

Jimmy He

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ABOUT

Generalist who turns math into products. Built and led talented engineering teams creating the future of human-computer interaction. Passionate about computer vision, machine learning, and graphics.

TECHNICAL SKILLS

Programming:	C++, C, Python, Rust, Matlab, R, Go, C#, Javascript, Java, SQL, SIMD, x86 assembly
Frameworks:	PyTorch, TensorFlow, OpenCV, Numpy, Scipy, Eigen, TensorRT, CUDA, Docker
Deep Learning:	Diffusion Models, RL, GAN, CNN, VAEs, NeRF, ResNet, U-Net, Contrastive Learning
Computer Vision:	Segmentation, 3D Reconstruction, Tracking, SfM, SLAM, Optical Flow, Calibration
Mathematics:	Optimization, Bayesian Inference, Kalman Filters, Graph Theory, Information Theory
Graphics:	Vulkan, OpenGL, GLSL, WebGL, Unity, Ray Tracing, Differentiable Simulation

EXPERIENCE

Hover <i>Senior Computer Vision Engineer</i>	San Francisco, CA 2021 – 2025
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- Developed point cloud photogrammetry pipeline with built-in scale and intrinsics optimization for reconstructing interior spaces, producing textured meshes with state-of-the-art accuracy and detail
- Designed AR-guided capture with real-time feedback to ensure quality photo and video coverage
- Invented patent-pending method for detecting and correcting dislocations in AR tracking data
- Revolutionized camera rotation solving via automated Manhattan alignment with manual curation

Redrock Biometrics <i>Principal Software Engineer</i>	San Francisco, CA 2020 – 2021
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- Developed rapid scoring mechanism for matching palmprint images against stored user biometrics
- Created automated pipeline to evaluate matching accuracy on large academic and field datasets
- Improved training realism by labeling field data and using neural style transfer on synthetic images
- Implemented support for hardware designs combining visible and infrared cameras for robustness

Cruise Automation <i>Senior Software Engineer</i>	San Francisco, CA 2018 – 2019
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- Developed a grid-based temporal object tracker using LIDAR which is robust to occlusions, significantly improving accuracy in distinguishing between parked and moving vehicles
- Modernized machine learning pipeline for predicting traffic actors from LIDAR, vision, and radar
- Devised new method of merging and retracing object tracks based on stored observation histories
- Created dashboard and pipeline to summarize aggregate object tracking accuracy. Integrated with CI to allow quick feedback on real world performance compared to running simulations manually

Leap Motion <i>Engineering Manager</i>	San Francisco, CA 2014 – 2018
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- Hired and led teams of 5-10 developers across hand tracking research, front-end applications and firmware. Worked to deliver state-of-the-art VR hand tracking running on cheap off-the-shelf parts
- Unblocked team members to meet aggressive release schedules while keeping technical debt in check
- Provided mentorship in career development, agile research planning, and software best practices

Leap Motion (cont'd)

Principal Software Engineer

2012 – 2018

- Developed key computer vision components in C++ including segmentation, rotation normalization, scale correction, optical flow, non-rigid motion estimation via Kalman filtering, and image denoising
- Created first company prototype of realtime visual-inertial odometry with EKF-based sensor fusion
- Wrote the camera calibration library and much of the in-house math and 3D geometry foundation
- Devised the factory and end-user stereo calibration techniques. Patented a novel method requiring only the device itself and a reflective surface, allowing anyone to recalibrate to sub-pixel accuracy
- Trained and advised team of 20+ customer support specialists throughout first consumer launch
- Wrote the embedded firmware currently running on over 600,000 consumer and developer units
- Built video pipeline with support for windowing, autoexposure, noise correction, and latency testing
- Optimized computationally intensive operations by orders of magnitude using SIMD vectorization
- Developed OpenGL-based visualization engine for live stereo images and 3D reconstructions, which became the company default platform for rapid algorithm prototyping and profiling
- Built flagship Intro to VR application to demonstrate hand tracking for first VR developer release

Altera

Hardware Engineering Intern

Toronto, ON, Canada

2011

- Developed novel algorithm to optimally route logic units on an FPGA given geometric constraints
- Used spatial indexing on the copies of logic elements to dramatically speed up computation
- Introduced new API for writing internal software tools for processing FPGA device blueprints

EDUCATION

University of Waterloo

B.A.Sc. Nanotechnology Engineering

Waterloo, ON, Canada

2007 – 2012

PATENTS

Augmented reality with motion sensing

2019

US Patent 10,349,036 – David S. Holz, Neeloy Roy, Jimmy He

Systems and method of interacting with a virtual object

2018

US Patent 9,911,240 – Raffi Bedikian, Jimmy He, David S. Holz

Biometric aware object detection and tracking

2017

US Patent 9,679,197 – Maxwell Sills, Aaron Smith, David S. Holz, Jimmy He

Calibration of multi-camera devices using reflections thereof

2017

US Patent 9,648,300 – Jimmy He, David S. Holz

Method for synchronizing operation of systems

2016

US Patent 9,348,419 – Ryan C. Julian, Jimmy He, David S. Holz

AWARDS

American Invitational Mathematics Examination

2007

2nd place in North America

CEMC Fermat Mathematics Contest

2006

1st place in Canada