

# Roderick L. Renwick

Machine Learning Engineer | Computer Vision Specialist

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USA | U.S. Citizen



## Summary

Machine Learning Engineer with expertise in computer vision systems, from rapid prototyping to embedded deployment. Experienced in building real-time inference pipelines, sensor fusion architectures, and hardware-software co-design for robotics and autonomous systems. Strong foundation in end-to-end implementation across research, development, and deployment phases.

## Technical Skills

- **Machine Learning:** PyTorch, TensorFlow, JAX, scikit-learn, Hugging Face
- **Computer Vision:** OpenCV, YOLO, Detectron2, MediaPipe, TensorRT
- **Hardware/Embedded:** FPGA/VHDL, NVIDIA Jetson, CUDA, ARM Cortex, RISC-V
- **Languages:** Python, C++, C, Java, Assembly, VHDL, SystemVerilog
- **Tools & Platforms:** Linux, Git, Docker, AWS, ROS/ROS2, Vivado
- **Domains:** Robotics, Autonomous Systems, Edge AI, Safety-Critical Software

## Experience

### Machine Learning Research Intern

Robotics Intelligence Division | East Hartford, CT

### Raytheon Technologies Research Center

Summer 2023

- Developed rapid prototyping and data collection methods for robotics intelligence applications
- Enabled smart detection of metal anomalies using structured light and ML-based inspection algorithms
- Built real-time inference pipelines for embedded GPU platforms, optimizing for latency and throughput
- Earned commendation from leadership for innovative ML solutions addressing complex operational requirements

### Research Assistant — MDAS.ai Autonomous Shuttle

Autonomous Vehicle Project | Dearborn, MI

### University of Michigan

Summer 2018 – Winter 2020

- Core team member for MDAS.ai autonomous shuttle development, contributing to perception and sensor systems
- Designed sensory data pipeline on NVIDIA Jetson TX2 for real-time multi-sensor processing
- Implemented real-time object detection achieving 30fps on embedded hardware using YOLO architecture
- Developed LiDAR-camera calibration pipeline for robust sensor fusion in autonomous navigation

### Engineering Intern

Battery Electric Vehicle Division | Dearborn, MI

### Ford Motor Company

Summer 2017

- Gained expertise in functional safety standards (ISO 26262) for automotive systems
- Developed logic tracing tools for safety-critical software analysis and verification
- Documented FMEA analysis for high-voltage safety circuits in powertrain systems

## Featured Projects

### Smart Cat Door System (CatNet 2.0)

End-to-End CV Application

- Built complete access control system using computer vision for pet identification
- Implemented UNet for semantic segmentation and custom CNNs for robust animal classification
- Deployed full pipeline on embedded hardware with real-time inference capabilities

### Deep-Fake Cat Generator (WGAN-GP)

Generative AI Research

- Evolved architecture from standard GANs to WGAN-GP for high-fidelity image synthesis with training stability
- Analyzed generator-critic optimization dynamics; debugged mode collapse and convergence issues

### ParkSmart iPhone Application

Full-Stack CV Solution

- Developed parking management system integrating real-time CV analysis with native iOS application
- Applied homography matrices and perspective transforms for accurate parking space detection

### VHDL Perceptron Implementation

Hardware-Software Co-Design

- Translated Python MLP to optimized VHDL for FPGA deployment, demonstrating hardware-accelerated neural networks
- Focused on combinational logic reduction and resource optimization for efficient FPGA utilization

## Education

### M.S. Electrical & Computer Engineering

Purdue University, February 2026

Focus: Signal & Image Processing, Deep Learning, Computer Vision

### B.S. Computer Engineering (with Distinction)

University of Michigan–Dearborn, 2020

Focus: VLSI Design, Embedded Systems, Autonomous Vehicle Perception