

31 July 2020

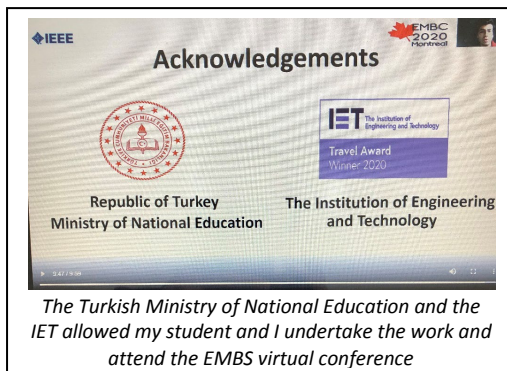
IET Travel Award 2020: conference attendance

The purpose of my recent application to the IET was to attend the Institute of Electrical and Electronic Engineers (IEEE) Engineering in Biology and Medicine Society (EMBS) conferences. This event was due to be held in Montreal, Canada. However, due to the COVID-19 pandemic it switched to a virtual meeting via the EMBS Learning Academy, 20th to 24th July 2020.

It was disappointing not to be able to travel to Montreal to participate in person as meeting and chatting with other researchers in my field helps formulate new ideas. Moreover, strolling through poster sessions and chatting ad-hoc to early career researchers is a great way to see the latest innovations and explore collaborative opportunities. However, given scale and severity of the pandemic, it was prudent by EMBS organisers to shift to the meeting to the Learning Academy platform. The latter was an excellent method to attend a virtual meeting and provided an opportunity to explore new digital educational tools for scientific dissemination.

For this conference, my PhD student and I submitted a 4-page paper, *A feasibility study towards instrumentation of the Sport Concussion Assessment Tool (iSCAT)*. This paper examines the role of wearable technology in concussion assessment. Concussion is common in contact sports (e.g. rugby) and returning to play before sufficient recovery increases risk of more serious secondary injury. Medical staff make return-to-play decisions based on 'snapshot' post-injury subjective concussion assessment tools. Typically, the latter includes the Sport Concussion Assessment Tool, which includes components of physical functioning. For our paper, we instrumented components of the

SCAT physical exam (e.g. tandem gait) to show how our approach could produce more accurate and insightful data to medical staff to better assess their patient via automated inertial sensor methods.



My student and I both attended the virtual sessions and were able to examine developments in the field of personalised sensing and with inertial wearables. The shift to a virtual conference was a learning curve but allowed us to attend sessions that may have normally been held in parallel and so we were able to listen to many more EMBS speakers.

In addition, collaborators from the University of Waterloo and I held a symposium entitled, *Data analytics in the wild: Emerging wearable inertial sensors and egocentric cameras for fall prevention and rehabilitation*. I chaired the symposium which was organised by PhD candidate Mina Nouredanesh and Dr James Tung, both from Waterloo's Centre for Bioengineering and Biotechnology. Falls in older adults is one of the most important public health problems worldwide. To complement wearable inertial measurement units in the context of fall risk assessment in the wild, models developed based on video data acquired by body-mounted cameras can be used to automatically identify environmental fall-related hazards (e.g., stairs, different terrains). Moreover, egocentric video data can be utilized to estimate spatiotemporal gait parameters (e.g., step width)

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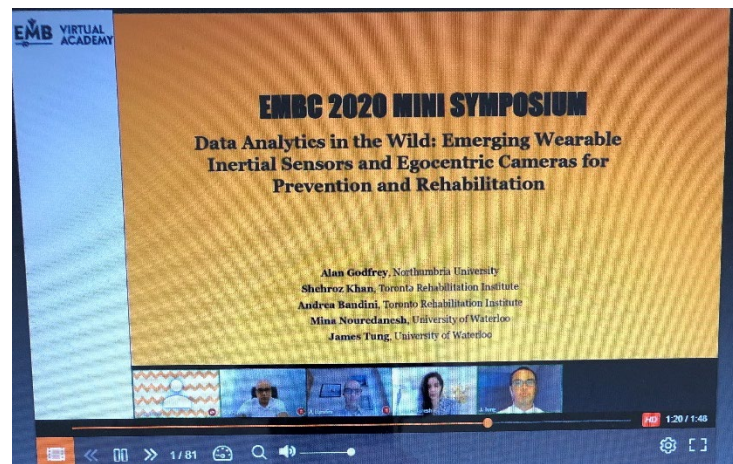


by locating feet in 2D RGB frames. These approaches are hoped to eventually inform clinical decisions on the most appropriate prevention interventions to reduce fall incidence in older populations, which were discussed in this symposium.

The list of invited speakers included Ms Nouredanesh, Dr Tung as well as Dr's Shehroz Khan and Andrea Bandini, both from the KITE research laboratory at the Toronto Rehabilitation Institute. In brief, the authors listed gave *snaps shots* in the story of the development of clinical-based outcomes with the capture of wearable technologies, the gathering of informatics, examples their previous and current work with considerations for implementation to pragmatic clinical use. Table 1 gives the titles and order of each speaker.

Table 1: List of speakers (in order of presentation) and titles

Speaker	Title
M Nouredanesh	First-person Vision-based Assessment of Fall Risks in The Wild, Towards Fall Prevention in Older Adults ²
Dr Khan	Multimodal Sensors in the Wild: Case Studies from Dementia Care and Post-hip Surgery
Dr Bandini	Measuring hand use in the home after spinal cord injury (SCI) using egocentric vision
Dr Tung	Neurodegenerative disease biomarker development using multimodal wearable sensor systems in the 'wild'



A virtual PowerPoint slide from the symposium, overview and order of speakers (unfortunately my technology let me down and my camera wasn't working!)

I would like to thank the IET for the wonderful opportunity to attend EMBS conference, albeit virtually. While not as productive as attending a conference in person to chat with old collaborators or meet with new ones over coffee breaks, this was still a valuable learning experience that allowed me to showcase my work as well as that of my team. This will have enhanced my profile as well as my new team within the area of concussion research with wearable technology.

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