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CREATE CHANGE

Report on the academic trip to the United Kingdom — 21st Young Researchers' Conference



Table of Contents

1. Visit to University of Birmingham	2
1.1 Background	2
1.2 Lab Tour	2
1.3 Project Demonstration	5
2. Presentation at 21st Young Researchers' Conference	7
3. Personal Reflection	9
4. Media Releases.....	10
4.1 Posts at the Institution of Structural Engineers Website.....	10
4.2 Photos taken at 21st Young Researchers' Conference.....	10

1. Visit to University of Birmingham

1.1 Background

My research project is to optimally design a floating windbreak to combat the more severe wind events and shelter the protected objects in its lee. Building connection with other wind engineering research groups around the world may bring in new inspirations and foster the research in this area. Given that the largest wind engineering research group in the United Kingdom is in Birmingham, University of Birmingham is chosen as my first destination for this academic trip. Prior to the departure, I contacted the leader of the wind research group, Professor Mark Sterling, who is also the current head of School of Engineering in University of Birmingham, through emails with my supervisors' help. Professor Sterling willingly accepted my request and soon asked his colleagues, mainly the post-docs in the group to arrange my visit. The day was finally set to be on Monday, March 11th, 2019. And the visit included a lab tour and demonstration of their research projects, which will be briefed respectively in the following two sections.

1.2 Lab Tour

Instructors: Dr Genora Joseph, Dr Francis Robertson, Dr Andrew Quinn

Place: Wind Engineering Lab in University of Birmingham

Briefing: After briefly introducing each other in the welcoming lunch, Dr Genora Joseph and Dr Francis Roberson led me to their wind engineering lab to meet Dr Andrew Quinn, who was the main instructor for this lab tour. The most iconic facility in the wind engineering lab is the multi-fan wind tunnel. With more than 30 individually controlled fans, as is shown in Figure 1, the tunnel is able to generate large-scale vortices with the aim of better

simulating the turbulence characteristics in the atmosphere. It is one of the few facilities of its kind in the world. On the tunnel floor, the roughness blocks are smartly controlled by an elevating system, which helps to reduce the time and human force when doing experiments. An urban wind research model, shown in figure 2, and a crop model were recently being tested in this wind tunnel.

We then proceeded to see the downburst / tornado simulator in the lab. An impinging jet is used to generate the downburst. When the simulator is turned upside-down, it can be used to generate tornado. Currently, a very interesting experiment was on-going, which allowed a train passing through a tornado to assess the influence of tornados to operating trains as is shown in Figure 2.

There are several other wind tunnels in the lab for normal commercial testing which will not be elaborated here. At the end of the lab tour, Dr Robertson took a photo for me with Dr Joseph and Dr Quinn as a memento, which is shown in Figure 3.



(a) *View of the fans*

(b) *Tunnel internal view*

Figure 1. Multi-fan Wind Tunnel in University of Birmingham



(a) View of the generator



(b) Train aerodynamics in tornadoes

Figure 2. Downburst / tornado generator in University of Birmingham



Figure 3. Memento photo for the lab tour in University of Birmingham

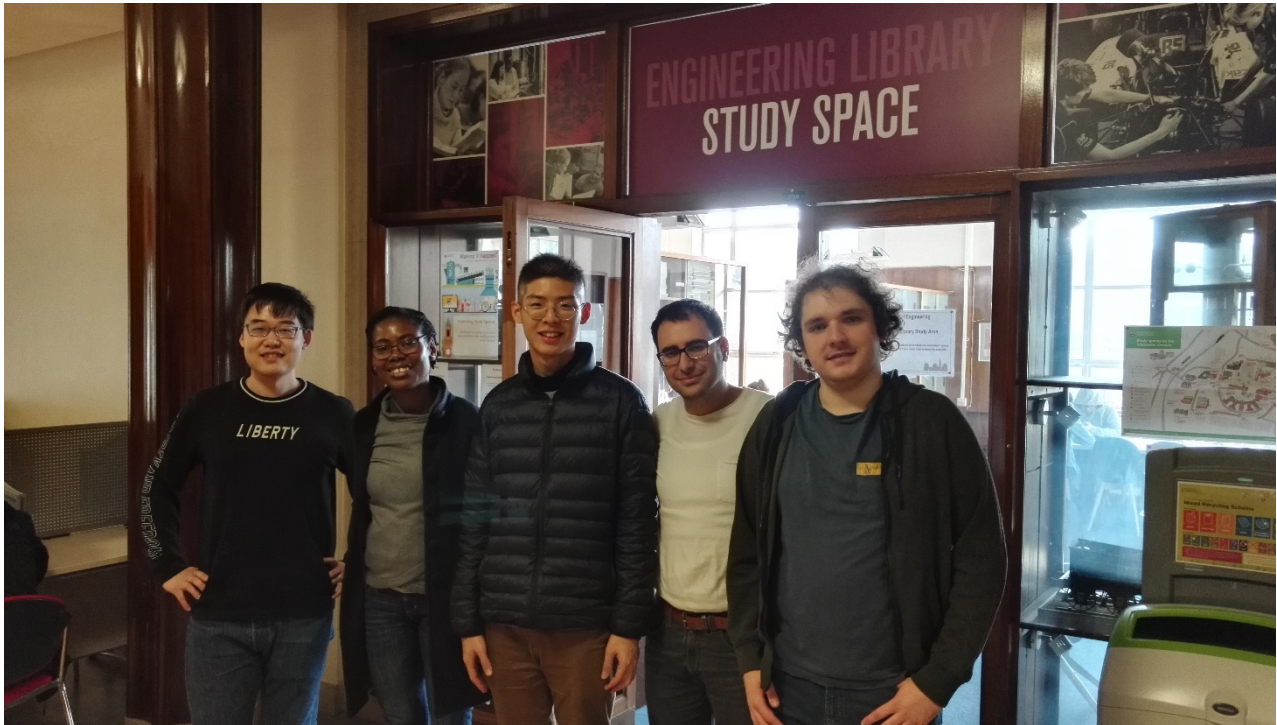


Figure 4. Memento photo for the project demonstration in University of Birmingham

