I was exposed to AI at the onset of the ML boom through Dr. Andrew Ng’s Stanford Online course. As a result, I started getting excited about applications of ML from a young age. I knew from then on that this was exactly the field I wanted to work in and dedicate my life to – and I started preparing by developing my calculus and programming skills. At that time, my exposure to self-driving cars and recommender systems made me feel like I knew all there was to know about this field. But five years later, I found myself in a world that got consumed by AI, and it exploded so fast I could hardly keep up.

I come from a country that ranks high on the poverty index, with 76% of the population living on under $5.5 a day. As a result, the technology boom was slow to reach us back home. I believe Google came to Bangladesh in 2012, and a dedicated broadband connection became a reality in my house only in 2015. Even now, technology hasn’t properly reached most parts of Bangladesh, and being computer savvy still means knowing Microsoft Word and Excel, and your prospects are great if you can land a government job where you do exactly that all day.

However, that wasn’t enough for me. I’ve always had bigger dreams, and they have forever compelled me to strive to be the best version of myself. A pursuit for better higher education has led me from Bangladesh to Germany, and now from Germany to the US. My passions have enabled me to stay strong and motivated as I churned through a strenuous engineering degree, and they helped me secure an internship and gather industry experience at Bosch, which is one of the largest tech giants in the world and a leader in cutting-edge engineering research and technology.

Throughout my undergraduate career, I have focused on taking actions that would prepare me for the next stage in this journey – research. I have accumulated knowledge in topics such as Computer Vision, Information Theory, Robotics, Control Systems, Digital Signal Processing and much more. For my internship, I worked as a Software Engineer for the Motorsport Data Acquisition Team at Bosch Engineering GmbH, where I largely dealt with Formula 1 car technology. At Bosch, I developed a framework for Syslog Analysis for F1 car devices, which provided me experience in dealing with large, tangled datasets. Moreover, working in data-oriented framework development strengthened my background in tools such as Python, C++, OOP, Pandas, Flask, QT, and Linux. During my exchange program at Drexel, I have expanded my knowledge in domains such as Transfer Learning, Reinforcement Learning and Natural Language Processing, and learned how to implement basic algorithms like GRU, DQN, LSTM, RNN, GAN etc.

With some hard work and dedication, I was also able to secure a research opportunity with Bosch Motorsport for my thesis. I will start next semester, and my research will involve developing strategies for the optimization of the Bosch Telemetry system. Using a predictor model and a network simulator, I will be simulating the signal chain telemetry around the racetrack, which would provide me information on bandwidth (data throughput) and network delay. Using this information and some priority specifications, I will be able to analyze the efficacy of existing algorithms for data transfer such as backfilling, reordering, prioritization, low-priority data decimation and their combinations thereof. This will allow me to choose the best algorithmic combination to maximize gain and minimize effort based on user-defined priorities, which is the goal of my thesis.

In many ways the last couple of years were very fulfilling, but in other ways they were the most difficult years in my life. My father passed away right before the intended start of my undergraduate education, which resulted in a delay in my studies. I hadn’t fully recovered from this incident when I started my undergraduate degree, and leaving my mother and sisters alone at home just a year after made it very hard for me to keep moving forward. Until the point of his passing, we never knew a life or a world where he didn’t exist. He’d be the one to wake us up in the mornings, sometimes holding fruits or other tasty treats to tempt us out of bed. The mornings felt more alive to me when I’d sit with him on the balcony talking about something or another. These memories made it unbearable to cope with his passing, and more so because we never really found the time to grieve.

Our family business and my family’s assets fell into disarray very quickly after his passing, like a trail of dominoes. It seemed like something was always going wrong after my father passed. My days were spent dealing with the crashing family business or an income tax lawsuit or a person claiming we owed him money or the civil lawyer claiming some of our assets were in trouble. It wasn’t perfect by the time I was leaving for Jacobs, but somehow I was able to contain the chaos, and continue working with my family to fix the recurring issues as I carried on with my education.

It affected everyone in different ways. While I dealt with depression in Germany, the physical activity requirements for keeping everything afloat took a toll on my mother after my departure, and she was inflicted with Osteoarthritis. Even still, she has always motivated me to keep moving forward and fulfilling my dreams, and I think that’s one the biggest reasons I am adamant about never giving up. Before it was ever a thought for me, my mother dreamed that I would have a PhD someday, and it is through her enthusiasm and inspiration that I learned to make this dream my own.

