STATEMENT OF BACKGROUND AND GOALS

Mahedi Kamal *Ph.D. Applicant*

I am applying to the University at Albany for the Ph.D. program in Computer Science, to deepen my expertise in computer vision, robotics, and machine learning, and contribute to these rapidly developing fields. My academic background, research experiences, and professional skills have provided me with a solid foundation and inspired me to pursue an academic career focused on research. And, the reputed Ph.D. program offered by University at Albany will most certainly leverage my endeavor to chase this dream.

My academic journey has been shaped by resilience through significant health challenges. At the start of 9th grade, I faced a critical health episode that kept me out of school for nearly a year. Although doctors expressed concerns regarding my ability to resume studies, I returned to my academic pursuits and ranked within the ***top 4 percent*** nationally in my 10th-grade exam among 1.6 million students. In my 12th grade exam, I placed within the ***top 1.2 percent*** among 1.3 million students. I completed my bachelor's degree in Computer Science and Engineering at the Military Institute of Science and Technology, one of the finest engineering institutes in my country, and achieved a CGPA of ***3.64***. I was also closely associated with different extracurricular and cultural activities. My experiences have instilled in me a commitment to overcoming challenges and striving for excellence.

My research experience has been pivotal in my decision to pursue a Ph.D. I have published ***5 papers*** in robotics, computer vision, machine learning, and user interface design. The difficulties I faced and the satisfaction I experienced in overcoming them are best illustrated during my work on- ***Monocular Vision-Based Vehicle Distance Prediction Utilising Number Plate***. Though the data pipeline was simple, we could not find the necessary benchmark dataset. We required a dataset of image frames taken from a moving car, and the distance from that car to other cars on the road. Due to budget constraints, we could not use expensive equipment, so we placed markers on the road and manually recorded distances by repeatedly driving the cars. Five team members independently collected data, cross-referencing their measurements to minimize errors. As data collecting proficiency improved, the final ground truth distances were taken by averaging the measurements of the five data collectors. Despite the probability of human error, the system ultimately performed better than initially anticipated because of meticulous data collection.

Since the beginning of my undergraduate studies, I have been actively involved in competitive programming, which has significantly improved my ability to think critically and solve problems. A limited number of teams from each university are chosen to compete in the nation's highest programming competition, the ***ICPC Dhaka Regional*** event, in which I have competed 3 times, and in 2021, my team placed ***45th***. My achievements include a national rank of ***76*** in a Codeforces Global Round, a global rank of ***95*** and a national rank of ***5*** in the CodeChef Starters

32 Division 2, and solving ***over 800*** problems across various online platforms. These experiences have cultivated my confidence in tackling complex challenges and have prepared me well for the rigors of a Ph.D. program

One of my most notable projects is the TWIN robot, an AI-powered system with numerous interactive features. The TWIN robot was able to identify emotions, send out alerts, respond to inquiries, play music, tell jokes, and determine the difference between known users and strangers. A ***Raspberry Pi*** served as the processing unit, and the codebase was developed in Python. This project integrated principles from both ***artificial intelligence*** and ***robotics***, showcasing practical applications of machine learning and automated systems.

Upon completing my bachelor's, I joined Frontier Semiconductor, a USA-based company, as a software engineer. Our lab specializes in developing measurement tools for the wafer fabrication industry, serving clients such as TSMC. My work involves developing software solutions that integrate ***image processing***, ***optical physics***, and ***advanced mathematics***, focusing on aspects such as surface roughness, wafer thickness, wafer bump profiling, etc. Working side by side with Ph.D. graduates who provide direction to our projects has impressed me with their depth of analysis and encouraged me to seek higher education.

I consider myself lucky to have grown up in an era of tremendous technological growth. My academic computer science education stoked my interest in artificial intelligence, which peaked with the introduction of ChatGPT and other similar tools. Being a direct observer of this development has greatly impacted my curiosity about AI and its revolutionary possibilities. My sibling is pursuing a Ph.D. in machine learning at The University of Texas at Dallas, further encouraging my academic interest in this field.

I aspire to broaden my perspective and develop a more discerning approach to research. My goal, following a Ph.D., is to pursue a career as an academician or a research scientist. I feel pride for my country, but as a developing nation, it lacks the resources to support advanced research initiatives. The University at Albany offers exceptional Ph.D. opportunities, renowned faculty, cutting-edge labs, and a collaborative research community, collectively motivating my pursuit of knowledge and contribution to global scientific advancements. I find Associate Professor Ming-Ching Chang’s work on computer vision, and machine learning fascinating because it directly ties to my interests. The state-of-the-art studies conducted by Associate Professor Chinwe Ekenna in robotics and machine learning also resonate with my enthusiasm. Additionally, I found Assistant Professor Abram Magner's work compelling in the field of theoretical machine learning.