OLIVIER MERCIER

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APPLIED RESEARCH SCIENTIST – SIMULATION AND COMPUTER GRAPHICS

Computer scientist with strong mathematics skills. Background in physical simulations, computer graphics, and numerical differential equations. Worked at Meta Reality Labs on the Display Systems Research team, simulating display image distortion for new optical architectures and developing novel eye tracking methods using advanced holographic optical elements. Holistic understanding of mixed reality systems, bridging communication between hardware, firmware, software, UX, and perception science. Excels at working on multidisciplinary teams with challenging deadlines, and learning new skills to achieve objectives.

SKILLS

Computer Graphics | Physics Simulation | Applied Mathematics | Rendering | Optimization | Software

WORK EXPERIENCE

META, Redmond, WA **March 2018 – Current**
Research Scientist – Reality Labs, Display Systems Research

Algorithm development for mixed reality headsets:
- Built an image distortion simulation pipeline to inform future product performance and tradeoffs
- Led a small team to develop a new eye tracking method relying on holographic optical elements
- Implemented multiple blur rendering methods, balancing perceptual accuracy and real-time performance
- Developed a prism surface optimization method for light waveform generation
- Supported 10+ user studies for headset misalignments and latency mitigation strategies

Holistic system integration, debugging, and communication:
- Integrated software, firmware, and hardware components for 7+ classes of headset prototypes
- Calibrated motors, displays, and tracking systems for many headsets and testbeds
- Performed holistic system debugging to track down electrical, mechanical, firmware, and software bugs
- Designed interactive devices and videos to clearly explain complex prototypes to external audiences

INTERNSHIPS

PIXAR ANIMATION STUDIOS, Emeryville, CA **January 2017 – April 2017**
Research Intern – Upres methods for viscous fluid simulation Supervisor: Theodore Kim

OCULUS RESEARCH, Redmond, WA **June 2016 – December 2016**
Research Intern – Scene decomposition methods for multifocal testbed Supervisor: Douglas Lanman

AUTODESK, Toronto, ON, Canada **May 2014 – August 2014**
Research Intern – Implemented wavelet turbulence in Maya's fluid solver Supervisor: Jos Stam

EDUCATION

PH.D. COMPUTER SCIENCE, University of Montreal, Montreal, QC, Canada **2013 - 2018**
Iterative solvers for physics-based simulations and displays Supervisor: Derek Nowrouzeahrai
Alain Fournier Award – Best Canadian doctoral dissertation in computer graphics

MASTER OF SCIENCE, McGill University, Montreal, QC, Canada **2011 - 2013**
Applied mathematics, numerical partial differential equations Supervisor: Jean-Christophe Nave

BACHELOR OF SCIENCE, University of Montreal, Montreal, QC, Canada **2008 - 2011**
Pure and applied mathematics, numerical analysis

SELECTED PUBLICATIONS

- Saccade-Contingent Rendering, *Kwak et al.* SIGGRAPH 2024
- Retinal-Resolution Varifocal VR, *Zhao et al.* SIGGRAPH 2023 Emerging Technologies
- Perceptual Requirements for Eye-Tracked Distortion Correction in VR, *Guan et al.* SIGGRAPH 2022
- Design and fabrication of freeform holographic optical elements, *Jang et al.* SIGGRAPH Asia 2020
- Local Bases for Model-reduced Smoke Simulations, *Mercier et al.* Eurographics 2020
- Iterative Solvers for Physics-based Simulations and Displays, *Ph.D. Thesis.* University of Montreal 2018

SELECTED PATENTS

- Multi-view eye tracking system with a holographic optical element combiner, *Jang et al.* 2023
- Image frame synchronization in a near eye display, *Lanman et al.* 2021
- Real-time multifocal displays with gaze-contingent rendering and optimization, *Mercier et al.* 2019
- Multifocal test system, *Mercier et al.* 2019

TECHNICAL TOOLS

Programming Languages and APIs C++, C#, OpenGL, DirectX, Python, MATLAB, JavaScript
Tools and Software Unity, Blender, Mathematica, Zemax, SolidWorks, Fusion360, Git
Maker and Editing 3D Printing, Arduino, Raspberry Pi, Davinci Resolve, Adobe Premiere

COMMUNITY INVOLVEMENT

Volunteer board member and marketing director for Eastside Improv, a 501(c)(3) non-profit.