

# James Minardi

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## EXPERIENCE

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### GARMIN

May – August 2024

#### **Embedded Graphics Engineer** | Internship

- Develop and maintain multithreaded Vulkan and OpenGL graphics libraries for next-gen flight decks & displays
- Implement DirectX library significantly reducing code reuse across multiple products
- Redesign flight deck simulator architecture to establish proper library ownership of graphics code
- Automated software requirement tracing in Python, meeting FAA regulations and reducing engineer person-hours

### Musco Sports Lighting

May – August 2023

#### **Software Engineer** | Internship

- Designed and implemented a next-gen AI and video processing platform to reduce development time & code reuse
- Developed Linux bash scripts to perform debugging services on hundreds of NVIDIA Jetson devices automatically
- Created active CI/CD pipelines for testing, staging, and production environments with Git integration

### BAE Systems, Inc.

June 2022 – April 2023

#### **Embedded Software Engineer** | Co-op

- Implemented linear algebra and combinatorial algorithms to satisfy hardware and systems requirements for high-performance, real-time, embedded GPS receivers
- Contributed 10,000+ lines of production code, optimizing for performance, memory, and power requirements
- Increased existing code coverage by 30% in unit and integration tests using Google Test
- Advocated for and designed better C/C++ coding practices to promote efficient code development

### Iowa State University

July 2021 – May 2024

#### **Resident Assistant** | Part-time

- Represented and served all RAs on campus under department leadership as Vice President
- Fostered the development of an inclusive community of over 70 residents

## PROJECTS

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#### **OpenGL-Compliant GPU** | *FPGA, C++, VHDL, Xilinx Vivado, AXI, DMA*

- Designed and developed an OpenGL-compliant GPU architecture on an Xilinx FPGA using VHDL
- Implemented rasterization algorithms to reduce traversal/interpolation time and resource consumption
- Designed vertex and fragment shader IP cores to execute GLSL instructions on the GPU
- Managed data flow from custom OpenGL drivers to the GPU using direct memory access (DMA)

#### **Procedural Terrain Generation** | *WebGPU, C++, Emscripten, GLM, GLFW, ImGui*

- Implemented procedural terrain using configurable noise types such as fBm, Perlin, and Value noise
- Developed for cross-platform compatibility using C++ and Emscripten

#### **Machine Learning Hardware Accelerator** | *FPGA, Xilinx Vivado, VHDL, AXI, DMA, C++, Python*

- Developed a hardware accelerator for a self-trained image classification model on an FPGA
- Implemented deep learning optimizations including quantization, data reuse, tiling, and SIMD

#### **Pipelined CPU** | *VHDL, MIPS Assembly, Hardware Architecture*

- Designed a MIPS assembly pipelined CPU architecture while considering critical paths and hazards
- Optimized performance using hazard detection and forwarding, resulting in a 60% speedup
- Analyzed test bench waveforms by hand and automatically to debug the hardware design

#### **Autonomous Roomba Robot** | *Embedded C*

- Developed bare metal drivers for an ARM Cortex M-4 processor robot to navigate an obstacle course
- Features UART communication, IR sensors using ADC, Sonar sensors using PWM timers, and more

## SKILLS

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**Languages:** C, C++, Python, Bash, Make, CMake, GLSL / WGSL / HLSL

**Frameworks:** OpenGL, Vulkan, WebGPU, WebGL, AMBA (AXI, AHB, APB), Win32, Google Test

**Tools:** RenderDoc, Xilinx Vivado, Intel Quartus, Vitis, Git, SVN, MATLAB

**Topics:** Computer Graphics, Raytracing, FPGA RTL Design, HW Architecture, Data Structures & Algorithms

## EDUCATION

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Iowa State University, *Bachelor of Science*

**Computer Engineering**

Expected May 2025

3.66 / 4.00