

## **YOUNG SCIENTIST AWARD 2025**

**LIU ZIWEI**

**Associate Professor, College of Computing and Data Science,**

**Nanyang Technological University**

“For his contributions to the field of generative AI, in particular, how it perceives, understands and recreates the visual world around us.”

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Dr Liu Ziwei is an Associate Professor at the College of Computing and Data Science, Nanyang Technological University, Singapore. He is recognised as a pioneer in AI-driven mixed reality, which bridges the digital and physical worlds and enables machines to intuitively perceive, understand and recreate our visual environment in immersive 3D and 4D. His work addresses a critical gap: while AI excels with text, it struggles to dynamically interpret and reconstruct the richness of our visual reality. By unifying generative AI with mixed reality, Dr Liu’s approach creates a dynamic flywheel linking data to real-world applications, transforming passive digital interactions into active and collaborative experiences.

His core innovation lies in teaching AI to function as both a scientist and an artist. As a scientist, the AI observes visual scenes, studying light, geometry and movement, and reasons about object interactions. As an artist, it re-creates these scenes through neural rendering, generating digital twins of reality. This enables applications such as reconstructing historic streets from faded photographs or providing virtual try-ons that adapt to a user’s exact size and lighting.

Dr Liu proposed the world’s first deep neural network and database for facial attribute analysis, which is now covered in standard machine learning textbooks and incorporated into major deep learning platforms. He developed the world’s first generative AI framework for video frame synthesis, which was later adopted in the Google Clips product. He built one of the most comprehensive multi-modal 4D human motion capture systems worldwide, comparable to existing systems in Tsinghua University, Carnegie Mellon University, Tencent and ByteDance. He also led one of the earliest efforts to develop

open-source video generation foundation models, surpassing concurrent commercial models from Meta and Nvidia.

Dr Liu is a recipient of the PAMI Mark Everingham Prize, one of the most prestigious prizes in computer vision, MIT Technology Review Innovators under 35 Asia Pacific, a Computer Vision and Pattern Recognition (CVPR) Best Paper Award candidate (top 0.1%), and the International Congress of Basic Science Frontiers of Science Award (chaired by Turing Award laureate Andrew Yao). These honours recognise his fundamental contributions to 3D and 4D content creation.

Dr Liu now leads a vibrant and fast-growing team conducting frontier research in computer vision, machine learning and computer graphics, with a particular focus on AI-driven mixed reality. To date, he has successfully designed multiple AI systems that align with human values, collaborating with government agencies, industry partners, clinicians and educators. His team's outputs have been filed as patents, delivered to public services and commercialised into products, with the potential to bring new breakthroughs to Asia Pacific and beyond.

As a Young Scientist Award recipient, Dr Liu aims to take his mission to the next level, advancing AI-driven mixed reality to unlock new possibilities for science, creativity and society. His work empowers artists, researchers and everyday users to create immersive digital worlds, positioning Singapore at the forefront of human-centric AI where mixed reality becomes as seamless as daily communication. Looking ahead, his research aspires to realise "pocket universes": on-device AI capable of instantly generating personalised 4D environments, connecting communities across generations and preserving memories at scale.