

**Control and Coordination of Multi Agent Robot System Experience  
Report  
By Gabor Bernat**

Life offers a few unique chances for the lucky ones. The chance to be a part of the C&CofMARS program was definitely one of these opportunities. I found out about the program through some advertising made in my home University (Sapientia – Hungarian University of Transylvania) and contacted shortly after our supervisor Dr. Márton Lőrincz. He guided us through the application process and additionally introduced us to the system on what we were going to work in the following months.



-Vancouver –

We faced multiple difficulties, however finally around October 2009 it became clear that we will spend the period January – April 2010 in Vancouver at the Simon Fraser University. Our excitement peaked along with the fact that the winter Olympics were held in this time period at Vancouver. Therefore like any normal European would act we packed up some warm clothes and got on the plane to Vancouver. The trip was long and tiresome; nevertheless looking back I can say that it absolutely worth it.



Probably as faiths irony we experienced one of the warmest winters in Vancouver. We got there in a pleasant 10 degree Celsius and never really got



below this value. Snow fall only little and that too in the early march. This let us plenty of time to experience the beautiful sightseeing opportunities offered by the ocean-mountains combination that Vancouver offers. However, Vancouver has to offer much more than this. It has one of the most welcoming peoples. It is just mind blowing how thoughtful most of the people are and how often they do not hesitate to say the magic words: “I’m sorry.” It does not matters you go inside a pub or a park. Everyone is careful to make you feel just like home.



Luckily for me I went there together with two of my friends here on the SFU and I had the opportunity to meet there Kotai Adam. Adam was an exchange student from BME. We are all of a Hungarian nationality so it was a lot easier to fit in as we could speak our mother language between us and improve our English knowledge with the others. We worked together on the project, went together to classes, sightseeing, kayaking, clubbing and experiencing foreign kitchens in the many restaurants the city has to offer. I have made friends for a life.



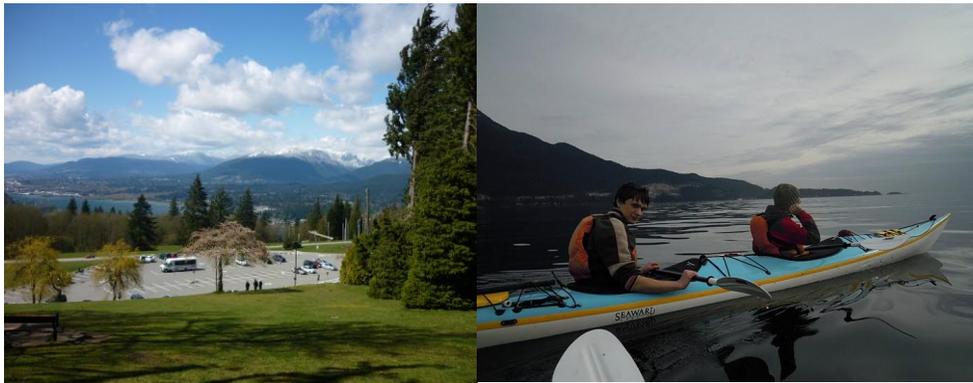
The Simon Fraser University offered a buddy program throughout we could meet Sarah Inglis, a fellow student at the SFU who supported us with advices and guiding throughout our staying in the Vancouver. She took out to a weekend trip to the magic Bowen Island where we could try out kayaking and invited us to her home at Eastern to experience this sacred day inside a Canadian family. The egg hunting was awesome and I would like to thank her again to her continuous support throughout our staying in Canada.



