

YiChang Shih

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PROFESSIONAL SUMMARY

15 years of experience in **Computational Photography**, specializing in **Machine Learning** and **Edge AI** development for consumer products. Collaborated across engineering and research to innovate ML-based imaging features, on-device generative-AI solutions, and effective ML infrastructure.

EXPERIENCES

Google LLC
Senior Staff Engineer
Staff Engineer
Senior Engineer

Mountain View, CA
Apr 2022 - Present
Oct 2019 - Mar 2022
Aug 2017 - Sep 2019

Led the **Computational Photography and Machine Learning** team, which builds cutting-edge AI/ML solutions to power Google Pixel Camera series. Oversaw the algorithm development, model training, and on-device/cloud optimization for product launch.

Zoom Enhance (since Pixel 9)

The first on-device generative-AI solution for super-resolution using image diffusion, accelerated by extensive GPU and Edge-TPU optimization.

HDR imaging (since Pixel 9)

Highlight recovery using multi-exposure fusion and floating-point tone-mapping.

Extended Depth-of-field Photography (since Pixel 9)

Recover facial detail on background subjects in group shots through ML and multi-focus fusion.

Video Boost 4k60fps Mode (since Pixel 9)

Enhanced video quality and temporal consistency via large ML models running on cloud servers.

Camera Pro Mode (since Pixel 8)

Manual camera mode to set focus control, shutter speed, brightness, and ISO. Capture enhanced RAW with Adobe DNG SDK 1.6 features.

Ghosting Flare Removal (since Pixel 8)

Automatic removal of lens flare artifacts caused by internal reflection using on-device ML enhancement.

Fusion Zoom (since Pixel 7, SIGGRAPH Asia 2023)

Super-resolved digital zoom by fusing Wide and Telephoto camera using deep ML models. Densely aligned cameras by efficient ML optical flow on mobile devices. Robust to Camera DoF and focus quality.

HDR+ (since Pixel 7)

ML enhancement for natural skin texture rendition, (since Pixel 8) perfectly-exposed Moonshots, and photometric-aware burst processing.

Face Unblur (since Pixel 6, SIGGRAPH 2022)

Removed motion blur on faces by adaptively taking an ultrawide camera shot with a faster shutter speed, and fuses both the wide and ultrawide photos using ML models.

Edge-TPU for Camera ML Optimization (since Pixel 6)

Accelerated the latency and power performance for core Camera use cases using edge-TPU in Google Tensor SoC. Led the task force to resolve GPU/TPU inferences for all ML-based camera workloads.

Chromatic Aberration Correction (since Pixel 5)

Corrected color-fringing in ultrawide-angle camera using optical simulation and image warping.

Real-time Subject Segmenter (since Pixel 5)

Enabled ML portrait segmenter in camera preview for people-aware image quality enhancement and WYSIWYG effects.

Camera Mesh Warp (since Pixel 4)

Designed and implemented the image mesh warping framework across Android camera stack (HAL, Framework, and App) for distortion correction and creative effects in camera preview and photo capture.

Face Distortion Correction (since Pixel 3, SIGGRAPH 2019)

The world first ML-based automatic anamorphic distortion (ultrawide angle distortion at corners) correction. Praised by public. Real-time version for camera preview was landed since Pixel 4.

Lens Distortion Correction (since Pixel 3)

Calibrated and corrected optical distortion due to lens design and manufacturing limitations common in ultrawide-angle cameras.

Light.co

Research Scientist

Palo Alto, CA

Mar 2015 - Jul 2017

Launched L16, the world-first Developed core algorithms for multi-camera imaging system on mobile platform. Led product features and researches on computational photography.

Product Launch: the Light L16 Camera, released in 2017

Compact camera that uses computational photography to combine 16 different images into a single, stunningly detailed photo, from 28mm to 135mm. Participated in the full product R&D cycles from the prototype, factory manufacturing, testing (Foxconn), and imaging pipeline software development.

Depth from Multi-view Stereo

Computed the scene depth map from 10 different cameras on one mobile platform. Developed sparse and coarse-to-fine multi-view matching algorithm for efficient processing. Delivered robust occlusion and calibration tolerance handling.