As I embraced a life more intertwined with reality over the last 4 years, I learned a lot about managing expectations, and I’ve realized that my biggest competition in life can only be one person: Me. There were always setbacks that made it hard to continue in this rocky path. There were low-points when things went so wrong back home that I couldn’t focus on studies or exams, which affected my grades sometimes. But I always knew that it was more important to get up after the fall, and that’s exactly what I concentrated on every time. These experiences have also led to moments of self-actualization. It helped me realize that the most important goal for me on a given week is to be better than the person I was last week. When I take an exam, I don’t do it for the A, but rather to assess where I stand, how much I know, and where in my knowledge I could fill the gaps. When I apply for a job, I think of the people I’ll meet, the experiences I’ll create and the fun new things I’ll be able to do.

That’s what I had in mind when I was applying for the exchange program at Drexel, and I believe this is one of the biggest reasons I fell in love with the whole Drexel experience. During my exchange quarter, I was able to exercise my ideologies to their fullest potential. I took the time to make many friends, travel all around Philly, and create some good memories. From an academic standpoint as well, I enjoyed my quarter to the fullest. My education at Jacobs provided me a strong theoretical background which is invaluable, but I started seeing these theories fully put to action at Drexel. At Professor Prawat’s “Design with Embedded Processors” course, we learned how to program microcontrollers on embedded Linux distributions to develop IoT applications, like controlling LEDs or Servos from websites being served from a Beaglebone, and being able to use my knowledge to build things on my own was a fulfilling experience. But the highlight of my Drexel academic experience was Professor Walsh’s course, “Machine Learning Engineering Practicum”. For the first time, I found myself going beyond the theoretical barriers and applying advanced concepts such as Transfer Learning and Reinforcement Learning. Professor Walsh showed us how to apply these concepts and build functional models that can classify flowers or play the Atari games. Furthermore, we were introduced to very powerful tools such as tensorflow, scikitlearn, tf-agents, Google Cloud Platform, Pandas, and much more, and his instruction made us capable of using these tools to build these models on our own.

As I prepared for my PhD application, Professor Walsh also took time out of his extremely busy schedule to guide me. We talked about my interests in Transfer Learning, Computer Vision and Reinforcement Learning, and how I might pursue a research career in these fields. He also introduced me to research currently being undertaken at Drexel which are within my areas of interest, which helped me a lot with my search. We talked about Professor Walsh’s own research in Network Coding, and his interest in further exploring Bounded Rate regions, which I found very interesting as a possible avenue of research with the Adaptive Signal Processing and Information Theory Group.

We also talked about recent contributions by Dr. James A. Shackleford, Dr. Nagarajan Kandasamy and Dr. Gregory C. Sharp in the research of improving precision of deformable image registration, which was very intriguing for me due to the brilliant use of U-Net and CycleGAN to improve precision on image registration using CT-CBCT datasets. A future direction for this work would be the use of CNNs to perform image registration, which is something I am interested in exploring with the respective Professors.

On Professor Walsh’s suggestion, I also attended the Drexel Graduate School Seminar, where I learned more about Drexel research which are highly aligned with my interests. I am particularly interested in Professor Matthew C. Stamm’s research in Information Forensics, and I believe my background in signal processing, machine learning and information theory makes me a good fit for his Multimedia and Information Security Lab (MISL).

Through the same seminar, I was also introduced to Dr. David Han’s research and the Intelligent Machine Perception and Learning Laboratory (IMAPLE), and the outstanding research conducted by IMAPLE in vision based aerial object detection and classification, 3D scene reconstruction and underwater target detection using acoustic scene understanding. These are some amazing topics I would love to conduct research on under the supervision of Dr. Han.

Drexel contains the faculty, opportunities, and resources I require to obtain outstanding mentorship and become an expert researcher. It has a beautiful campus populated with brilliant students that I would like to surround my life with. Studying at Drexel for a quarter has made me very familiar with its campus and its community. Furthermore, my own interests align very well with some of the excellent research being conducted at Drexel University. That is why I want Drexel to be the next chapter in my book.