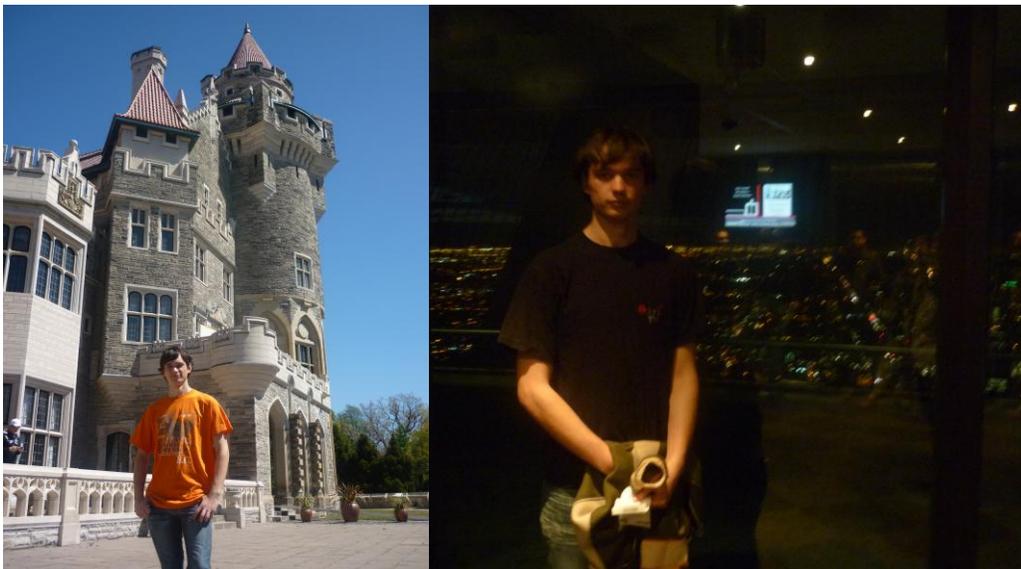
We lived on the Simon Fraser University Campus situated on the top of the Burnaby Mountain. I really liked how well the campus is planned. You have a soccer field, football field, a swimming pool and three gyms literally at a couple of steps from your doorway. The entrance is free for students so we went there multiple times on a week. We took part in a friendly competition named Rez Challenge on the Townhouse Rejects team. In the end we finished in fourth place, however the achievement was nothing near the connections I could make on these events and the fun we had by doing so.



From the memorable places I have been I can enumerate: Bowen Island, the campus itself, Capilano, the Vancouver Aquarium, the Vancouver Planetarium, Stanley Park and the Granville street before, during and after the Olympics.



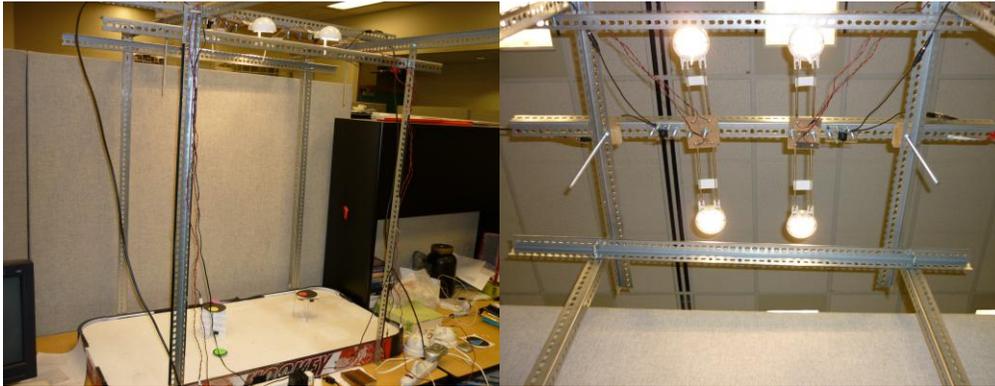
During the last days of my staying in Canada I took a 3 day long trip to Toronto. This allowed me to visit some monuments enjoying world fame like the CN tower, the Niagara Falls and the Casa Loma, Toronto Island, University of Toronto and etcetera. I really enjoyed the expedition to these. The city of Toronto has its own unique flavor that is also interesting. Finding out that the people on the east coast are just as warm and welcoming as the people in Vancouver is also a plus.



