"Awareness". This is what humans possess but machines lack. Not long ago, this assertion would remain unchallenged. However, our perception of the future is changing and Robotics is a field that is bringing about this revolution. I too, want to contribute to this future. I am currently, an undergraduate student in Electronics and Communication Engineering at Manipal Institute of Technology. I wish to apply for the Masters' program in Robotics at University of Pennsylvania as it is aligned with the area of my interest and the course of my undergraduate studies.

In retrospect, a watershed event for me was being recruited by the College's Robotics team in the first year of my undergraduate course. As I spent countless hours in the Robotics workshop, solving problems, learning, working on and implementing ideas that I came across for the first time, an enthusiasm grew in me towards the field of Robotics. Of the many subjects that Robotics encompasses, one that I have the most exposure to, is the design of embedded systems. During the time I spent at the workshop, I gained greater insight into the use of principles of Signal Processing, Control Systems, Machine Learning as well as basic Mechanics that apply when designing and building a robot. I was able to hone skills such as programming, PCB design, and etching, soldering, as well as basic carpentry with the help of my seniors and teammates. I learned how rewarding sleepless nights, hours of toil and dealing with multiple failures can be when targets are reached successfully. I enjoyed working alongside my teammates who were similarly motivated towards research and development in Robotics. It was then, that the firm resolve to continue learning and working in this field arose.

Individually and as part of the Robotics team, I have experienced working on an eclectic variety of projects. My first project was building a Bluetooth controlled model car that was controlled by a GUI on my laptop. Building it from scratch made me very proud. More recently, I built a Robotic arm with three degrees of freedom, along with a gripper. To control its movement, an inertial measurement unit sensor was used for feedback. IMU sensors are MEMS sensors that output fairly sensitive yaw, pitch and roll values. In order to make a robust control system, a PID controller was implemented. One of the many hurdles I faced was to ensure the precision and stability of output, which is key in any robotic system. A project of mine in the seventh semester, based on Computer Vision concepts involved recognizing characters on a paper keyboard. The task demanded identification and tracking of the human hand fingertips, recognizing the position and translating this information to the character to be read. Resilience to variable lighting conditions and adequate speed of the algorithm were issues that I worked to improve upon.

Internships gave me the chance to work further on challenging tasks. An internship at Yostra Labs, Bangalore, in 2016 under the tutelage of Dr. Maruthi, included discovering the proof of concept for a non-invasive, affordable hemoglobin measurement device. The challenge was to be able to "see through" human skin, find a correlation between externally measured factors and hemoglobin levels. In 2017, as part of a project at the Indian Institute of Science with Dr. K.V.S. Hari, I was given the task of creating an algorithm for path planning of an autonomous self-parking vehicle. While the project concentrated on a very specific scenario, it was interesting to learn the kinematic model of four-wheeled vehicles and build an algorithm that would take into consideration all constraints that operate in the scenario, which the autonomous system must be prepared to handle. The robotics team I was part of, worked on a number of interesting projects too. One of which was a semi-autonomous badminton-playing robot that used a pneumatic actuator to thrust forward a badminton racket when a shuttlecock was detected by an IR sensor grid. The next year, we built a robot that, powered by a miniature horizontal axis wind turbine, could navigate through an obstacle course by line following sensors (cameras). My work in these projects involved designing and implementing analog/digital circuits according to system requirements, interfacing sensors and actuators with the processing units, designing PCBs for modularity, ensuring power efficiency and safety of each component. The experience and knowledge I gained from this work are invaluable to me. Upon deliberation, I have found that there are many difficulties when automating machines to perform even seemingly normal actions. Something

that leaves me in awe and compels me to further explore this domain is the complexity of tasks that Roboticists bravely undertake and the ingenuity employed in their solutions.

I believe that given the right platform, I will definitely make good use of the opportunity and work hard to better myself. I have always been an enthusiastic learner and my active participation in school and college level activities is proof of this. In school, I would often take part in debates, Olympiads and other scholastic competitions. Due to my excellent academic record and rapport with my peers, I was also appointed school captain in Class 12. Since my father serves in the Indian Air Force, my family has had to shift to different cities every couple of years. Despite transferring from one school to another very often, I have always been quick to adapt to the environment and make new friends. I have an enterprising nature and take on new endeavours with great vigour. I feel that pursuing a Masters' program in Robotics at the University of Pennsylvania is an apt choice for me and I am suited to be part of this prestigious institute. Its labs boast of cutting-edge technology and host the most contemporary research work. It is my greatest wish to learn from the institute's expert faculty and become proficient in the field.

One area that I have always been extremely interested in is Human-Robot interaction. Through improving my skills in subjects such as computer vision, signal processing, control systems and embedded systems, I want to create machines that are safe and effectively aid human life. The addition of robots to areas such as elderly assistance, surgical procedures, and medical rehabilitation is a cause that I want to devote my time to. Through exploration of the university's website, I have found that a group led by Dr. Michelle Johnson at the Rehabilitation Robotics lab undertakes research of this exact nature. In this context, if granted the chance to be a part of the University of Pennsylvania, it is my ardent desire to participate in Dr. Michelle's group and work in this field. I plan to continue my education, after a Masters' degree, with a Ph.D., and in the future, a career in teaching and research. Currently, a greenhorn in the field, I wish to make worthwhile contributions through my research. I feel that this course offered by the University of Pennsylvania is best suited to help me accomplish my dream.