

I would like to work on distributed systems because they present possibly the most difficult, and therefore the most interesting problems in the field of software engineering and system design. I believe that this program would give me an opportunity to contribute to this field under the supervision of highly regarded faculty and to develop my research skills to pursue a PhD degree or an R&D career in the industry as a result.

My research experience started when I participated in the Junior Academy of Science contest for high-school students in Ukraine with a machine learning project that tried to predict the rating of an app in the App Store before its launch. After that, I started learning about Algorithms and Data Structures in depth. I wanted to solidify my knowledge in this field and find people who were interested in this topic as well. So, during my first year of university, I started a programming club, where I gave lectures on the algorithms that I had learned before. This was an extremely valuable experience for me, as I realized the importance of communicating my ideas clearly and had an opportunity to practice this skill.

During my second year, I participated in a group project with Prof. Liudmila Omelchuk, where groups of students would develop different versions of an e-learning system. We used genetic algorithms to match students in learning groups based on their skillset and people that they want to be in a group with. I worked on this project as a full-stack developer and was responsible for designing the architecture of the project and the development of the web part of the app. Overall, the project was a success and the final reports were posted on the department's website.

I got my first experience with distributed systems while doing an internship at a blockchain company. At the job, I mostly used libraries that allowed me to communicate with blockchains without having to understand the details of how they work under the hood. I was curious about how developers maintain a distributed system where any bug might cause huge financial losses, so I studied software engineering practices that reduce the number of errors in code such as Test-Driven Development (TDD). I even conducted a small study to statistically prove that using TDD is beneficial to the quality of the produced code and did a talk about it at a local university meetup.

The complexity of distributed systems intrigued me, and in the summer of 2022, I took part in a Summer Research program at the University of Toronto that gave me a chance to learn more about the theoretical aspects of such systems. I worked with Prof. Faith Ellen on the topic of consensus in distributed systems. Specifically, we focused on Byzantine Agreement, a version of consensus where processors might act maliciously. I've been working on this project in the fall term as well by studying the foundations of distributed computing and considering consensus algorithms in different models of computation. The project inspired me to audit a graduate course called "Introduction to Distributed Computing" to gain even more knowledge about the field. While working on this research project, I've realized that besides being clear, it is also important to be extremely precise while defining theoretical models.

As a graduate student, I would like to work on distributed systems. Given my background in algorithms and data structures, software engineering and testing, I would like to work on security, formal verification and game-theoretical incentives in distributed systems. Projects that are related to blockchains and cloud are of specific interest to me, although I'm open to working on other distributed systems as well. As a side note, I'm also interested in participating in the Graduate Blockchain Training Pathway offered by the UBC.

In my opinion, UBC's program presents a great opportunity for me to learn the skills that a researcher needs: precisely define the problem that needs to be solved, conduct independent research, and clearly present the information to others. At UBC, I'd like to work with Prof. Alexander J. Summers because of his research on verification of concurrent programs. I'm also captivated by the research of Prof. Caroline Lemieux on automatic test-input generation, which, I believe, can be extended to distributed systems. Finally, I'd like to work with Prof. Kevin Leyton-Brown because of his work in game theory for multi-agent systems, which is one of the central topics for consensus algorithms in blockchain systems. That being said, I'm happy to work with other professors who would be interested in my application.

Rewards summary

- Mitacs Globalink Research Award
 - Value: CAD 6,000
 - Period: 09/2022 - 12/2022
 - Type: International award
 - Description: stipend to continue the research on randomization in Byzantine Agreement at the University of Toronto.