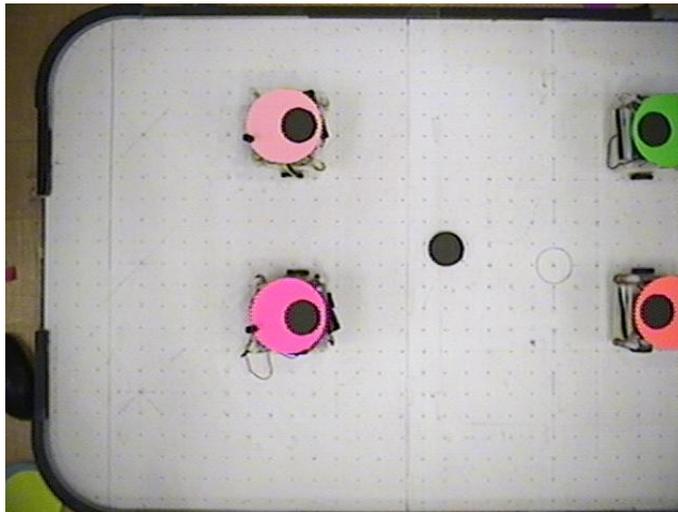
However, the real gift in my eyes after the seeing the city of Toronto was that I could appreciate once again just how green and gorgeous is Vancouver. Definitely one of the best looking cities I ever had the opportunity to see. It was great to see that in the 21<sup>th</sup> century there are cities where nature and concrete buildings can exist in harmony.



On the project I have worked on the image processing feedback system. Basically it was my duty to give an accurate eye to the system using two cameras. My code needed to find out from the input picture where the robots position are and identify each robot.

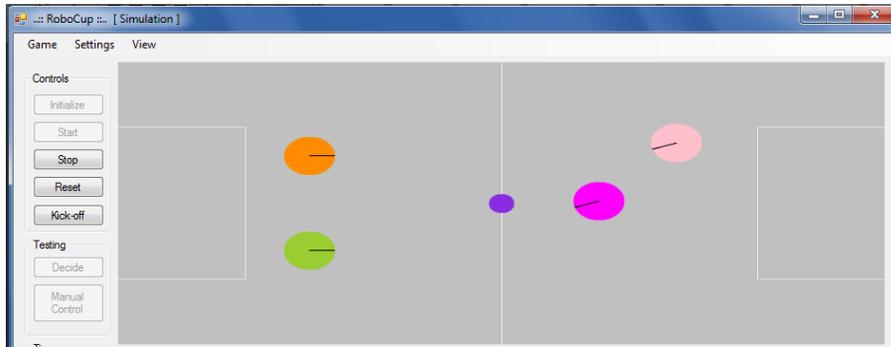


- The system –



-An example input-

In order to achieve to find and identify the robots' positions I had to study and implement domains like background subtraction, canny edge detection, and Hough transformation in order to find the circles and image color systems like the HSV in order to find out which robot is which. Finally after a successful image acquiring and image processing our system could return the result in a user friendly Windows environment like this:



-An example output-

Of course like always we needed to tweak some existing features in order to get them work as we brought from SHUT the platform and needed to adapt it to the one existing at the SFU. This included rewriting the communication, the image acquiring, the low level system (that transforms positions into speed and angle velocity for the robots) and debugging some previous bug of the project. Professor Sharam Payendah was supportive throughout the semester and made sure that we are on the right track and we do not lose focus. He was definitely a key figure in falling through with the project. Nevertheless, the effort invested was worth as in the end we could see the system working. I managed to learn a lot during these months and I can say that the digital image processing growth itself close to my hearth.

Participating near this in the Modern Control Systems lecture with professor Mahdi Alavi and the Canadian Social History with professor Alan Seeger offered me the opportunity to see how is the teaching in Canada compared to here in Romania. I can tell that the system there demands a lot right from the start however in the end



we catch up. You can say that the material it is better distributed overseas. Furthermore during our history class we managed to actually see how the Canadian nation formed and how its social class system evolved. Both teachers were definitely one of the bests with whom I had the honor to learn.

The C&CofMARS is one of the best programs in what I had the opportunity to participate. And it assures that we can learn from each other even though we are on the other side of the globe. We can exchange our culture, knowledge and effort in order to make this world a better



place to live in. It definitely makes any people take up even the most boring book and read through it in an effort to live through the experiences I had pleasure to do. This kind of experiences are those that give motivation to people in order to surpass itself and gives drive to learn and explore new things. I really hope that the collaboration between the two Universities will continue just as the Terry Fox statue whispers in the middle of the SFU to never give up and remembers us daily that: “A single dream. A world of hope.”

