Statement of Purpose
Applying to the Computer Science Department (AI Lab)
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"Allow your passion to become your purpose, and it will one day become your profession."

This famous quote precisely describes how my passion and curiosity towards technology, led me towards making engineering being my passion and ultimately, my path of career. Being born and brought up in a traditional Indian community and, at the same time, one of the centres of technology globalization of India - New Delhi, my life has been placed around striking the perfect balance between traditions and innovation. I have been motivated by technology since I was a kid and have witnessed its power in the last decade and a half. Now that I am capable enough, I do not intend to be a mere spectator as technology shapes our future - I aim to be one the change makers.

'Know-how' was always my driving force to learn, throughout high school and the senior secondary. With a keen interest in technology and gadgets, it was only a matter of time before I was drawn towards the world of Computers. I remember that my first push towards the world of computer sciences was in school when I witnessed the change first hand. During grade 6, we saw a sudden influx of computers. Our classes started being taken on projectors, our attendance on excel sheets, curriculums and circulars being mailed online. The transformation brought with it an incredible time efficiency and visualisation to concepts that only used to be words once. This new world that I saw emerging, gave rise to my ever-growing passion for the understanding and creation of the computers.

Soon I decided to pursue engineering in this field. Being in an academically rich and educationally driven country like India, the level of competition led me to focus on every major exam in route to ending up at IIIT-Delhi. As I soared through the senior secondary school with merit, I was all set to pursue my passion for computers and technology, as my career at this esteemed Institute of Engineering. IIIT-Delhi is a professional institute highly regarded for its values in education and excellent faculty. It follows a US based curriculum and way of teaching. With this promising path in front of me, I made it my goal to use this opportunity as a platform for growth.

Studying at IIIT-Delhi, I tried my best to grab every opportunity to learn and expand my experience in each sphere of software engineering, whether it be in skills or teamwork. This provided me with my next big push towards technology. Inspired by a TED Talk by Pranav Mistri on wearable computing and augmented reality I took a workshop in Interactive Design at Infizeal Technologies. As my first steps towards engineering my ideas, I made my first gesture controlled car. This was a tipping moment when my passion truly transformed into purpose.

Coming along the learning curvature in the course, I dedicated myself to gathering new skills and acknowledging the areas I needed to focus on to excel in my career. As I saw facebook, google, microsoft, apple all evolve into what they are, I realized the importance of coding and made it a goal to learn how to write good scalable code**.** I took up internships at MoMagic Technologies and Lava international, both experiences that provided me with valuable experience in this area- The former in the form of application development and testing and the latter in the form of designing large scale tertiary systems and databases. My constant efforts and determination to learn, led me towards achieving Teaching Assistant positions in all my semesters after completing 2 years. Through this opportunity, I also got the chance to design the online content for System Management for Dr. Amarjeet Singh. Since then, I have been a TA for courses such as Introduction to Programming, Data Structures and Algorithms and Advanced Programming. My growth and recognition as an able programmer also led me to be elected as the administrator for a prominent programming club at IIIT-Delhi – 'Foobar'. This has been one of the most fulfilling and enriching experiences that has also reinforced in me the importance of not only being dedicated and focussed but the being able to help others reach their maximum potential.

My next big push came when I was introduced to the idea of 'Machine Learning' through an online course by Dr. Andrew Ng. As I expanded my knowledge in this concept, I took up an independent project on 'Distress Detection', under the guidance of Dr. Sanjit Kaul and his PhD student Anil Sharma. In this project we used audio data to detect distress in the ambient surroundings (Screams) by using trained SVMs. I worked on this project for a year testing the algorithm, collecting data, testing classifiers and designing the application and monitoring dashboard. During the course of this project we tackled a lot of problems. It all culminated in us winning the 'Elevator Pitch" competition for the Best Poster and Demo at the Research Showcase'15 (IIIT-Delhi).

