IET Travel Award Report

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I recently had the opportunity to present my research at the 10th International Temperature Symposium (ITS10) in Anaheim, California, USA, between the 3rd and 7th of April 2023. This symposium is the most prestigious conference there is within the field of temperature, the measurement of temperature and its closely related disciplines. It takes place approximately every 10 years, with the first conference taking place in 1919. In addition to being able to present my research to experts within the field of temperature measurement, it was also an opportunity to develop new ideas for my research plans going forward. Having recently been appointed to the position of Lecturer within the Department of Electronic and Electrical Engineering at the University of Sheffield, attendance at this conference was invaluable as I look to explore new ideas as I expand my own independent research portfolio.

The symposium was organised by the National Institute of Standards and Technology (NIST), based in the USA, who are a National Metrological Institute (NMI). Like all NMIs, the NIST is responsible for governing standards and traceability within measurements, including temperature and humidity measurements, all of which were the subjects of ITS10. Traceability within temperature measurements is related back to known fixed points, such as the melting point of gallium or the freezing point of silver. Such phase transitions occur at the same temperatures regardless of where in the world they are located. Therefore, this ensures reliable and repeatable worldwide standards for temperature calibration. The conference delegation largely composed of members from other NMIs across the world, and there was a large focus within the conference relating to improving traceability standards in order to reduce measurement uncertainty. However, there were also delegates from both industry and, as was the case for myself, academia. The work that was presented from delegates from these backgrounds largely focused on the development of new forms of measurement instrumentation for use within various new measurement scenarios.

My own research focuses upon the development and application of non-contact, infrared based temperature measurement instrumentation for use within various academic and industrial scenarios. This includes, but is not limited to, the development of high operating temperature optical fibre-based instrumentation for use within machining applications, and the development of high-speed fibre-optic instrumentation for the characterisation of confined blasts loads. I presented this combined research under the title “High Temperature Fibre-Optic Infrared Radiation Thermometry” at the conference, during a session dedicated to “Radiation Thermometry”. My talk resulted in interesting discussions relating to various technical challenges with other researchers working in the same area, and has generated new ideas for me to explore back at the University. In addition to my own talk, I also accompanied and mentored a junior member of research staff and a

PhD student through what were their first ever conference presentations. They both did incredibility well and have returned from the conference highly enthused to continue to “push the boundaries” within their own research.

The conference covered many related topics beyond my immediate research interests, including contact thermometry, high and low temperatures fixed points, calibration standards and traceability. However, it also covered further topics which I wish to expand my independent research portfolio into, including humidity and trace moisture measurement, luminescence thermometry, low temperature thermometry and thermometry for nuclear environments. I am actively looking for opportunities to write appropriate grant proposals to explore research within these areas. In addition to the parallel sessions, where new, exciting research was presented by experts within their respective fields, for the first time in this conference series, workshops took place covering the fundamentals of specific key topics. I attended the series on an “Introduction to Humidity and Trace Moisture Measurements”; I now have a much better idea of how my research ideas fit within recognised humidity and trace moisture standards.

In addition to the parallel sessions and workshops, they were several keynote and plenary talks from invited speakers covering a wide range of topics. These included “Recollections from the era of ITS6 and ITS7 “, “Frontiers in Temperature Measurement, “Trends in Industrial Temperature Measurement” and “Temperature, Climate and Human Health”. Within the main exhibition hall, several poster sessions took place, with posters presented covering many of the mainstream or niche topics within the remit of the conference. Also within this exhibition hall were exhibition stands from several manufacturers of calibration and measurement equipment; several of these offer products which would be highly applicable to my proposed future research.

I am grateful to the Institution of Engineering and Technology (IET) for providing me with this Travel Award to make attendance at ITS10 possible. It was a truly invaluable experience, and I have come away with many new ideas for new research areas to expand into and have established several new contacts. I intend to develop these ideas further and apply for several research proposals over the coming weeks and months to support this research. I would encourage any early career researcher to apply for an IET Travel Award. This can help enable conference attendance for themselves in order to both present their current research, and to generate new ideas for future research.