Mark Kellogg

Software Engineer
Mountain View, CA

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SUMMARY

Experienced and driven senior software engineer looking for opportunities to work with bright and talented people who share my passion for computer graphics and creating interactive virtual experiences.

TECHNICAL SKILLS

Graphics & Game Development: OpenGL, GLSL, WebGL, Three.js, Unity 3D, HLSL, VTK, Blender

Web Development: JavaScript, React, Material UI, Flask, Django, Underscore.js, jQuery, Jinja, Jest

General: C#, C/C++, Python, Typescript, Java, Git, Qt, OpenCV

PROFESSIONAL EXPERIENCE

Leo Labs — Menlo Park, CA
Senior Software Engineer, 3D Visualizations — April 2019 - present

- Developed high quality visualization of earth and objects in low-earth orbit using Three.js & WebGL:
  - Hybrid physically-based and "classic" rendering with normal-mapping and atmospheric effects.
  - High performance, multi-LOD instanced-rendering of thousands of objects with custom satellite models for many high profile constellations & objects.
  - Custom volume-rendering solution for visualizing 3D conjunction covariance regions.
- Built several front-end applications on top of LEO visualization to showcase our industry-leading capabilities in space situational awareness including conjunction visualizations, object state-vector analysis tools, and custom tools for proximity monitoring against adversarial objects.

Drive.ai — Mountain View, CA
Senior Software Engineer, Simulation — June 2018 - January 2019

- Enhanced and extended the company's internal Qt & VTK based simulation software.
- Implemented numerous upgrades to the capabilities of the in-car visualization software:
  - Meshing algorithms to improve lane map geometry across segmented maps.
  - Software-based 3D rasterizer in C++ to render 3D scene objects into OpenCV and Qt images.
  - Real-time aggregation and visualization of LIDAR point-clouds colorized from on-car camera imagery. Optimized through boundary filters and LOD mechanisms. Implemented in C++ with Python front-end.

Matterport — Sunnyvale, CA
Senior Software Engineer, Web & Graphics — January 2016 - May 2018

- Core engineer for Showcase, Matterport's flagship WebGL-based model-viewing application.
- Core engineer for the Common WebGL Framework (CWF) - a modular JavaScript/WebGL framework containing the foundational functionality for Matterport's web-based 3D applications, built on Three.js:
  - Developed a streaming, tile-based, multi-LOD, 360 degree panorama loading system.
  - Implemented a new model-touring and panorama-transition system which included heuristic-based rendering of uncaptured scene areas, and luminance-map-based adaptation to conflicting lighting conditions.
  - Wrote custom GLSL shaders and custom WebGL code.
  - Optimized rendering performance, including a custom scene-graph management and object-culling system.
- Developed a portable 3D rendering library for Android using C++, OpenGL, and the Android NDK.
- Wrote utilities for the vision pipeline in C++ to support front-end development.

DeNA West — San Francisco, CA
Software Engineer, Games — November 2013 - February 2015

- Unity 3D focused game development in C#: NPC systems, scene management, mesh processing, asset bundle management, HLSL shaders, post-processing effects, and performance and memory management optimization.
- Developed proof-of-concept apps and internal game prototypes with native Android and Unity 3D that utilized DeNA's in-house mobile gaming platform Mobage.
- Member of 1st party game teams for shipped titles: "Transformers: Age of Extinction" and "Pirate Bash."

Software Engineer, Mobile & Web — Silicon Valley, CA
Independent Software Consultant — 2011 - 2013

- Performed freelance and contract-based software engineering for multiple clients in the Silicon Valley area. Clients included Satellite Healthcare in Redwood City and Wave Systems in Cupertino.
- Specialized in C# .NET development (front-end and back-end), JavaScript MVC applications with frameworks such as jQuery, Underscore.js, and Backbone.js, and mobile development for iOS and Android.

NASA Ames Research Center — Mountain View, CA
Research Intern in Parallel Computing — June 2011 - March 2012

- Developed C/C++ utility programs to profile the performance of several industry-standard MPI implementations with regard to their ability to perform computation and communication functions asynchronously.
- Used Nvidia CUDA to port the SP kernel of the NASA Advanced Supercomputing Parallel Benchmarks (a solver for systems of non-linear partial differential equations) to a GPGPU form.
- Tested the PGI OpenACC compiler against the modified SP kernel on NASA's Pleiades supercomputer.

EDUCATION

California State University, Chico — Chico, CA
M.S. in Computer Science: General foundations, with distinction — 2006 - 2010

California Polytechnic State University — San Luis Obispo, CA
B.S. in Computer Science — 2000 - 2003

PUBLICATIONS

Haoqiang Jin, Mark Kellogg, and Piyush Mehrotra, "Using Compiler Directives for Accelerating CFD Applications on GPUs," International Workshop on OpenMP, 2012

Haoqiang Jin and Mark Kellogg, "CUDA Parallelization of the NAS Parallel Benchmarks: SP Kernel," Internal technical report, NASA Ames Research Center, NAS Division

OPEN SOURCE PROJECTS

Open Source Graphics Engine - http://projects.markkellogg.org/core.php

C/C++ based graphics engine supporting features such as physically-based rendering, dynamic shadows, particles systems, and skeletal animation with vertex skinning and animation blending.