Onni Kosomaa

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ABOUT ME

I'm a driven and proactive engineer with extensive professional experience within software engineering and machine learning research. Before transferring back to automotive software engineering, I spent several years developing a novel deep learning method for 3D medical imaging reconstruction. I have a no-fuss approach to all my work, and I strive to solve problems from a practical standpoint while maintaining a solid theoretical foundation. I have experience in low-level development with rigorous testing and safety standards. I'm used to balancing performance, safety and code quality. My electrical engineering education has given me a strong background in signal processing, hardware knowledge, and low-level systems and embedded programming.

EXPERIENCE

Compute Software Engineer, Basemark **Dec 2022 –**

- I'm developing a safety critical GPU compute engine, focused on neural network inference for next-generation automotive augmented reality applications.
- I optimize GPU kernels, improve functional safety and author documentation.
- C++, Vulkan SC, GLSL, Python.

Research Staff, Aalto University & NVIDIA **Feb 2021 – Nov 2022**

- I developed a fully three-dimensional CT reconstruction algorithm using deep learning, based on the first principles of digital signal processing.
- Publication Self-Supervised Deep Learning for Volumetric Helical CT Reconstruction in review as of Nov 2022.
- My work led to two patent applications in July 2021.
- I designed and wrote all the software used.
- Additionally, I developed differentiable alias-free versions of commonly used tomographic primitive operations as well as a 3D CT volume renderer for visualizing the results, using CUDA and OpenGL.
- Technologies utilized were Python, CUDA, C++, PyTorch, DICOM.
- Extreme memory consumption of volumetric deep learning pipeline required adding several custom CUDA operations to the PyTorch implementation, and optimization of GPU memory bandwidth was crucial.

Research Scientist, NVIDIA **May 2020 – Jan 2021**

- I researched deep learning for CT reconstruction. My bachelor's thesis is based on this research.

System Software Engineer, NVIDIA **Sep 2019 – Apr 2020**

- I worked on automotive ISO 26262 ASIL-B safety certification and development of a Linux user space GPU driver for the Tegra SoC, while also developing new features for upcoming chips.
- Additionally, I wrote design documents, refactored code to adhere to safety standards, and increased testing coverage.
- Codebase was C++17 run on SoCs, and Python for scripting. Coding standards MISRA and AUTOSAR C++.
- I received "Top Contributor" status, awarded amongst top 5% of engineers of matching seniority level.
- **Additionally, four internships within System Software Engineering at NVIDIA, totaling 14 months.**

PUBLICATIONS

Projection-Domain Self-Supervision for Volumetric Helical CT Reconstruction
In review as of January 2023. Pre-print available at the project page.
Onni Kosomaa, Samuli Laine, Tero Karras, Miika Aittala, Jaakko Lehtinen.

End-to-end training for a three-dimensional tomography reconstruction pipeline
Patent US17/365,574 - Filed Jul 1, 2021
Onni Kosomaa, Jaakko Lehtinen, Samuli Laine, Tero Karras, Miika Aittala.

Three-dimensional tomography reconstruction pipeline
Patent US17/365,645 - Filed Jul 1, 2021
Onni Kosomaa, Jaakko Lehtinen, Samuli Laine, Tero Karras, Miika Aittala.

EDUCATION

Aalto University **Sep 2016 – Dec 2020**
BSc with Honors, Electrical Engineering. Top one university in Finland.
- 4.6/5.0 GPA (EE Major: 4.7/5.0, CS Minor: 5.0/5.0)
- Absent for conscript service during Fall 2017 – Spring 2018

SKILLS & INTERESTS

- **Skills:**
  - Modern C++, C, and Python.
  - CUDA, Vulkan, PyTorch, OpenGL, Linux, Git.
  - Functional safety, GPU compute, deep learning, computer vision, embedded systems.
  - Native speaker of Finnish and Swedish, fluent in English.
- **Interests:** Woodworking, cooking, bouldering, and restoring old furniture and electronics.