

Po Kong Lai

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Work Experience

Head of R&D, Brinx Software Inc. (operating as Masterpiece X) – Ottawa, ON, Canada Sept 2018 – Present

- Spearheaded 60+ R&D initiatives to modernize the 3D content creation pipeline by integrating advanced geometry processing and generative AI to yield a variety of benefits such as reduced bottlenecks, empowered user creativity, and accelerated iteration cycles
- Conceptualized and launched MasterpieceX, a text/image driven generative AI tool for end-to-end 3D asset creation with over 130k users addressing a critical need for accessible 3D asset creation
- Designed and implemented modular agentic-based 3D content workflows integrating human oversight to boost creative output speed and quality while maintaining precise creative vision
- Engineered advanced geometry processing algorithms (auto-uv unwrapping, remeshing, mesh booleans, voxelization, skeletonization, auto-rig & skin) resulting in over 80% reduction in time-to-creative output
- Addressed multi-platform compatibility challenges by refining data structures and algorithms to enable seamless deployment across cloud, desktop, and Android (Quest2), resulting in enhanced system reliability and user reach
- Developed cutting-edge immersive virtual reality applications (mesh sculpting, texture painting, rigging & skinning, 3D animation creation and editing) for desktop PC and the Quest2 platforms
- Architected, deployed and maintained 25+ different containerized solutions resulting in streamlined operations
- Defined and executed the strategic vision for R&D, aligning technology roadmaps with business goals to drive innovation with cross-functional teams leading to improved project delivery
- Mentored and fostered the growth of 12 developers resulting in zero turnover

Research & Teaching Assistant, University of Ottawa – Ottawa, ON, Canada Jan 2014 – Sept 2019

- Designed and implemented a novel framework for creating immersive experiences for virtual reality using a single RGB-D sensor
- Developed novel methods for background/foreground separation, dynamic 3D scene reconstruction, video summarization and machine learning models for both omni-directional depth map generation and 3D shape completion
- Gave lectures, graded assignments, held office hours and proctored exams for the following courses: Discrete Structures, Introduction to Computing I with JAVA and Python

Research & Teaching Assistant, Carleton University – Ottawa, ON, Canada Sept 2011– Dec 2013

- Implemented surface parameterization algorithms for unfolding 3D meshes of tunnels for geological analysis
- Design and analysis of mesh processing algorithms to extract information of geological interest: fracture orientation, surface roughness, and feature detection
- Gave lectures, graded assignments, held office hours and proctored exams for the following courses: Discrete Mathematics, Abstract Data Types and Algorithms, Introduction to Computer Science for Arts and Social Sciences and Internet Application Programming

Software Developer, March Networks – Ottawa, ON, Canada Jan 2010 – Aug 2011

- Core development of VideoSphere Command - an IP management software suite
- Prototyped integrations of VideoSphere SDK with external partners

Intern Software Developer, Corel Corporation – Ottawa, ON, Canada May 2009 – Apr 2009

- Implemented color management features, enhancements and fixed defects in CorelDRAW Graphics Suite X5
- Integration of an asset manager written in C# WPF to the C++ environment of CorelDRAW allowing users to quickly access all of their media files within CorelDRAW

Intern Software Developer, IBM – Ottawa, ON, Canada May 2008 – Dec 2008

- Core development of J9 Java Class Libraries (JCL) increasing the range and quality of functionality for users
- Added regression testing to nightly builds and automated management of execution environments for different J9 JCL configurations

NSERC USRA - Research Assistant, Carleton University – Ottawa, ON, Canada

Jan 2008 – Aug 2008

- Implementation of a novel image segmentation algorithm using the “Well-Separated Pair Decomposition” data structure from computational geometry

Projects

Depth maps from omni-directional stereo images

<https://github.com/pokonglai/ods-net>

- Designed and trained a convolutional neural network (CNN) using TensorFlow to predict depth maps when giving an omni-directional stereo (ODS) image
- Applied the trained model to omni-directional stereo (ODS) videos often used by users of virtual reality headsets to allow for 6 degrees-of-freedom movement
- This repo is the source code accompanying my paper that was presented at IEEE VR 2019

