

Mac Robertson Funding Report 2019/2020

About me

Name: Mateusz Dubiel

Nationality: Polish/British

I am a 3rd year PhD student in the department of Computer and Information Sciences at the University of Strathclyde. My research focuses on development and interactive evaluation of voice interfaces for conversational search tasks (e.g. itinerary planning and service search). In particular, I am interested in how different ways of presenting information over an audio channel impact individual's search performance, cognitive workload and satisfaction with voice interfaces. In the academic year 2019-2020, I was awarded a £3745 scholarship from the Mac Robertson Travel Fund which allowed me to conduct a two-month research visit at the Tokyo Institute of Technology (Tokyo Tech) in Japan.



On a weekend trip to Itsukushima Shrine, Miyajima

Why did I apply for the travel scholarship?

My reason for applying for Mac Robertson scholarship was to expand my research portfolio and learn more about pupillometry – the method of measuring the pupil size and its reactivity to different stimuli. Pupillometry has recently found application in evaluating the impact of different types of synthetic speech on cognitive workload. My motivation to acquire this new methodological skill was to enable me to evaluate voice interfaces from a different angle and open new research avenues to be explored after the end of my PhD. I conducted my research visit at Nakayama Lab of Tokyo Tech, under the guidance of Professor Minoru Nakayama, the world's leading expert in the field of pupillometry. Before applying for the scholarship, I was hoping that the host institution would offer me access to high-end eye tracking equipment and provide me with detailed feedback on the experimental setup – my expectations were exceeded.



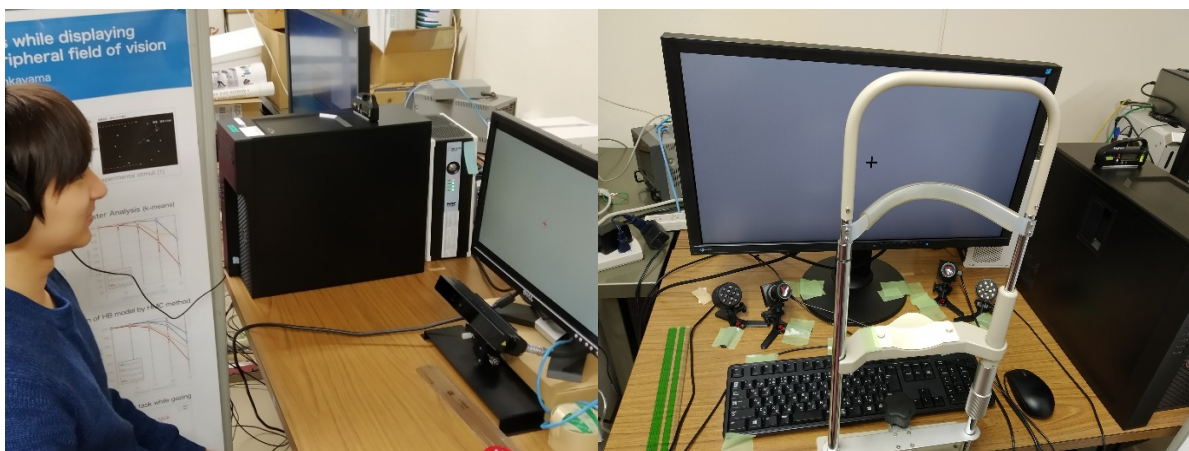
Ookayama campus of Tokyo Institute of Technology

Details of my visit

I spent two months (November and December 2019) at Tokyo Tech, Nakayama Lab. My campus was located in Tokyo's Ookayama in the southern part of the city. During my stay, I conducted an extensive literature review to learn about applications of pupillometry in speech processing, attended weekly department meetings and gave a presentation about human-computer interaction studies that I conducted in Glasgow. Over the course of my stay, I had regular meetings with my host, Professor Nakayama. I received comprehensive tutorials on to use the eye-tracking equipment and assistance with setup and execution of my speech perception experiments.

In the run up to the experiments, I had a privilege to meet Professor Takao Kobayashi, who is considered to be the father of synthetic speech in Japan. Professor Kobayashi helped me with selection of speech corpus for evaluation and provided useful tips regarding idiosyncrasies of Japanese language. I have also received help from Dr Xing Wang from National Institute of Informatics in preparation of synthetic speech samples that were used in the experiment.

In mid-December, the experiment was ready for deployment. We recruited participants and asked them to interactively evaluate the samples of natural and synthetic speech. The preliminary results of the study were promising in terms of measuring cognitive workload using pupil dilation.



Experimental Setup: Participant listening to synthetic speech samples

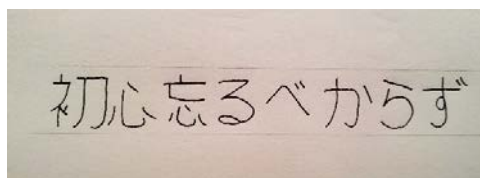


Enjoying Japanese hot pot with Nakayama Lab members

Impact of the Scholarship

The visit at Tokyo Tech helped me to expand my academic network and to acquire a new method for evaluating cognitive workload. It also provided me with good understanding of both theoretical and practical aspects of eye-tracking. I learned how to: calibrate the eye-tracking equipment, prepare experimental stimuli and analyse pupil dilation data. Also, I became aware that aspects such as size of fixation cross (an object displayed on the screen to focus participant's attention) and its background can be detrimental to experimental validity. The study that we conducted together with Professor Nakayama established foundations for collaboration between the University of Strathclyde (my home institution) and Tokyo Institute of Technology which we are hoping to expand in the future.

The time spent at Tokyo Tech was a rewarding and an inspiring scientific experience. However, the benefits of my visit go beyond the world of academia. During my visit in Japan, I have learned Hiragana and Katakana (Japanese writing systems) and become more familiar with Japanese culture and cuisine. I am grateful for the opportunity to learn new things (that I will use in the future), meet new people (who offered me inspiration and encouragement), and visit many beautiful places (that I only knew from books before the visit).



Japanese proverb 'shoshin wasuru bekarazu' in my handwriting

I would like to close my report with a Japanese proverb "*shoshin wasuru bekarazu*" which can be roughly translated to "we should never forget our beginner's spirit" and thank the Mac Robertson Scholarship panel of this fantastic opportunity.



A view from seminar-room window with Mt Fuji in the background

Acknowledgements

I would like to thank my host, Professor Minoru Nakayama and all members of Nakayama Lab for welcoming me in Japan for their support throughout my visit. I would also like to thank Professor Kobayashi for providing me with useful insights on phonetics of Japanese language and Dr Xing Wang for helping me with synthesising sentences for the experiment. A big thanks goes to all the volunteers who took part in my experiments and to Kokoro Watanabe, my language exchange partner.



Autumn on campus: An alley with golden ginkgo tree leaves