Internship Report

Background

      I am a 4th year engineering student from the University of Toronto in Canada with primary research interests in autonomous driving and computer vision. This summer, I completed my research internship at Hochschule Düsseldorf (HSD) as a part of the RISE Germany 2023 program offered by DAAD. I worked under the supervision of Professor Alexander Braun and graduate student Mohamad (Ali) Mohamad. My work focused on leveraging computer vision algorithms to improve calibration and safety for autonomous trains.

Research and Technical Work

      Upon joining the lab, I was given freedom to choose a task that I found interesting while also contributing to the overall research efforts of the team. My project involved working with a sensor dataset to develop a computer vision pipeline that would improve the overall safety of autonomous train systems. In particular, I worked on developing a sensor fusion pipeline, using both LiDAR point clouds and camera images, for detecting the presence of poles and streetlights in the sensor data. The ability to detect landmark structures, such as poles, is helpful for localization, which is the process of determining the precise location of the train as it is driving.

      To this end, I spent three months implementing and validating the complete pipeline for pole detection. I leveraged the LiDAR-camera calibration data to pinpoint the exact location of the poles in the image plane and associated this detection back to 3D space. By the end of my internship, I was able to successfully implement the pipeline to utilize both LiDAR and camera data to locate the exact positions of poles in the point cloud dataset.

Daily Expectations

      My typical work day lasted from around 9 am to 5 pm, but the work schedule was very flexible and accommodating. I enjoyed the friendly environment of our lab and always felt that I had the support I needed to succeed with my tasks. We also had weekly meetings to update the rest of our team with our progress, which were helpful for checking that I was staying on track with my work. My favourite part of the day would always be our team lunch breaks, when we would all walk over to a grocery store or restaurant to grab lunch together. It was very nice to relax and socialize with the team after an entire morning of hard work.

Life in Germany

      Growing up in Canada, this internship was my first time living abroad by myself and it was definitely a very memorable experience! I took the opportunity to travel to nearby cities and neigbouring countries on the weekends and visited many new destinations across Europe. Additionally, I fully enjoyed immersing myself in German culture through new experiences. My team was extremely welcoming and more than happy to share all the unique intricacies of

German culture with me, whether it be trying döner for the first time or heading out to a classic German restaurant for a couple beers. While I did not speak much German prior to this internship, I've found that my German has rapidly improved over the course of the summer and I'm hoping to continue studying the language after I return back to Canada as well.

Tips & Tricks

Here are some tips and tricks that may be useful for future interns:
- Wise and N26 offer easy-to-use online banking services, but it's still good to have some cash on you at all times because some smaller shops only accept cash
- Telekom, Vodafone, and O2 all offer prepaid SIM cards for purchase in-stores
- Public transit is very accessible in Germany and the monthly 49-Euro Deutschlandticket allows you to hop on any regional transport throughout the month. I would also recommend getting a Probe Bahncard 25 if you are planning on frequently travelling via ICE within Germany
- The DB app is really useful for planning trips within Germany. Just make sure to account for delays!
- Be open to new experiences! Germany has a rich and diverse culture that I've grown to love and appreciate during my stay here

Conclusion

I'm incredibly grateful to DAAD, Mitacs, HSD, my professor Alexander Braun, my supervisor Mohamad (Ali) Mohamad, and every single person on my team for this incredible learning opportunity and experience. Through this research project, I was able to gain invaluable experience in the field of autonomous driving while also immersing myself into an entirely new culture and country. I recommend this program to anyone who is interested in studying abroad and could not be more thankful for the opportunities it has given me!

I agree that my report and accompanying pictures may be used by the DAAD in printed materials, presentations, and on websites in order to inform funding organizations, sponsors, and students about the RISE program.