CHI-HAN PENG

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I am an Assistant Professor at the College of AI, **National Yang Ming Chiao Tung University (NYCU)**. My research areas include AI/neural networks, computer graphics, geometric processing, and computer vision. In particular, I am interested in novel computational methods for the architecture, engineering, and construction (AEC) industries enabled by AI. I also work with hospitals to develop AI-based methods for medicine.

I was a research scientist at the Visual Computing Center at **King Abdullah University of Science and Technology (KAUST)**, Saudi Arabia. I was a postdoctoral researcher at **University College London (UCL)**, working with Prof. Niloy Mitra. I worked at **Nogle**, a software company based in Taipei, on the 3D modelling and simulation of garments.

I received PhD in Computer Science at **Arizona State University**, supervised by Prof. Peter Wonka. My research interests were computer graphics, geometric modelling, and urban environment design. During my PhD studies, I was a summer research intern at **Adobe ATL** (supervised by Dr. Nathan Carr and Radomir Mech).

Prior to my PhD study, I received my B.S. and M.S. in Computer Science at **National Chiao Tung University (NCTU)**, Taiwan. I worked at **CyberLink**, the maker of PowerDVD video players, as a software engineer for four years. I was also the co-founder of an online taxi carpooling company serving the Taipei metropolitan area.

EDUCATION

Arizona State University, USA

2010-2014 **Ph.D. Computer Science / GPA:** 4.00 (University Graduate Fellowship Award - summer 2014)

National Chiao Tung University, Taiwan

2003-2005 **M.S. Computer Science / GPA:** 3.83 / **Thesis:** User-Assisted Mesh Simplification

1999-2003 **B.S. Computer Science / GPA:** 3.78 (Ranked 3rd among 56. Won academic achievement award twice.)

PUBLICATIONS

2024 **Topology-Preserving Downsampling of Binary Images.** Chia-Chia Chen and Chi-Han Peng. The 18th European Conference on Computer Vision **(ECCV)** 2024.

2024 **Shortest Path Speed-up Through Binary Image Downsampling.** Chia-Chia Chen and Chi-Han Peng. **ACM Siggraph Asia** 2024, poster.

2023 **SLIBO-Net: Floorplan Reconstruction via Slicing Box Representation with Local Geometry Regularization.** Jheng-Wei Su, Kuei-Yu Tung, Chi-Han Peng, Peter Wonka, Hung-Kuo Chu. Thirty-seventh Conference on Neural Information Processing Systems (**NeurIPS**) 2023.

2023 **GPR-Net: Multi-view Layout Estimation via a Geometry-aware Panorama Registration Network.** Jheng-Wei Su, Chi-Han Peng, Peter Wonka, and Hung-Kuo Chu. IEEE Computer Society Conference on Computer Vision and Pattern Recognition Workshop (**CVPRW**) 2023, Omnidirectional Computer Vision Workshop (Omnicv2023).

2023 **Seam Removal for Patch-Based Ultra-High-Resolution Stain Normalization.** Chi-Chen Lee and Chi-Han Peng. The 23rd IEEE International Conference on Bioinformatics and Bioengineering (**BIBE**) 2023.

2023 **Interactive Relative Pose Estimation for 360◦ Indoor Panoramas through Wall-Wall Matching Selections.** Bo-Sheng Chen and Chi-Han Peng. **ACM Siggraph Asia** 2023, poster.

2023 **Distortion Reduction for Off-Center Perspective Projection of Panoramas.** Chi-Han Peng, Jiayao Zhang, Chia-Chia Chen, and Yun-Wei Lin. **NICOGRAPH International** 2023. *Best Short Paper Award.

2023 **High-Resolution Depth Estimation for 360◦ Panoramas through Perspective and Panoramic Depth Images Registration.** Chi-Han Peng and Jiayao Zhang. IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV**) 2023.

2022 **H&E Stain Normalization using U-Net.** Chi-Chen Lee, Po-Tsun Paul Kuo, and Chi-Han Peng. IEEE International Conference on BioInformatics and BioEngineering (**BIBE**) 2022.

2022 **Optimizing Placements of 360◦ Panoramic Cameras in Indoor Environments by Integer Programming.** Syuan-Rong Syu and Chi-Han Peng. Smart Tools and Applications in Graphics (**STAG**) 2022.

2022 **Floor Plan Exploration Framework Based on Similarity Distances.** Chia-Ying Shih and Chi-Han Peng. Smart Tools and Applications in Graphics (**STAG**) 2022, poster.

