Luke Birchenough

Mechatronics Engineer

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Summary

Mechatronics Engineer with 5 years of experience building industrial measurement systems in the railway industry. Skilled in software development, from computer vision and machine learning to building full-stack web applications. Combines strong analytical and technical abilities with an engineering mindset and hands-on experience in R&D, troubleshooting, hardware and system integration, calibration and end-to-end testing. A fast learner and practical problem-solver with an education background that supports clear communication and collaboration across multidisciplinary teams. Motivated by challenging problems and complex systems.

Skills

- **Programming:** C++, Python, JavaScript, TypeScript , PHP, Go
- **Front-End:** React, Svelte, EJS, Blade Templates, HTML, CSS, Tailwind, Shadcn/ui, Bootstrap
- **Back-End:** Node.js, Express, Laravel, Next.js, Supabase, REST APIs, SQL (PostgreSQL, MySQL, SQLite), MongoDB, Gin
- **Computer Vision & Machine Learning:** Camera/Laser Measurement, Camera Calibration, OpenCV, TensorFlow, Keras, Object Detection, Image Segmentation, YOLO, MobileNet
- **Robotics & Embedded:** ROS, Arduino, Raspberry Pi, ESP32
- **Cloud and DevOps:** AWS, Docker, Git, CI/CD Pipelines
- **Tools & Platforms:** Jira, Confluence, Linux, Vite, Jest

Professional Experience

Solutions Engineer | Siemens Mobility MRX

2020 - 2025

Software team member and subject matter expert supporting computer vision products for measurement and detection of train components, including high-accuracy laser-based Vehicle Equipment Measurement Systems (VEMS) and Visual Inspection Systems (VIS) performing ML/AI-based object and anomaly detection.

Responsibilities

- **Developed** and maintained measurement processing software and supporting microservices (c++) to improve system performance.
- **Built** UIs (React, PyQt) and scripts (Python, shell) to streamline system troubleshooting and automate workflows.
- **Orchestrated** deployment of containerised microservices using Docker and CI/CD pipelines.
- **Managed** site configurations, resolving inter-service communication and backend integration challenges during initial deployments
- **Handled** system integration to achieve end-to-end functionality from sensor triggering and data capture to measurement processing and reporting in front end.
- **Delivered** remote technical support for VEMS systems, resolving critical field issues across international deployments.
- **Trained** object detection and segmentation deep learning models for integration into VIS products.
- **Performed** hands-on camera calibration, sensor alignment and measurement validation for a range of systems.
- **Executed** Factory Acceptance Testing (FAT) on a range of NxG products authoring technical documentation to standardise and streamline the process accross product lines.
- **Completed** Site Acceptance Testing (SAT) and generated comprehensive customer reporting.
- **Produced** 3D models, assemblies and renders for measurement processing simulation.

Achievements

- **Played** a key role in the development of the Next-Generation (NxG) Wheel Profile Measurement System (WPMS) product from prototype to first shipment. Contributing across software development, R&D, hardware testing, system integration, calibration, and factory testing.
- **Engineered** a Python/Qt UI that was instrumental in visualising and analysing WPMS debug data. Redeveloped the tool as a performant React SPA designed for integration with the browser-based results platform, laying the groundwork for backend data retrieval and a reprocessing pipeline to enable a seamless user experience.
- **Created** the core FAT procedures and documentation used across the NxG product line, personally performing FAT and enabling the successful shipment of six systems.
- **Completed** SAT and reporting across five separate projects, navigating extensive customer feedback cycles and achieving acceptance at each site.
- **Acted** as the software technical lead on a project with a two-month delivery window, identifying a critical software incompatibility during requirements alignment with the customer. Led a small team to deliver a successful solution within the project timeline.
- **Identified** operational bottlenecks and safety hazards during the first on-site NxG WPMS validation. Designed and retrofitted a physical attachment that eliminated the safety issue and significantly reduced validation time, freeing track-access windows for additional critical tasks.

Robotics Intern | Woodside Energy

2019 - 2020

- **Developed** python-based ROS nodes to interface with an embedded microcontroller, enabling dynamic LED pattern control for real-time robot status indication and operational safety.
- **Integrated** a roller door controller with an IP camera to enable remote operation and visual verification. Implemented control logic enabling autonomous robot facility access.

Technical Support Officer | South Coogee Primary School

2017 - 2018

- **Co-led** an extracurricular program teaching Python scripting, 3d printing and robotics to advanced students.
- **Mentored** students competing in RoboCup and managed educational robotics resources.

Digital Imaging Support Officer | Henry Schein Halas

2013 - 2015

- **Provided** technical support for installation and troubleshooting of dental x-ray imaging systems across Western and South Australia.
- **Executed** preventive maintenance programs including routine calibrations increasing system reliability.

High School Teacher | Darling Range Sports College

2011 - 2012

- **Delivered** IT curriculum for Years 9–12, teaching computing and digital technologies to secondary students.
- **Collaborated** with teaching staff to develop and enhance learning programs.

Education

Bachelor of Engineering (Honours, First Class) – Mechatronic Engineering
Curtin University, 2016 – 2020

Bachelor of Arts / Bachelor of Communications (Education & Interactive Multimedia)
Edith Cowan University, 2007 – 2011

Projects

Heavy focus on web technologies and expanding full-stack development capabilities. See projects.

Certificates

- AWS Certified Cloud Practitioner - Developed cloud fluency and foundational AWS knowledge.
- Robotics Software Engineer - Localization, mapping and navigation using ROS.

References

Available upon request.