

Expanded Goals Statement

My interest in Science dates back to when I was in school. It started with developing some small projects in school science fairs. Besides I was fascinated by how the world worked and questioned everything that caught my attention. Later on completing my Bachelor's and Master's degree in Computer Science and Engineering introduced me to the dynamic applications of computer science towards technology. Realizing the potential applications of computer science I decided to further my career in research in this field and it prompted my interest in the Ph.D. program at George Mason University. Several years from now, I picture myself as a faculty in a reputed university or as an extensive researcher in institutes like Google, Microsoft or Bell Labs to make a real difference on latest problems in the fields.

I am particularly interested to pursue my Ph.D. in the areas like Real-Time Embedded Systems, Fault Tolerance, Low Power Computing and System Security. The reason for my interest about the aforementioned topics is that all of these fields have a large impact on the industrial applications. I have a fascination to work in the industries and apply my hands-on experience obtained from my research. This fascination grew up while watching "Mega Structures" documentaries in Discovery channel. I wondered how big companies are running their factories seamlessly with a very little help from the humans as all these factories are automated and a promising application area of Real-Time Embedded Systems. Fault Tolerance and System Security are very closely related to the Real-Time Embedded Systems as major portion of research in this field deal with the Fault Tolerance and System Security issues. Besides, Low Power Computing involves wireless sensors which are major components of Real-Time Embedded Systems. Recently energy harvesting in the wireless sensor networks has drawn much attention by the researchers as these cause a significant improvement in the sensor as well as the system life time.

I am applying to Computer Science Department of George Mason University as it offers wonderful opportunities to work with some of the finest minds of computer science. I am particularly interested to work under **Prof. Hakan Aydin**. His works on scheduling of real-time systems is a promising area to work on and coincides with my research interest. Prof. Aydin works on various scheduling techniques of real-time task sets that require modeling of workloads, power and various faults. It also requires expertise on probability like poisson distribution. Besides, I am also interested to work under **Prof. Robert Simon** in Energy-Harvesting Sensor networks which require an extensive knowledge on optimization and computer networks. Furthermore, I am also interested to work on the Network and System Security under the guidance of **Prof. Songqing Chen**.

During my undergraduate studies, I covered some major courses like Computer Networks, Data and Telecommunications, Wireless Networks, Operating Systems, System Programming and Security, Probability and Stochastic Processes. These courses have enabled me to get a sound foundation on the topics that I wish to work on my Ph.D. research. Besides

during my Master's studies, the courses like Advanced Probability and Stochastic Processes, Network Systems Analysis and Advanced Optimization Techniques have polished my knowledge and prepared me to work on the aforementioned topics.

My Bachelor's thesis focused on 'Rate Adaptation in Wireless Networks'. The main idea is how we can adjust to the highly varying channel condition in order to maximize the network throughput. I developed an algorithm that outperformed most of the existing ones. During this time I got deeply involved in 'ns-3' simulator where I had to modify the kernel to incorporate my own algorithm. My thesis work 'RARRA: Receiver Assisted Robust Rate Adaptation in Wireless Networks' was published in IUT Journal of Engineering and Technology (JET) in June, 2015. I did my Master's thesis on the extension of my Bachelor's work. This time I addressed the stale feedback problem prevalent in many existing rate adaptation algorithms. I provided a novel approach to overcome the stale feedback problem using neighborhood information from other nodes and then selecting the optimal transmission rate using the regression method. Now I am working on the journal version of my Master's thesis work.

Besides, I am also working as Lecturer in Islamic University of Technology (IUT), one of the leading engineering universities in Bangladesh from where I completed my Bachelor's and Master's degree. As part of my teaching responsibilities, I have conducted several courses like Fundamentals of Computers, Communication Engineering, Mathematical and Statistical Analysis. I have also conducted labs on RDBMS Programming, Computer Networks, Internet Engineering, Wireless Networks, Software Development, Artificial Intelligence and Expert Systems, Simulation Modeling and Performance Evaluation. Besides, I supervised two undergraduate project groups. In addition to that, I also co-supervised one undergraduate thesis group on data mining. Manuscript of our work is under preparation and will be submitted to a reputed conference very soon. Other than my official responsibilities I also mentored several junior year students who became champion in various application development contests in national level.

In addition to that, I have started collaboration with professors from Canada this summer. So far we have completed one project on RFID networks. We developed a redundant reader elimination algorithm that gives minimum number of readers required to cover all the tags available. The performance of our algorithm was very promising compared to other prevalent ones. I also developed a simulator in python for this purpose. We submitted our work to an IEEE conference, which is currently under review.

I believe with the combination of highly capable faculties and avant-garde research facilities, the Ph.D. Program in the Computer Science Department of George Mason University will be the perfect place to help me to pursue my career in academia and research.