David Bauer

Machine Learning Researcher · Meta

Research scientist with +5 years of experience in machine learning, neural rendering, radiance fields, and real-time graphics. Strong research background in scientific and immersive visualization and volume rendering with multiple first-author journal publications at top venues.

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SKILLS

Machine Learning
PyTorch, TensorFlow, Triton, DDP, TorchRec, Python, Docker

Graphics & GPGPU
C/C++, CUDA, OptiX, HLSL/Slang, GLSL, Metal, OpenGL, VDB, USD, glTF

VR & Visualization
VTK, OpenXR, Unity, Unreal, VRTK, Blender, WebVR, React, D3

EDUCATION

Sep 2019–Mar 2025 **University of California, Davis**
Advisor: Kwan-Liu Ma
Ph.D. in Computer Science

Jul 2018–Aug 2018 **Tokyo Institute of Technology**
Earth-Life Science Institute
Visiting Scholar

Oct 2016–Aug 2018 **Vienna University of Technology**
Advisor: Eduard Groeller
B.Sc. in Computer Science

PUBLICATIONS

2025 **GSCache: Real-Time Radiance Caching for Volume Path Tracing using 3D Gaussian Splatting**
David Bauer, Qi Wu, Hamid Gadirov, Kwan-Liu Ma
IEEE Transactions on Visualization and Computer Graphics & IEEE VIS 2025
Real-time radiance caching using a collection of Gaussian point clouds that act as a path-space cache.

Neural Rendering Techniques for Volume Visualization
David Bauer
Dissertation
Research on machine learning techniques to enhance the performance and quality of scientific volume visualization systems.

HyperFLINT: Hypernetwork-based Flow Estimation and Temporal Interpolation for Scientific Ensemble Visualization
Hamid Gadirov, Qi Wu, David Bauer, Kwan-Liu Ma, Jos Roerdink, Steffen Frey
Computer Graphics Forum
Using hypernetworks to parameterize neural flow-field encodings for parameter space exploration.

From Cluster to Desktop: A Cache-Accelerated INR framework for Interactive Visualization of Tera-Scale Data
Daniel Zavorotny, Qi Wu, David Bauer, Kwan-Liu Ma
Eurographics Symposium on Parallel Graphics and Visualization (EGPGV)
Applying multi-resolution data caching to accelerate implicit neural representation rendering performance.

2024 **A Multi-Layout Design For Immersive Visualization of Hierarchical Network Data**
David Bauer, Chengbo Zheng, Oh-Hyun Kwon, Kwan-Liu Ma
IEEE International Symposium on Mixed and Augmented Reality (ISMAR)
Introduction and evaluation of novel network layout suite for graph visualizations in VR.

2023 **Photon Field Networks for Dynamic Real-Time Volumetric Global Illumination**
David Bauer, Qi Wu, Kwan-Liu Ma
IEEE Transactions on Visualization and Computer Graphics & IEEE VIS 2023
Caching photon trace radiance using neural networks for accelerated volume path tracing.

Interactive Volume Visualization via Multi-Resolution Hash Encoding based Neural Representation
Qi Wu, David Bauer, Michael J. Doyle, Kwan-Liu Ma
IEEE Transactions on Visualization and Computer Graphics
Neural compression and efficient in-shader rendering of large volume datasets.

HyperINR: A fast and predictive hypernetwork for implicit neural representations via knowledge distillation
Qi Wu, David Bauer, Yuyang Chen, Kwan-Liu Ma
Preprint arXiv, doi: arXiv:2304.04188
A hypernetwork approach for multi-variate neural volume compression.

2022 **FoVolNet: Fast Volume Rendering using Foveated Deep Neural Networks**
David Bauer, Qi Wu, Kwan-Liu Ma
IEEE Transactions on Visualization and Computer Graphics & IEEE VIS 2022, Best Paper Honorable Mention Award
Real-time rendering of sparsely sampled volume datasets using deep learning assisted denoising and in-painting.

