

## IET Travel Award Report – I2MTC 2025, Chemnitz, Germany

I am Huazhi Dong, a third-year PhD student in the SMART Group, School of Engineering at the University of Edinburgh. The goal of my research is to achieve whole-body awareness in intelligent robots by advancing multi-modal electronic skins (e-skins) that integrate tactile and proprioceptive sensing capabilities, allowing these robots to respond to their environment with life-like sensitivity and accuracy. I am immensely grateful to the Institution of Engineering and Technology (IET) for awarding me the IET Travel Award, which enabled my participation in the 2025 IEEE International Instrumentation and Measurement Technology Conference (I2MTC 2025), held in Chemnitz, Germany, from 19th to 22nd May 2025.



At I2MTC 2025, our paper titled “Flexible electrical impedance tomography for tactile interfaces” was presented in the special session “From Rigid to Flexible: Advances in Flexible Conformal sensing”. The work introduces a stretchable EIT-based tactile sensor using a lattice-patterned hydrogel layer, which significantly enhances sensitivity while maintaining mechanical robustness. Through both simulations and physical experiments, we demonstrated that the design enables real-time, high-resolution tactile reconstruction. To showcase the system’s practicality, we integrated it into a virtual Super Mario Bros control interface, enabling a dynamic human-machine interface (HMI) application.

This special session is dedicated to presenting recent developments in the realm of a) soft sensors and instrumentation designed for complex or non-standard surfaces, b) novel signal processing algorithms and sensing techniques optimized for flexible platforms, and c) pioneering applications that leverage flexible conformal sensing. Topics ranged from nonlinear observability in soft robotics using flexible e-skins to direct-write ultrasonic sensors for structural health monitoring and functional fiber-based sensors capable of simultaneous pressure detection and signal transmission. These talks showcased a diverse set of approaches, from material-level fabrication

to system-level integration, for enabling robust sensing in dynamic and deformable environments. This session fostered engaging discussions with researchers across materials science, embedded sensing, and soft robotics, and inspired new perspectives on combining adaptive structures with data-driven models, deepening my understanding and sparking new directions for future work.



A particularly memorable moment at I2MTC 2025 was receiving the 2025 IEEE Instrumentation and Measurement Graduate Fellowship Award, presented by the Instrumentation and Measurement Society in recognition of my research on multi-modal electronic-skin perception systems for embodied intelligence. The award ceremony took place during the official plenary session, where I was honored to be recognized alongside other outstanding early-career researchers from institutions worldwide. Receiving this award on stage, in front of the international measurement and sensing community, was both humbling and motivating. It served as a strong affirmation of the significance of our work on flexible, EIT-based tactile sensing, and further encouraged me to pursue impactful, interdisciplinary research in the field of soft robotics.



Outside of presenting our work and receiving the award, I made full use of the four-day program. I attended several fascinating sessions, like instrumentation and measurement systems for robotics. I also had valuable discussions with researchers from Chemnitz University of Technology, University of Manchester, Tianjin University, Xidian University, and Xi'an Jiaotong University. These interactions not only broadened my technical perspective but also helped form the basis of potential collaborations, particularly around developing the flexible tactile sensor.

The support from the IET Travel Award was instrumental in making this trip possible. The award covered essential travel and accommodation costs and enabled me to represent the University of Edinburgh and the IET community at an international venue. In line with the IET's sustainability ethos, I made a conscious effort to minimize the environmental impact of my travel. While in Germany, I relied exclusively on public transportation, including trains and local trams. In summary, attending I2MTC 2025 has been a profoundly enriching experience. It allowed me to present my work on flexible EIT-based tactile sensing at a prestigious venue and got high-level professional suggestions. The feedback and insights I gained will directly inform the next phase of my doctoral research. I extend my sincere gratitude to the IET for its generous support, and I am committed to carrying forward its values of innovation, collaboration, and impact in my future work.