2021 **Reconstructing 3D Indoor Layout from Multiple Panoramic Images (結合深度學習與圖形最佳化方法之多視角室內全景影像三維格局重建).** Sio-Keong Si, Jheng-Wei Su, Chi-Han Peng, Kuo-Wei Chen, Felix Chang, Chih-Yuan Yao, and Hung-Kuo Chu. Computer Graphics Workshop (**CGW**) 2021. *Best Paper Award.

2021 **Manhattan Room Layout Reconstruction from a Single 360◦ Image: A Comparative Study of State-of-the-Art Methods.** Chuhang Zou, Jheng-Wei Su, Chi-Han Peng, Alex Colburn, Qi Shan, Peter Wonka, Hung-Kuo Chu, and Derek Hoiem. International Journal of Computer Vision (**IJCV**), 2021.

2019 **Checkboard Patterns with Black Rectangles.** Chi-Han Peng, Caigui Jiang, Peter Wonka, and Helmut Pottmann. **ACM Transactions on Graphics** (Proceedings of ACM SIGGRAPH ASIA) 2019.

2019 **DuLa-Net: A Dual-Projection Network for Estimating Room Layouts from a Single RGB Panorama.** Shang-Ta Yang, Fu-En Wang, Chi-Han Peng, Peter Wonka, Min Sun, and Hung-Kuo Chu. IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**) 2019.

2018 **Designing Patterns using Triangle-Quad Hybrid Meshes**. Chi-Han Peng, Helmut Pottmann, and Peter Wonka. **ACM Transactions on Graphics** (Proceedings of ACM SIGGRAPH) 2018.

2018 **PanoAnnotator: A Semi-Automatic Tool for Indoor Panorama Layout Annotation**. Shang-Ta Yang, Chi-Han Peng, Peter Wonka, Hung-Kuo Chu. **ACM Siggraph Asia** 2018, Poster.

2016 **Computational Network Design from Functional Specifications**. Chi-Han Peng, Yong-Liang Yang, Fan Bao, Daniel Fink, Dong-Ming Yan, Peter Wonka, and Niloy J. Mitra. **ACM Transactions on Graphics** (Proceedings of ACM SIGGRAPH), 2016.

2014 **Computing Layouts with Deformable Templates**. Chi-Han Peng, Yong-Liang Yang, and Peter Wonka. **ACM Transactions on Graphics** (Proceedings of ACM SIGGRAPH), 2014.

2014 **Exploring Quadrangulations**. Chi-Han Peng, Michael Barton, Caigui Jiang, and Peter Wonka. **ACM Transactions on Graphics** (Proceedings of ACM SIGGRAPH), 2014.

2014 **Connectivity Control for Quad-Dominant Mesheswith Applications in Urban Design**. Chi-Han Peng. Advances in Architectural Geometry (**AAG**) 2014, poster.

2013 **Connectivity Editing for Quad-Dominant Meshes**. Chi-Han Peng and Peter Wonka. Eurographics Symposium on Geometry Processing (**SGP**), 2013.

2011 **Connectivity Editing for Quadrilateral Meshes**. Chi-Han Peng, Eugene Zhang, Yoshihiro Kobayashi, and Peter Wonka. **ACM Transactions on Graphics** (Proceedings of ACM SIGGRAPH ASIA), 2011.

2011 **Feature Detection in Aerial Images**. Cheng Pan, Yifan Zhang, and Chi-Han Peng. SIAM Data Mining Conference (SDM) 2011, Doctoral Forum. Advisors: John Femiani, Anshuman Razdan, Peter Wonka.

2006 **User-Assisted Mesh Simplification**. Tan-Chi Ho, Yi-Chun Lin, Jung-Hong Chuang, Chi-Han Peng, and Yu-Jung Cheng. ACM Virtual Reality Continuum and Its Applications (**VRCIA**) 2006.

U.S. PATENTS

2017 **System and method for three-dimensional garment mesh deformation and layering for garment fit visualization.** Jonathan Leong Zhan Hua and Chi-Han Peng. Publication Number: US9754410B2.

2006 **System and method for implementing remote control functions in a mouse in a video playback system**. Yi-Chao Tsai, Fu-Kai Juang, and Chi-Han Peng. Publication Number: US20080022219A1.

WORK EXPERIENCE

National Yang Ming Chiao Tung University (NYCU), Taiwan
2020- **Assistant Professor.** College of AI. Courses taught: Intro. to Computer Graphics, 3D Computer Vision.

ShanghaiTech University, China
2019-2020 **Assistant Professor.** School of Information Science and Technology.