Research is a parallel road that runs along every professional field. It is what provides us with the scope of implementing new ideas and designing the future. I had my first taste of research in the winter months of the 2014 when I took up a research internship with Dr. Saket Anand, my to-be thesis advisor. I had earlier worked with him on a 3D modelling project in the summer break and this time I got to work on another interesting project with one of his PhD students Ankita Shukla in the winter break. This was a great learning experience where my course work in Image Analysis and programming background was tested thoroughly. Dr. Saket made sure that since it is my first research

project I begin the work with a strong foundation and guided me with the process of doing active research from day one. My role was to perform literature surveys and later implement graph cuts on tiger images taken in the wild and cancer cell images to perform binary segmentation based on a kernel based semi-supervised distance metric. While working on the project my interest grew in the field of Computer Vision and I took up the course the following semester, finishing top of my class . As I explored the field of research, I saw a new horizon emerge towards computer vision when Dr. Saket introduced me to Dr. Chetan Arora and helped me take up my Thesis topic, “SLAM in egocentric Videos”. The work for this thesis has been divided into three phases - Literature Survey, Implementation of the State-of-the-art and improving upon the limitations in the egocentric context. As I am working, a whole new dimension of technological dynamics has unfolded in my vision, another feeder to my passion in this field. While this is still an ongoing project with its completion due in May next year, the exposure I have got till now by reading through all developments made in SLAM till date to implementing and deriving the State of the art from scratch has been intense. I recently implemented my own version of the LSD-SLAM algorithm by the TUM group. My advisors have always maintained that before writing even a single line of code one should derive everything no matter how trivial it is on a paper. This although proved to be a challenging task in the beginning but today with the code working I realise how right they have always been.

With regards to continued learning and to be at par with the global development in the profession, I have taken up many relevant courses throughout. Some of these include- - Image Analysis, Mobile Computing, Pattern Recognition, Data Mining, Machine Learning*, Computer Graphics* and Artificial Intelligence*. Backed by my interest in the field I have always completed these courses with flying colors. Though these are very heavy courses when one thinks of attempting them in a single summer I feel a challenge makes the learning even more worthwhile and valued afterall! (*ongoing courses, results awaited)

Earlier during summer this year, finding an interesting internship was not at all a challenge with Dr. Saket and Dr. Sanjit Kaul initiating Swarath at IIIT-Delhi. This was an autonomous car project, in which I led a team of 2 towards designing the software system for the Perception Module and the Testing Suite. In the initial phase I also trained 40 interns through workshop sessions on Git, ROS and programming in C++. Under this project, I worked with people from diverse backgrounds and learned a lot about the state-of-the-art. I coordinated work amongst the team members, and took a constant feedback. This helped the team work together and successfully complete the work within the proposed deadlines. From making a gesture controlled car two years ago to working on an actual autonomous car today I feel a sense of accomplishment and at the same time a sense of being confident that I am working in the right direction..

Through these experiences I realized that my interest lies at the intersection of Computer Vision, Statistical Machine Learning and Artificial Intelligence and is strongly motivated by application of these technologies to design sophisticated systems that will allow autonomous systems to be better integrated into human life. Even in my course projects I chose to work on topics in my recent projects on the same lines such as - multi-agent path planning, multi-sensor data fusion for human activity detection, a survey on scene recognition using bag-of-words, etc. When it comes to research work at Stanford, work of Dr. Silvio Savarese done on scene understanding at CVGL particularly intrigues me as it is closely related to the work I have done and studies in my thesis and course projects. That said my interests are more specific to the application of scene understanding in autonomous systems. His work be it on Scene Layout Understanding, Occlusion Reasoning , Object Category Recognition as proposed in the papers can readily be applied to autonomous systems to make the smarter. The recent news about the Toyota - Stanford collaboration piqued my interest even more in applying to stanford. I would love to join the group working on AI-assisted driving and believe that I would be able to contribute significantly owing to my current experience in the field.

When I think of the future, I think of the infinite possibilities that human mind has encountered so far and brought into reality, so many ideas and turned them into technological marvels. I also aim to do so. And thus, I aim at gaining relevant knowledge about the field and being a leading researcher. My vision in career is to either work in a lab setup or in academia. At the same time, not ruling out opportunities of entrepreneurship that I will definitely take up with time. Stanford is globally known for its research contributions to the field and serves as a dream destination for any aspiring researcher. If the sheer resources and academic support the Stanford can provide is not enough, my next most important reason would be the people. To share a classroom with some of the best and brightest students besides being advised by some of the leading researchers in their respective fields sharing the is alone a reason big enough for me to choose Stanford.

What I bring to the AI Lab at Stanford is a strong work ethic, an unbounded imagination for an abiding curiosity and the passion to be a leading researcher in the next 10 years besides relevant work experience and a thorough understanding of the state of the art . What I look for at Stanford, very simply put, is an opportunity to shine.