopped yet.

In the four years of my study at IIT Bhubaneswar, I was introduced to various fields in Mechanical Engineering apart from various elective courses that included Mathematics. Of particular interest to me were Fluid Mechanics, Transform Calculus, Partial Differential Equations and Machining. I found it extremely interesting that any perceptible natural phenomenon, no matter how complex, can be brought down to an equation and some conditions on a piece of paper and that the secret to understanding and predicting all those phenomena lies in coming up with a solution to those equations. Thus, subjects like Analytical Fluid Mechanics were of particular interest to me. However, I learnt that not all those equations can be solved analytically. Therefore, I was encouraged by my professors to equip myself with basic modelling and simulation skills. Over my time there I cultivated an intense desire to learn. I got a taste of the joy of figuring out solutions to engineering problems and it is a high that I want more of.

I believe that I have a knack for analytical thinking and problem solving. I am aware of the great power of numerical methods and computation and am keen on harnessing that power to solve problems. For my final project, under the supervision of Dr. A. Venugopal, I chose to work in the field of Fluid Mechanics on Steering and Focusing of Synthetic Jets. I was focused on building a prototype that would successfully demonstrate steering and focusing of 2-D synthetic jets due to vortex-vortex interactions. It was there that I understood the importance of computation. All the geometrical parameters I used to design the prototypes were previously modelled and the vortex-vortex interactions of various prototype sizes were first simulated to determine which range of non-dimensional parameters would give the best results. This made the construction much easier. There was no analytical solution to the problem and constructing multiple prototypes of varying sizes would be expensive and time consuming. Though I was not familiar with using computation in Mechanics, I was forced to acknowledge the drastic improvement numerical methods like Finite Element Analysis could bring to solving problems. In my fifth and sixth semesters, I was part of a club that designed and developed a single seater all-terrain vehicle. I oversaw designing the roll cage of the vehicle. This made me fairly competent at computer aided design and exposed me to solid structure simulations. During the summer after my sixth semester, I took up a research internship in Indian Institute of Science, Bengaluru where my focus was to develop a MATLAB program that would post-process images of particle laden sessile droplets subjected to vibrations. It was this project that gave me a taste of Research in general and this is something that I want to be exposed to more.

After graduating, I have now worked for nearly two years as an operations officer in IndianOil Corporation, at an oil distribution terminal. Working here has given me a knowledge of instrumentation, automation and how research is carried over as solutions to industries. My purpose in applying to this program is to explore the fascinating idea of Research to a greater depth,

something I have no doubt I will thoroughly enjoy. I believe that I have a good sense of commitment and responsibility and shall strive hard to achieve my goals.