Chia-Kai (Kai) Yeh

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Education

Northwestern University, Evanston, IL

Ph.D. Computer Science   *Aug. 2020*

- Related courses: Machine learning, Deep learning, Introduction to computational photography, Introduction to computer vision, Advance computer graphics, Advance computer vision
- Research interests: 3D reconstruction, Appearance acquisition, Multi-view stereo and Photogrammetry
- Thesis: Mobile Computational Imaging Systems for Appearance Modelling Based Surface Shape Recovery
  Advisor: Prof. Oliver Cossairt

Northwestern University Kellogg School of Management, Evanston, IL

Certificate in Management for Scientists and Engineers   *Aug. 2019*

- Received certificate from program aimed at developing business and management skills in STEM PhD students.
- Topics included marketing, economic strategy, accounting, risk/uncertainty management, IP management, entrepreneurship, crisis management, finance, and operations management.

Chang Gung University, Taoyuan, Taiwan

Bachelor of Science Electronic Engineering   June 2013

- Related courses: Digital signal processing, Microprocessor, Embedded system, Digital logic circuit design, Data structures, Numerical methods, Geometrical optics and Algorithm

Work Experience

8i Inc., Chicago, IL

Research Engineer   Sept., 2021 — Present

- Developed and optimized depth and 3D mesh reconstruction for both real-time and offline multi-view stereo
- Researched and developed non-rigid tracking and deformation of 3D mesh and point clouds
- Researched and integrated machine learning module of multi-view depth reconstruction/fusion and temporal non-rigid track to drive further improvement in volumetric capturing and 3D reconstruction pipeline
- Developed and optimized multi-view camera calibration pipeline

M^3., Palo Alto, CA

Applied Science Lead   Sept., 2020 — Aug., 2021

- Developed automatic custom 3D respirator fitting and morphing algorithm and participated the iOS app development of the 3D Face Scanning for custom-fitted respirators
- Developed 3D facial reconstruction from sparse data input and single image input with AI/ML
- Led the team, built the AI/ML sizing recommendation system based on 3D data

Adobe Inc, San Jose, CA

Research Intern   June, 2018 — Feb. 2019

- Research in photorealistic human facial geometry and reflectance modeling
- Participated in the project of Light Dome setup for human facial geometry and reflectance modeling
- https://research.adobe.com/news/photogeode-3d-faces-from-2d-imagery/
  Advisor: Dr. Sunil Hadap, Dr. Duygu Ceylan

Institution of Creative Technologies, University of Southern California, Los Angeles, CA

Visiting Researcher of Graphics Lab   June, 2016 — Sept. 2016

- Researched in markerless human body and facial 3D reflectance motion capturing from Light Stage
- Participated in the project of miniature dome setup for bidirectional texture function acquisition
  Advisor: Dr. Andrew Jones, Dr. Paul Debevec

3D Aperture Technologies Co., Ltd, Taipei, Taiwan

Camera Module Design Engineer   Oct. 2014 — Aug. 2015

- Developed array camera module firmware (sensor porting), calibration process, image quality evaluation, image pipeline on embedded and Android platform, demo software and UI designed
- Worked with clients such as Google (ATAP Project Ara) and Amazon Lab126 on optical mechanical system and optical designed for advance mobile array camera module
- Led the team, designed and built the 3D capture environment for multi-view stereo 3D reconstruction for VFX studio

Publications

A Streamlined Photometric Stereo Framework for Cultural Heritage.
Chia-Kai Yeh, Nathan Matsuda, Xiang Huang, Fengqiang Li, Marc Walton, Oliver Cossairt. ECCV Workshops 2016.

Shape-from-Shifting: Uncalibrated Photometric Stereo with a Mobile Device.
Chia-Kai Yeh, Fengqiang Li, Gianluca Pastorelli, Marc Walton, Aggelos K. Katsaggelos and Oliver Cossairt. IEEE International Conference on eScience Workshop on High Throughput Digitization for Natural History Collections (BigDig) 2017

Hand-guided qualitative deflectometry with a mobile device
Florian Willomitzer**, Chia-Kai Yeh**, Vikas Gupta, William Spies, Florian Schiffers, Aggelos Katsaggelos, Marc Walton, and Oliver Cossairt. Optics. Express 28, 9027-9038 (2020)

A Low-Cost Solution for 3D Reconstruction of Large-Scale Specular Objects
Yunhao Li, **Chia-Kai Yeh**, Bingjie Xu, Florian Schiffers, Marc Walton, Jack Tumblin, Aggelos Katsaggelos, Florian Willomitzer, and Oliver Cossairt. Computational Optical Sensing and Imaging 2021

Low-budget 3D scanning and material estimation using PyTorch3D
Oliver Cossairt, Florian Willomitzer**, Chia-Kai Yeh** and Marc Walton, *2020 54th Asilomar Conference on Signals, Systems, and Computers*, 2020

Photometric Stereo by UV-Induced Fluorescence to Detect Protrusions on Georgia O'Keeffe's Paintings.
Johanna Salvant, Marc Walton, Dale Kronkright, **Chia-Kai Yeh,** Fengqiang Li, Oliver Cossairt, Aggelos Katsaggelos. Accepted for publication in the Springer Nature book: Metal Soaps in Art-Conservation & Research

CS-ToF: High-resolution compressive time-of-flight imaging
Fengqiang Li, Huaijin Chen, Adithya Pediredla, **Chia-Kai Yeh**, Kuan He, Ashok Veeraraghavan, and Oliver Cossairt
Optics Express, 25(25) 31096-31110, 2017

High spatial resolution time-of-flight imaging
Fengqiang Li, Huaijin Chen, **Chia-Kai Yeh**, Kuan He, Ashok Veeraraghavan, and Oliver Cossairt. Proc. SPIE 10669, Computational Imaging III, 1066908 2018

Media Coverage

New app reveals the hidden landscapes within Georgia O'Keeffe's paintings.
Sid Perkins, Science, February 16, 2019
https://www.sciencemag.org/news/2019/02/new-app-reveals-hidden-landscapes-within-georgia-o-keeffe-s-paintings

PhotoGeode: 3D Faces from 2D Imagery
Adobe Research Blog, May 24, 2019
https://research.adobe.com/news/photogeode-3d-faces-from-2d-imagery/

Skills

- Coding Languages: C/C++, Python, Matlab, , Java, Javascript, Verilog, CUDA
- Coding Libraries: OpenCV , TensorFlow, Pytorch, Pytorch3D, Open3D, libIGL, PCL, CGAL, WebGL
- Software Tools: Git, Dockers, AWS Lambda
- Hardware skills: AutoCAD, LabView, Protel (Circuit design, PCB layout), Soldering

Professional Experience

Professional Service
2017   Reviewer-UIST
2019   Speaker-Adventures in Seeing Works of Art: A COSI Workshop in Deflectometry, Smart Museum of Art, The University of Chicago

Teaching Experience
2016   Teaching Assitant-EECS101: An intro to computer science for everyone, Northwestern University
2017   Teaching Assitant-EECS110: Intro to Computer Programming (Python), Northwestern University
2019   Teaching Assitant-EECS395/495: Machine Learning: Foundations, Applications, and Algorithms, Northwestern University

Languages

Mandarin Chinese (Native); Taiwanese (Native); English (Professional proficiency)