As my father is a mechanical engineer, I have often visited his manufacturing workshop with him when I was at school and this has gradually sparked my interest in the field. Seeing the complex machines working in sync with each other to produce light bulbs and the level of automation of these machines greatly ignited my curiosity. To quench my thirst for knowledge about these machines, I read several science magazines that introduced me to the wonders of space exploration, satellites, and rovers. When I attended a Tech Fest conducted at IIT Bombay during my undergraduate program, I learned more about the scope and potential applications of space exploration. I began concentrating on subjects such as Computational Techniques, Programming Languages, and Computer Applications in Mechanical Engineering to build a strong knowledge base and skill set in this field. Eventually, I learned about several technological advancements in recent times especially in the domain of control systems and robotics, and the level of automation that can be achieved by deploying these technologies fascinated me. Taking a course in CAD/CAM design and simulation software, and visiting an industrial exhibit at Gandhinagar enabled me to become familiar with the latest technological advancements and possibilities in the field of space exploration. I am currently pursuing an online course on Robotics and my learning so far has motivated me to work on the development of a fully autonomous small-scale wire bending machine to bring about automation in the manufacturing industry. In order to go further down the road and take up research in the field of robotic systems development, I wish to begin by pursuing a postgraduate education in Robotics and Control Systems.

Being a lover of science and mathematics since school, I constantly wondered about the machines that were used at home and at my father's workplace, and attempted to study their construction and working in detail. After completing high school, I wanted to pursue a course that would help me apply my knowledge and skills in the real world, and so, I decided to take up my undergraduate studies in Mechanical Engineering. During this period, the subject that I enjoyed the most was Dynamics of Machines where I learned how to design various mechanisms, cams and followers, and gears, and balance masses and vibrations which catalytically increased my interest in robotics. Another course that I thoroughly enjoyed was Production Technology where I learned about the various manufacturing equipment and processes, and the various control systems adopted in machines. Not wanting to limit myself to hardware, I learned the different programming languages and computational techniques which helped me understand complex mathematical operations used for analysis of engineering models. This further enhanced my interest in control systems and robotics motivating me to choose my elective subject, Computer Applications in Mechanical Engineering. This was one of the most inspiring subjects of my undergraduate program where I learned about microprocessors and microcontrollers, CAD/CAM and PTC Creo, fuzzy logic, neural networks, digitial differential analyzers, motors and automation systems, and C++ programming. All these skills were extremely useful in helping me build a strong foundation for the development of beneficial and smart robotic systems.

Eager to explore the capabilities of all the technologies and skills I had learned during my undergraduate coursework, I wanted to develop an innovative system that would address a pressing issue in the industry. Hence, I decided to work on the development of a multi-bot material handling system which was inspired from Centibots and KIVA Robots where the functions of several bots are synchronized to perform a single task. For this, I used bots that were centrally actuated to work in sync

with each other for carrying a material from one location to another. A centralized control unit would decide the number of bots that were needed to carry a specific amount of load and the time that would be required for the task. This system could offer unsupervised autonomous transfer of resources which could find application in warehouses where a large amount of load is constantly transferred from one place to another. Due to its ability to define the number of bots needed for optimum transfer, simple design, and greater versatility, it could be widely adopted in industries and could end up saving a lot of time and manual effort. Working on this project enabled me to learn about hardware as well as software components, and I was able to build a strong technical skill set in chassis design, determining dimensions of the chassis, integration of mechatronic systems and microcontrollers with stepper motors, integration with DC motors, and NRF modules. A challenging part of the project was programming of the central system so that the bots could communicate with each other through the NRF modules; however, I managed to learn and put the wheels in motion for this project and developed the entire logic for the bots and the central system.

Wanting to apply my acquired knowledge and skills in industry-level projects and to learn about the automation of various manufacturing processes, I decided to undertake an internship at Crompton Greaves Consumer Electricals Ltd, one of the highly reputed companies in the field of electric technologies. On the first day of my internship, I was given the task of proposing ways by which the efficiency of the manufacturing line could be improved. To begin with, I did an extensive on-site survey of the various equipment and processes used in the manufacturing department, noting down the time required for each stage of the production process and the types, number, and severity of defects detected in the final product. An in-depth analysis of this data helped me isolate one production process that contributed to the largest number of defects in the product. After considering all possible ways of improving the efficiency of the process at this stage, I proposed that reduction in the oxygen consumption could lower the occurrences of defects in the product. I also hypothesized that if sensors were used to detect product defects at this stage, a lot of money could be saved in preventing these products from going through the entire manufacturing process and being rejected at the end. Although I could not test the feasibility of my proposals due to time constraints, the biggest takeaway from this internship for me was the significance of analytical thinking, logical reasoning, and presence of mind while working in an industry, and the knack of optimizing and automating procedures for profitability of the company.

Apart from my undergraduate coursework, I participated in several extracurricular activities that helped me acquire an enhanced understanding of the current state of technology. I attended a training program in CAD/CAM software conducted by Siemens where I learned how to design and simulate mechanical components and perform strength analysis using different parameters. In order to develop my creative thinking skills, I participated in the MG Innovation Challenge conducted by MG Motors where I attempted to reduce exhaust emissions and increase the produced power at the same rate of exhaust emissions. Being a leader of my team for this competition placed a huge responsibility on me, but I gladly took up the challenge acquiring effective communication and leadership qualities on the way.

After completing my undergraduate studies, I wanted to get some experience working in the manufacturing sector on real world projects, and so I started working at CEAT Ltd, one of the leading tyre manufacturers in India. During my work period here, I got in-depth knowledge of the various equipment and processes used for the manufacture of various types of tyres, and this showed me the potential of applying robotics and control systems to automate the manufacturing processes in these types of industries.

Although my work at CEAT Ltd was very educational, it didn't serve my purpose of wanting to pursue research in the field of applications of robotic systems for automation of processes. Now, I look forward to pursuing my postgraduate education in Robotics and Control Systems so that I can build a strong foundation for me to apply my knowledge in the domain of space exploration. After completing my higher studies, I intend to go for my doctoral studies where I can get involved in extensive research for building drones, satellites, and rovers. Eventually, I would like to work as a professor continuing my work in developing UAVs, drones, and systems used in satellites and rovers that are required for space exploration purposes.

In order to fulfill my goal of doing research in the field of robotics, I wish to take up a postgraduate program in Robotics and Control Systems at _____ University. The numerous research projects that I have worked on and the internship I have attended during my undergraduate period have given me a strong command over the concepts. I now wish to deepen my understanding of the field and become up-to-date with the most recent trends in the field of robotic technologies. I intend to acquire a strong technical skill set by pursuing several exciting and challenging projects at your state-of-the-art research facilities. Being guided by accomplished faculty such as _____ and _____ at your premises will help me take my projects to the next level and acquire a more comprehensive understanding of the field.

My experiences in using my knowledge and skills for research projects in my field of interest have given me a strong knowledge of my subjects, and I am confident that my aptitude and passion for the field will help me stand out at your campus.