FoVolNet: Foveated Volume Visualization using Deep Neural Networks
David Bauer, Qi Wu, Kwan-Liu Ma
NVIDIA GTC Poster Session

2021 **A Comparison of the Fatigue Progression of Eye-Tracked and Motion-Controlled Interaction in Immersive Space**
Lukas Masopust*, David Bauer*, Siyuan Yao, Kwan-Liu Ma
IEEE International Symposium on Mixed and Augmented Reality (ISMAR)
An investigation of the fatigue behavior of different interaction techniques in VR.

2018 **Image Analysis Server**
David Bauer
Bachelor Thesis
An automated, AI-powered tool to analyze x-rays. Interactive visual masks enable exploration of morphology and grading of osteoarthritis. In active use in hospitals around Austria.
https://www.cg.tuwien.ac.at/research/publications/2018/Bauer_David_2018

PROFESSIONAL EXPERIENCE

Apr 2025–current **Meta, Menlo Park, CA, US**
Research Scientist
Develop and research cutting-edge deep learning techniques and large-scale machine learning systems.

Jun 2023–Sep 2023 **Disney Research Studio, Zürich, CH**
PhD Research Intern
Research into advanced methods for neural path guiding via neural parameteric representations.

Jun 2021–Jun 2023 **Intel Corporation, Santa Clara, CA, US**
PhD Research Intern
Development of image denoising pipelines for ray-traced frame sequences using deep convolutional neural networks.

Feb 2018–Jun 2019 **Image Biopsy Lab, Vienna, AT**
Researcher and Developer
Development of deep learning models for the prediction and visualization of degenerative bone diseases. Work on the FDA approval of said techniques.

Aug 2012–Jun 2013 **Centre for Visual Analytics - CVAST, Vienna, AT**
Research Assistant
Visualization of temporal data for clinical applications. Development of novel inspection methods for sparse medical data with dense aggregation zones.

SERVICE

Peer Reviewer

2025 IEEE VIS
2025 Super Computing

2025 Eurographics
2025 The Journal of Supercomputing
2023–2024 IEEE Transactions on Visualization and Computer Graphics
2023 Pacific Graphics

Teaching Assistant

2021–2024 ECS175 Computer Graphics
2021 ECS162 Web Programming
2021 ECS163 Information Interfaces
2019–2020 ECS32B Algorithms and Data Structures

Guest Lectures, Talks, and Exhibits

2022 Intel Innovation Exhibition on Neural Rendering and Deep Learning in Scientific Visualization, San Jose
2021 ECS175 Computer Graphics: "Graphics Programming: From OpenGL to 3D Engines", UC Davis

AWARDS

2024 UC Davis Graduate Group of Computer Science Summer Scholarship
2021–2024 Intel Center of Excellence Gift Grant
2021 NVIDIA Research Hardware Grant
2019 Research Fellowship from The University of California, Davis
2019 Visiting Scholar Award from The University of Illinois at Urbana-Champaign (declined)
2018 Research Exchange Award from The Vienna University of Technology and The Tokyo Institute of Technology
2017 Merit-Based Scholarship from The Vienna University of Technology

PROJECTS

Since 2024 **Fabulous Ray Tracer**
Code on GitHub
Hobby project that implements real-time GPU path tracing for various backends to facilitate learning of different graphics APIs and experiment with novel rendering techniques.

Since 2024 **Stage: A Universal 3D Scene Loader**

Code on GitHub

Stage is a tool that lets you load various 3D scene and object formats into a uniform representation that is easy to use and integrate into your renderer, ray tracing application or game engine.

Since 2022 **OVR: Open Volume Renderer**

Code on GitHub

Scientific visualization renderer developed in our research group at UC Davis. Supports various types of volume rendering and different rendering backends like NVIDIA Optix or Intel OSPRay.