Gravitational Clustering

<https://github.com/pokonglai/GravClustering>

- Developed a clustering algorithm using the principles of gravity
- A 2D visualizer was also implemented to serve as a demo

Skills

Tools, Software & Platforms: Visual Studio, VSCode, Git, Docker, CMake, Google Cloud Platform (GCP), PyTorch, TensorFlow, Blender, Unity3D, Unreal Engine

Languages: Python, C/C++, C#, GPU shaders, JAVA, Bash, Javascript

Education

University of Ottawa – Doctorate in Philosophy in Computer Vision and Machine Learning 2014-2019

Carleton University – Masters of Computer Science in Computational Geometry and Image Processing 2011-2013

Carleton University – Bachelor of Computer Science, Highest Honors 2006-2011

Publications

Shuang Xie, Po Kong Lai, Robert Laganier and Jochen Lang. "Effective convolutional neural network layers in flow estimation for omni-directional images." In *2019 International Conference on 3D Vision (3DV)*, pp. 671-680. IEEE, 2019.

Po Kong Lai, Weizhe Liang and Robert Laganier. "Additive depth maps, a compact approach for shape completion of single view depth maps." *Graphical Models* 104 (2019): 101030.

Po Kong Lai, Shuang Xie, Jochen Lang and Robert Laganier. "Real-time panoramic depth maps from omni-directional stereo images for 6 dof videos in virtual reality." In *2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, pp. 405-412. IEEE, 2019.

Po Kong Lai and Robert Laganier. "Creating Immersive Virtual Reality Scenes Using a Single RGB-D Camera." In *Image Analysis and Recognition: 14th International Conference, ICIAR 2017, Montreal, QC, Canada, July 5–7, 2017, Proceedings 14*, pp. 221-230. Springer International Publishing, 2017.

Po Kong Lai and Claire Samson. "Applications of mesh parameterization and deformation for unwrapping 3D images of rock tunnels." *Tunnelling and Underground Space Technology* 58 (2016): 109-119.

Po Kong Lai, Marc Décombas, Kelvin Moutet and Robert Laganier. "Video summarization of surveillance cameras." In *2016 13th IEEE International conference on advanced video and signal based surveillance (AVSS)*, pp. 286-294. IEEE, 2016.

Po Kong Lai, Claire Samson and Prosenjit Bose. "Visual enhancement of 3D images of rock faces for fracture mapping." *International Journal of Rock Mechanics and Mining Sciences* 72 (2014): 325-335.

Po Kong Lai, Claire Samson and Prosenjit Bose. "Surface roughness of rock faces through the curvature of triangulated meshes." *Computers & Geosciences* 70 (2014): 229-237.

Po Kong Lai, Claire Samson, and Prosenjit Bose. "Visual enhancement of 3D images of rock faces for fracture mapping." *International Journal of Rock Mechanics and Mining Sciences* 72 (2014): 325-335.

Tara McLeod, Claire Samson, Martin Labrie, Kareem Shehata, Jason Mah, Po Kong Lai, Langyue Wang and James Elder. "Using video acquired from an unmanned aerial vehicle (UAV) to measure fracture orientation in an open-pit mine." *Geomatica* 67, no. 3 (2013): 173-180.

Alexandre Boivin, Po Kong Lai, Claire Samson, Ed Cloutis, Scott Holladay, and Francisco José Martínez-Moreno. "Electromagnetic induction sounding and 3D laser imaging in support of a Mars methane analogue mission." *Planetary and Space Science* 82 (2013): 27-33.

Patents

Computer animation methods and systems. U.S. Patent No. 12,094,043 B2. (Granted in September 2024).

Role: Inventor | Brinx Software Inc. | Google Patents Link: <https://patents.google.com/patent/US12094043B2/en>

System and method for remixing 3D assets using Generative AI. (Pending since February 2025).

Role: Inventor | Brinx Software Inc. | Google Patents Link: <https://patents.google.com/patent/US20250069350A1/>