BRENDAN CAIN

Senior Software Engineer | Philadelphia, PA
bcain150@gmail.com • github.com/bcain150 • https://brendan-cain.com

SUMMARY

Senior Software Engineer with 4+ years building, integrating, and testing hardware/software systems in biotech, aerospace, and satellite communications. Specialize in PLC, ROS 2, and instrument drivers, embedded controls, automated commissioning and test infrastructure, and cloud data pipelines. Cut a robotic biotech platform's bring-up and commissioning time from 3 months to 2.5 days across three hardware generations.

EXPERIENCE

Senior Software Engineer → Software Engineer Oct 2023 – Present
Vivodyne — Philadelphia, PA

Vivodyne runs 12 robotic labs (HIVEs) that grow and test human tissue at scale for drug discovery. Promoted to Senior Software Engineer in 2025.

Bring-up, Commissioning & Factory Acceptance Test

- Brought 9+ robotic lab systems from contract-manufacturer hand-off to production-ready across 3 hardware iterations; cut end-to-end bring-up and commissioning time from 3 months → 2 weeks → 1 week → 2.5 days through tooling, scripting, and process redesign.
- Authored Vivodyne's Factory Acceptance Test specification and workflow, covering ~75% of system commissioning; stood up the process on-site at the contract manufacturer and mentored a junior engineer there to run it autonomously.
- Wrote bring-up automation scripts and a hardware verification test suite with one-click component-level checks, used on every system from the third onward; did hands-on electronics debugging across power, control, and sensor subsystems.

Calibration & Fleet Operations

- Wrote the driver and calibration pipeline for a Keyence confocal laser sensor, taking it from proof of concept to production on 9 systems and cutting tissue-disk height calibration from 15–30 minutes to under 1 minute.
- Hardened it against field failures with four automatic checks (cubic surface fit for warped disks, outlier rejection, fit-quality gates, and an autofocus cross-check); fresh calibrations fit to 4–10 µm RMSE. Traced a failed production study to a 523 µm offset error that the cross-check now catches.
- Built a calibration GUI (about 4,400 lines; wrote 118 of 137 commits) so operators can teach and verify every robot calibration point instead of editing files; used on 5 production systems.
- Led rollouts of two control-software releases across 11 systems; built a scripted AWS SSM remote deploy with tested upgrade and rollback (back online in ~1 min) and automatic change records.
- Shipped three emergency production fixes, each deployed within days; fixed a robot safety bug where speed limits were lost after a reset; gave each of 12 systems its own claimable PagerDuty alerts, so scientists no longer page the whole region.

Control Software (Gen 1): PLC, Drivers & Environmental Control

- Designed and shipped the PLCnext driver and PLC API, exposing every sensor and actuator on the system through a single interface used by UI, automation, and verification tooling.
- Implemented PLCnext-based PID loops for heat and CO_2 that run independently of the main control software, eliminating a class of failure modes present in earlier generations.
- Built fridge "freezer mode" control (PID upper stage, delayed bang-bang condenser), owned fridge testing and install, and added RS-232 glycol-chiller control with timed defrost to stop icing failures.
- Authored additional drivers: Schmalz vacuum-pump suction tool for picking tissue disks and plate lids, automated confocal microscope driver, and a config-based driver routing layer.

Cloud Data Services: Bridging Study Execution & Analysis

- Built the first cloud data services: Zeiss and Nikon microscope images to S3 for AI analysis, control logs and timing data for perfusion analysis and plate mapping, and incubation metrics.
- Shipped the first alert system (emergency, failure, and manual-task notifications) and a scheduler log-analysis tool that compares expected vs. actual study actions.

Next-Gen Control Software: ROS 2 Drivers in Python & C++

- Built core ROS 2 drivers in Python and C++ for the next-generation platform: PLC, environment monitoring and incubation control, a 4-channel pipette driver based on the Hamilton Zeus X1, and the notification system; also built the platform configuration system.
- Wired and installed an autonomous confocal imaging system, defining its control panel and motion stage operation end to end.

Cross-Functional Leadership

- Coach senior internal engineers on production-grade version control and software engineering best practices; know the full control stack end to end (robotics, sensors, actuators, control and notification systems) and serve as point of contact across HW and SW teams in Philly and SF.
- One of four engineers trusted to approve merges to the main control-software repo; built Claude Code skills that automate release docs, remote deploys, and weekly reports for the team.

Software Test Automation Engineer 2022
iDirect Government

- Developed regression, unit, and sanity tests for satellite communications software, automated in Jenkins CI with Python, YAML, and pytest.

Systems Integration & Test Engineer 2022
Northrop Grumman — Mission Systems

- Ran regression tests for the F-35 radar system and built MATLAB-based test automation to speed up the development cycle.

DevOps Engineer 2021
CRISP Shared Services — Health Information Exchange (Remote)

- Automated code deployments via YAML pipelines in Azure DevOps; scripted cloud infrastructure with Terraform and Azure CLI.

Code Tester & Teaching Assistant 2020 – 2021
UMBC Training Centers — 170 Delta (Remote)

- TA'd two 10-week Intro to Python courses and tested solutions for Network Programming in C, Programming in C II, and Programming in Python II.

Research Intern (NREIP) Summers 2018, 2019
Naval Research Enterprise Internship Program — NAS Patuxent River, MD

- Parsed binary and hex telemetry from the Triton UAV (C#, Java, SQL Server); built a C++ simulation harness running parallel instances with MPI on a small HPC cluster.

TECHNICAL SKILLS

Languages: Python, C, C++, C#, MATLAB, YAML, Bash

Hardware & Embedded: PLC (PLCnext), PID control, CAN bus, UART, RS-232, Keyence laser sensors, Raspberry Pi, VESC motor controllers, IMUs, system bring-up, commissioning, FAT

Robotics & Systems: ROS 2 (Jazzy), multi-threaded executors, systemd, Ubuntu Server, networking

Test & DevOps: pytest, Jenkins, Azure DevOps, Terraform, Git, hardware verification suites

Cloud & Tools: AWS (S3, SSM), PagerDuty, Claude Code, Azure, SQL Server, MPI, Linux, Jira, Agile

EDUCATION & CERTIFICATIONS

B.S. Computer Engineering, University of Maryland, Baltimore County (UMBC) Fall 2020

Previously Held: HashiCorp Certified: Terraform Associate • DoD Secret Clearance