Dynamic Online Calibration

Refined the camera calibration parameters for every shot to compensate mechanical tolerance. Delivered multiscale and multi-view feature matching algorithm for robust bundle adjustment, and the calibration tuning tool by visualizing epipolar geometry and reprojection errors.

Multi-view Image Fusion

Delivered high-quality image denoising algorithm using RAW sensor data from 5 different cameras, and the efficient algorithm using wavelet transform and robust matching.

Multi-view Imaging Pipeline

Designed and optimized multi-view image processing pipeline: demosaicking, bad pixel correction, calibration, lens correction, and perspective correction. Optimized the system with SIMD (NEON and SSE) and multi-threading. Built the software stack release process and regression tests.

Google X

Software Engineer Intern

Mountain View, CA

Jun 2014 - Sep 2014

Efficient depth-from-stereo algorithm using bilateral solver. Published in CVPR 2015.

Advisors: Marc Levoy and Jon Barron.

Adobe Research

Research Intern

Style transfer algorithm for portrait pictures. Published in SIGGRAPH 2014.

Advisors: Sylvain Paris and Connelly Barnes.

Cambridge, MA

Jun 2014 - Sep 2014

Google Research

Research Engineer Intern

Image denoising algorithm for face pictures in Google+. Published in ICCV 2013 and patents.

Advisors: Vivek Kwatra and Troy Chinen.

Mountain View, CA

Jun 2012 - Sep 2012

Microsoft Research

Research Intern

Lens simulation, calibration, and image enhancement for mobile phone camera. Published in ECCV 2012 and patents.

Advisors: Neel Joshi and Brian Guenter.

Redmond, WA

Jun 2012 - Sep 2012

SELECTED PUBLICATION

I conducted research with my team to explore future road map.

High-Resolution Frame Interpolation with Diffusion, arXiv:2410.11838, 2024

Junhwa Hur, Charles Herrmann, Saurabh Saxena, Janne Kontkanen, Wei-Sheng Lai, Yichang Shih, Miki Rubinstein, David J. Fleet, Deqing Sun.

Vision Transformer for NeRF-Based View Synthesis from a Single Input Image, WACV 2023

Kai-En Lin, Yen-Chen Lin, Wei-Sheng Lai, Tsung-Yi Lin, YiChang Shih, and Ravi Ramamoorthi.

Efficient Hybrid Zoom using Camera Fusion on Mobile Phone, SIGGRAPH Asia 2023

Xiaotong Wu, Wei-Sheng Lai, YiChang Shih, Charles Herrmann, Michael Krainin, Deqing Sun, Chia-Kai Liang.

Face Deblurring using Dual Camera Fusion on Mobile Phones, SIGGRAPH 2022

Wei-Sheng Lai, YiChang Shih, Lun-Cheng Chu, Xiaotong Wu, Sung-Fang Tsai, Michael Krainin, Deqing Sun, and Chia-Kai Liang.

Correcting Face Distortion in Wide-Angle Videos, IEEE TIP 2021

Wei-Sheng Lai, YiChang Shih, Chia-Kai Liang, and Ming-Hsuan Yang.

Portrait Neural Radiance Fields from a Single Image, arXiv:2012.05903, 2021

Chen Gao, YiChang Shih, Wei-Sheng Lai, Chia-Kai Liang, and Jia-Bin Huang.

Distortion-Free Wide-Angle Portraits on Camera Phones, SIGGRAPH 2019

YiChang Shih, Wei-Sheng Lai, Chia-Kai Liang.

Transform Recipes for Efficient Cloud Photo Enhancement, SIGGRAPH Asia 2015

Michaël Gharbi, YiChang Shih, Gaurav Chaurasia, Jonathan Ragan-Kelley, Sylvain Paris, and Frédo Durand.

Data-Driven Photographic Style Using Local Transfer, PhD Thesis, 2015

YiChang Shih.

Fast Bilateral-Space Stereo for Synthetic Defocus, CVPR 2015

Jon Barron, Andrew Adams, YiChang Shih, and Carlos Hernandez.

Reflection Removal using Ghosting Cues, CVPR 2015

YiChang Shih, Dilip Krishnan, Frédo Durand, William T. Freeman.

Style Transfer for Headshot Portraits, SIGGRAPH 2014

YiChang Shih, Sylvain Paris, Connelly Barnes, William T. Freeman, Frédo Durand.

