Tianhao (Walter) Wu

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EDUCATION

University of Cambridge 2021 - Now

PhD Computer Science: expected 2025

Research Interests: 3D computer vision, neural implicit representation, 3D reconstruction, scene understanding, NeRF, graphics, inverse rendering, neural avatar

University College London (UCL) 2017 - 2021

MEng Computer Science

First Class Honours (Average 84%)

Dean's List Award: to students graduated with outstanding academic performance

PROGRAMMING

- **ML Platforms**: TensorFlow, PyTorch, Jax (Flax).
- **Programming**: Python, C++, C, CUDA.

RESEARCH HIGHLIGHTS

Neural Upper Body Portrait Jun 2023 – Now

- **Coordinate-Based MLP**: use a coordinate-based MLP method that fits and reenacts a single identity with style noise decoupled. It achieves superior performance compared to multi-identity approach and can easily extend to model the upper body.
- **Gaussian Splatting**: incorporate gaussian splatting as a hybrid 3D representation to model articulated body parts such as arms and hands.

αSurf Jun 2022 – March 2023

- **Translucent Surface Reconstruction from Images**: reconstruct semi-transparent and intricate surfaces from multi-view RGB images.
- **Novel Surface Representation**: level sets of voxelated scalar fields with opacity to model surfaces with translucent or blending effects.
- **Differentiable Rendering**: ray-surface intersection through cubic root-finding algorithms to support naturally differentiable rendering.

D^2NeRF (NeurIPS2022) Nov 2021 – May 2022

- **Dynamic Scene Reconstruction**: reconstruct non-rigid scenes from monocular video via NeRF with a deformation field.
- **Scene Decomposition**: decouple 3D scene into dynamic & static without any mask supervision, and hence can work on moving shadows or pouring liquid.
- **Shadow Decoupling**: novel density-less shadow field to correctly decouple dynamic object shadow.

WORK

Meta Reality Labs Internship Jun – Oct 2023

- **Neural Avatar**: surveyed various methods covering 3DMM, NeRF, GANs to identify promising directions for neural avatar and worked on *Neural Upper Body Portrait* project. Recognized for exceptional performance.

Uni of Cam Supervisor/Ticker Oct 2021 –Now

- **Teaching**: supervised students of the Master Thesis, Machine Vision Perception, Further Graphics & Intro to Graphics courses.

UCL Research Internship July – Sep 2020

- **One-Shot 3D Reconstruction**: worked on *DualNeRF*, a one-shot reconstruction NeRF.

Software Engineering Internship Jun – Aug 2019

- **Software Engineering**: developed a mobile app and learned good coding practices.

OTHER PROJECTS

Constrained Network (NeurIPS 2023) March – May 2023

- **Neural Field with Hard Constraint**: enforce hard constraints on linear operations of neural field and its derivatives.
- **Material Appearance Fitting**: apply the method in BRDF fitting task and achieve high accuracy around specular highlights.

Neural Radiance Caching++ Nov 2022 – Now

- **Real-Time Global Illumination**: leveraging coordinate-based MLP and hash-grid for real-time rendering of global illumination.
- **Motion-Awareness & Smoothness**: incorporating motion vector and Lipschitz constraint to improve convergence.

Kubric (CVPR2022) Oct – Nov 2021

- **Data Generation**: cooperated with researchers from Google and top universities to build an easy-to-use synthetic data generation pipeline.

AWARDS

CAPA 2022

- Recognized for having one of the seven best engineering-related proposals in Cambridge.

Google Hash Code – UK Ranking 21st 2019

- Achieved highest ranking at UCL and 449th globally.