1.3 Project Demonstration

Demonstrators: Dr Genora Joseph, Dr Francis Robertson, Dr Mingzhe He, Mr. Giulio Vita

Place: Engineering Library

Briefing: Representatives of the current on-going projects in the wind engineering group in University of Birmingham demonstrated their research in Engineering Library to me. Dr Joseph started with her exciting research on understanding and reducing lodging in maize and rice. She collaborated with researchers from China and Mexico and with researchers from agriculture trying to solve the food security problem from multi-disciplinary efforts. By doing field measurements of the crops' displacement and the surrounding

wind velocities, she was developing a model that can describe the lodging process for maize and rice.

The following demonstration was given by Dr Robertson and Dr He. They collaborated on understanding the drag created in the gap of two trains when they came close to each other and ran at a high speed. Previously there were reports of things on the platform being suck to the rail when one train was leaving and another one was arriving. Dr Robertson was conducting experiments in specially designed TRAIN rig built exactly for the purpose of train and vehicle aerodynamics research, while Dr He was doing Large Eddy Simulation to provide us with more details of the pressure and velocity field around the trains. Their results showed a good agreement between the experiments and numerical simulations.

Mr. Vita finished the demonstration with his research on urban winds. A site inside the campus was chosen as the objective, whose model is shown in Figure 2. Numerical simulations, wind tunnel experiments and on-site measurements are conducted simultaneously to fully understand the problem and explore solutions. All the participants of today's demonstration took a photo together in front of the Engineering Library as a memento, which is shown in Figure 4.

2. Presentation at 21st Young Researchers' Conference

On March 13th, 2019, I attended the 21st Young Researchers' Conference in the headquarter of The Institution of Structural Engineers in London. The high-level conference is also a competition with participants mainly from the UK. As the winner of Young Researchers' Conference Australia 2018, I am invited to present my work as a guest speaker.

The conference started with the welcoming speech of the president of The Institution of Structural Engineers, Mr. Joe Kindregan, followed by a keynote speech delivered by Dr Jon Shave from WSP. Coincidentally, Dr Jon was also one of the winners of Young Researchers' Conference in early years. Dr Shave exhibited a big picture of the research demands in the industry world to us. He suggested that the research for the future should be adaptive and also responsive to the code updating.

The competition was comprised of two parts, poster presentations and oral presentations. The contestants were very competitive. Their presentations have covered near all the topics in the area of civil engineering, from concrete and steel to new materials, from traditional construction methods to BIM, and from buildings to infrastructure.

After careful selection, the winners were chosen respectively for poster and oral categories after careful judgement by the panels. The panels also provided two valuable suggestions for all the young researchers. One is considering more about the impact of your research rather than purely focusing on calculations, and the other is conducting sensitivity and validation study more carefully as they are indispensable parts of high-quality research. During the closed-door discussion among the panels, I presented my work of Optimal Design of an Efficient Floating Windbreak to the audience.

The conference concluded with a prize-giving reception and a networking event.



Figure 5. Presentation at the conference



Figure 6. Interaction with other academics



Figure 7. Group photo of all the participants at the conference

For figures 5, 6, 7, credit to Stop Talking Photography Ltd

3. Personal Reflection

Attending the 21st Young Researchers' Conference is a truly unforgettable experience for me. This is the first time for me to make academic presentations outside of Australia. I feel very honoured to represent the Regional Group of Structural Engineers in Australia to present my work in such a formal and world-renown stage. It helps to promote the research happening in Australia and grow impact of our research. During the visit of UK, I was fortunate to be able to exchange views with the wind engineering peers in the UK and learn a lot from their on-going research. Through the interactions with peers from other fields of civil engineering during the conference, I broadened my horizon and gained inspirations from the talks. The newly established friendship and contacts with them planted seeds in the soil for the blossom of research collaborations in the future. Here, I sincerely express my thanks to The Institution of Structural Engineers for providing this opportunity to me to participate in the 21st Young Researchers' Conference and funding my trip. I also would like to thank the people that help me make the visit possible, including the Australia Regional Group of IstructE, my supervisors, the organizers of this conference and the academics in University of Birmingham. I highly recommend all young researchers to participate in this event in the future.

4. Media Releases

4.1 Posts at the Institution of Structural Engineers Website

Young Researchers' Conference Introduction

<https://www.istructe.org/events-awards/conference-and-lectures/young-researchers-conference>

21st Young Researchers' Conference Proceedings

[https://www.istructe.org/getattachment/events-awards/conference-and-lectures/young-researchers-conference/YRC_Programme_2019_web-\(1\).pdf?lang=en-GB](https://www.istructe.org/getattachment/events-awards/conference-and-lectures/young-researchers-conference/YRC_Programme_2019_web-(1).pdf?lang=en-GB)

21st Young Researchers' Conference Schedule:

<https://www.istructe.org/events-awards/conference-and-lectures/young-researchers-conference/programme>

<https://www.istructe.org/events-awards/conference-and-lectures/young-researchers-conference/posters>

4.2 Photos taken at the 21st Young Researchers' Conference

<https://www.flickr.com/photos/90122896@N06/albums/72157707449743485/with/47421592501/>

Thank you for your reading !

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