Seeing the Arrow of Time, CVPR 2014

L. Pickup, Z. Pan, D. Wei, Y. Shih, W. Freeman, A. Zisserman and B. Schölkopf.

Joint Noise Level Estimation from Personal Photo Collections, ICCV 2013

YiChang Shih, Vivek Kwatra, Troy Chinen, Hui Fang, Sergey Ioffe.

Data-driven Hallucination of Different Times of Day from a Single Outdoor Photo, SIGGRAPH Asia 2013

YiChang Shih, Sylvain Paris, Frédo Durand, William T. Freeman.

Image Enhancement using Calibrated Lens Simulations, ECCV 2012

YiChang Shih, Brian Guenter, Neel Joshi.

Laser Speckle Photography for Surface Tampering Detection, CVPR 2012

YiChang Shih, Abe Davis, Samuel W. Hasinoff, Frédo Durand, William T. Freeman.

Light Field Analysis for Modeling Image Formation, IEEE TPAMI 2011

Chia-Kai Liang, YiChang Shih, Homer H. Chen.

PATENTS AND DISCLOSURES

US/11922720: Perspective Distortion Correction on Faces.

US/11132800: Real time perspective correction on faces.

US/9659352: Image denoising system and method.

US/9137526: Image enhancement via calibrated lens simulation.

US/9131118: Laser speckle photography for surface tampering detection.

US/8977012: Image denoising system and method.

PCT/US2022/072362: Fusing optically zoomed images into one digitally zoomed image.

PCT/US2021/044185: Exposure control for image-capture.

PCT/US2019/061298: Foreshortening-distortion correction on faces.

Dpub/7271: Highlight Recovery Using Multi-exposure Fusion and Floating-point Tone-mapping.

Dpub/6260: Automatic Removal of Lens Flare Artifacts.

Dpub/5487: Automatic Composition Recommendations for Portrait Photography.

Dpub/4274: Techniques for Deblurring Faces in Images by Utilizing Multi-Camera Fusion.

Dpub/2581: Utilizing a Set of Processed First Frames for Expediting the Settling of Image-Processing Settings.

Dpub/3299: Techniques for Wide-Angle Distortion Correction Using an Ellipsoidal Projection.

Dpub/3090: Improved Object Detection in an Image by Correcting Regions with Distortion.

ACADEMIC SERVICES

Technical Program committee: ICCP, IJCAI 2021

Reviewer: CVPR, ICCV, ECCV, ACCV, WACV, AAAI, PG, EG, CG, SIGGRAPH, SIGGRAPH ASIA, IEEE TIP, IEEE MM, IEEE TMM, IEEE TPAMI, IJCV, ACM MM, ICIP, ICASSP, ACM TOG.

INTERNS SUPERVISION

2021: Kai-En Lin, PhD student in UCSD.

2020: Chen Gao, PhD, Virginia Tech.

2019: Zixun Yu, PhD student in Purdue University.

2018: Wei-Sheng Lai, PhD, in UC Merced.

EDUCATION

Ph.D. in Computer Science, Massachusetts Institute of Technology

Advisor: Frédo Durand and William T. Freeman

Cambridge, MA

Aug 2010 – Mar 2015

M.S. in EECS, Massachusetts Institute of Technology

Major: Electrical Engineering and Computer Science. GPA:5.0/5.0.

Cambridge, MA

Aug 2010 – Jun 2012

B.S. in National Taiwan University

Major: Electrical Engineering. Rank: Top 1% (1/ 191). GPA: 4.0/4.0. Minor: Physics.

Taipei, Taiwan

Sep 2005 – Jun 2009

HONOR

2021: CVPR outstanding reviewer award.

2012: Google Student Travel Awards for my paper in CVPR2012.

2012: Morris Joseph Levin Award for best master thesis presentation.

2010: The Presidential Graduate Fellowship Award at Massachusetts Institute of Technology.

2004: Silver Medal, International Physics Olympiads.

2005-2008: Presidential Award (top 5%, 6 semesters).

CITIZENSHIP

Taiwan and US citizen.

LANGUAGE

English (fluent) and Mandarin (native).

REFERENCE

Available on request.