Anthony Hoak

gitlab website linkedin email

Work Experience

Senior Image Processing Engineer, Systems Research & Development — Feb 2025 - Present
Brady Corporation — Milwaukee, WI

- Developed a template matching algorithm in C based on the polynomial approximation method in "*Very Fast Template Matching*" extended to use Gaussian pyramids
- Created a proof-of-concept (PoC) C++ application for high speed (10+m/s) barcode detection / decoding using OpenCV and Cortex Decode
- Integrated a YOLOv11-based (PyTorch) segmentation model with the C++ PoC using ONNX
- Trained a generative adversarial network (GAN) DeblurGAN-v2 to deblur images
- Created a label verification PoC in C++ with a minimal GUI using GTKMM-4.0, OpenCV, Cortex Decode, a Linux industrial PC (IPC) (an edge device), and a machine vision camera
- Created a multi-threaded scan tunnel PoC in C++ using GTKMM-4.0, OpenCV, ZXing, a Linux IPC (edge device), and three (3) machine vision cameras

Systems Engineer, Computed Tomography (CT) Advanced Technology Projects — Aug 2021 - Oct 2024
GE Healthcare — Waukesha, WI

- Developed Bayes classifier in Python to segment cardiac anatomy in dual energy CT images
- Benchmarked cardiac CT algorithms w.r.t memory consumption and processing time
- Wrote C++ code to run image registration algorithms on a remote, standalone Linux workstation
- Wrote C++ code to update CT image file metadata (DICOM)
- Migrated production Python code from Python2 to Python3 using 2to3

Digital Engineer II, Radio Frequency Countermeasures (RFCM) — Jan 2020 - Aug 2021
Northrop Grumman Corporation — Rolling Meadows, IL

- Developed simple embedded C code for verifying RFCM FPGA requirements
- Wrote basic C++ accessor and mutator functions to extend a portion of an RFCM system

Systems Engineer II, Infrared Countermeasures (IRCM) — Jan 2017 - Jan 2020
Northrop Grumman Corporation — Rolling Meadows, IL

- Authored and executed tests of IRCM systems
- Developed numerous MATLAB scripts/tools for IRCM algorithm and data analysis

Research Experience

Graduate Student, Electrical & Computer Engineering Department — Nov 2014 - Aug 2016
Computer Vision & Sensing Systems Laboratory, Marquette University — Milwaukee, WI

- Conducted primary research on multi object tracking (MOT) computer vision algorithms
- Integrated a deep learning pedestrian detection algorithm with a MOT framework

Education

Master of Science (M.S.) in Electrical & Computer Engineering — Aug 2014 - Aug 2026
Marquette University — Milwaukee, WI

- Thesis: An Interactive Likelihood for the Multi-Bernoulli Filter
- Advisor: Dr. Henry Medeiros
- Teaching Assistant for undergraduate courses Circuits I & II

Bachelor of Science (B.S.) in Electrical Engineering — Sep 2010 - May 2014
Milwaukee School of Engineering — Milwaukee, WI

- Minors in Mathematics and Physics
- Internships: Spectrum Brands (Rayovac), Kohler Co., and Johnson Controls Inc.

Publications

A. Hoak, H. Medeiros, and R. Povinelli, "Image-Based Multi-Target Tracking through Multi-Bernoulli Filtering with Interactive Likelihoods," *Sensors*, vol. 17, no. 501, Mar 2017.

A. Echeverri Guevarra, A. Hoak, J. Tapiero Bernal, and H. Medeiros, "Vision-based Self-contained Target Following Robot using Bayesian Data Fusion," in *International Symposium on Visual Computing*, 2016.

Awards & Scholarships

Frank Rogers Bacon Research Assistantship, Marquette University — Aug 2014 – May 2016
Academic Scholarship 8,000/yr., Milwaukee School of Engineering — Sep 2010 – May 2014
Dean's List, 6 Semesters, Milwaukee School of Engineering — Sep 2010 – May 2014

Skills

image processing, multi object tracking, statistical signal processing, computer vision, C, C++, CMake, OpenCV, Linux, GNU Debugger, python, signal processing, applied mathematics, probability & statistics, LaTeX, MATLAB, technical communication