King Abdullah University of Science and Technology (KAUST), Saudi Arabia
2017-2019 **Research Scientist.** Visual Computing Center.

Nogle, Taiwan
2016-2017 **Software Engineer.** 3D modeling and simulation for real-world clothes.

University College London (UCL), UK
2015-2016 **Postdoctoral research associate.** Working for Prof. Niloy Mitra, Dept. of Computer Science, UCL.

Adobe Advanced Technology Lab (ATL), San Jose, CA, USA
2012 Summer **Research intern** advised by Dr. Nathan Carr and Radomir Mech.

Peace Network Co., Ltd. (www.mytaxi.tw)
2009-2010 **Co-Founder**. My wife and I co-founded an online taxi carpooling service targeting commuters in Taipei. The taxi drivers are provided by a local taxi fleet. I collaborated with a website design house to build the website using PHP framework Codeigniter and MySQL.

CyberLink Corp.
2007-2010 **Senior Engineer**. I was in charge of the OEM customization of the navigator, content protection (BD+), and video protection protocols (COPP/OPM) of our HDDVD/Blu-ray software. I also integrated the anti-reverse engineering technologies, such as AACS and code obfuscation, into our video playback software.

2006-2007 **Engineer**. I improved the quality of the navigator and scripting engine (HDi) components of our HDDVD software to shipping quality. I shipped components to OEM customers such as HP, Dell, Asus, and Acer.

National Center for High-Performance Computing (NCHC), Taiwan
2002-2004 **Undergraduate Research Assistant**. Web-based remote stereo-image display system using Java3D.

PROGRAMMING AND TECHNICAL SKILLS

C/C++: Professional with 5+ years of working experience as a software engineer.

3D: proficient with **OpenGL/GLSL** shader programming. Specialized in **geometric processing** methods on polygon meshes. Experienced with **3D reconstruction** methods and tools such as **stereo matching** and **OpenMVG**. Good with 3D tools including **3ds Max**, **Blender**, **Maya**, and **Unity**.

Optimization: proficient in optimization problem modeling and usage of optimization solvers such as Gurobi, Ceres-Solver, and BFGS. Specialized in **Integer Programming** problem modeling and solving.

Python: worked on academic/research projects with PyTorch, TensorFlow, Conda, Linux (Ubuntu), etc.

ACQUIRED FUNDING

2022-2025 **Improving State-of-the-Art Panorama-based Novel View Synthesis Methods**
Role: Principal Investigator
Funding agent: Ministry of Science and Technology (MOST), Taiwan
Duration: 8/1/2022~7/31/2025. Funding amount: **2,361,000 TWD**

2021-2022 **3D Indoor Reconstruction by Leveraging Geometric Modeling, Neural Network, and User Interaction Techniques**
Role: Principal Investigator
Funding source: Ministry of Science and Technology (MOST), Taiwan
Duration: 1/1/2021~10/31/2022. Funding amount: **1,591,000 TWD**

2022 **Using Artificial Neural Network to Automatically Label Fibrotic Parts in Lung Computerized Tomography Images**
Role: Co-Principal Investigator
Funding agent: Sin-Kong Hospital, Taiwan
Duration: 4/1/2022~12/31/2022. Funding amount: **20,000 TWD**

ACADEMIC SERVICE

Publication Chair: The 19th IEEE VTS Asia Pacific Wireless Communications Symposium (IEEE VTS APWCS), 2023

Program Committee:
The 39th Annual AAAI Conference on Artificial Intelligence (AAAI), 2025.

Technical Committee:
9th International Conference on Computing and Artificial Intelligence, 2023 (ICCAI 2023).
3rd International Conference on Artificial Intelligence, Automation and Algorithms, 2023 (AI2A 2023).

Siggraph Asia Courses
2018, 2020 I am a lecturer and co-host in two courses at Siggraph Asia 2018 Tokyo and Siggraph Asia 2020 Virtual, titled “Integer Programming for Visual Computing”, with Prof. Peter Wonka.

Academic Paper Reviewer:
CVPR / ECCV / ICCV / ACCV / Siggraph / Siggraph Asia / Computer Graphics Forum / Eurographics / Pacific Graphics / CADJ / European Journal of Operational Research / Automation in Construction / Computer-Aided Design / IEEE Computer Graphics and Applications

Industry Technical Reviewer: *Programming HD DVD and Blu-ray Disc*, ISBN: 9780071496704. I reviewed several chapters about authoring HDDVD Advanced Content.