Robert Duane Edmonds

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Summary

Software and systems engineer and engineering leader with 25+ years building high-consequence products across medical devices, robotics, lab automation, and AI-assisted software engineering. Known for making complex systems reliable at the seams — between hardware and software, operations and data, and humans and agents. Combines systems architecture, technical leadership, telemetry/data thinking, and workflow/tooling design to make engineering teams and products more effective.

Highlights

- Currently building a 34-axis ROS2/C++ robotic system with 8 stereo cameras and a React/TypeScript operator GUI — defining the interfaces across motion control, vision services, and operator workflows, and using enso in daily engineering to keep context, decisions, and tooling persistent and inspectable.
- Owned EksoNR 0-to-1: NSF proof-of-concept to FDA clearance to global launch (30+ countries, 112+ million steps as of end of 2019). Established data telemetry from day one — enabling global usage analytics and rapid root-cause investigation at scale.
- Led engineering at SummerBio's CLIA-certified diagnostics lab, unifying automation, LIMS, and data architecture to achieve 128,000 tests/day at $13/test (market norm: $38-60). Built Salesforce-to-Snowflake pipeline to reduce transactional load and enable real-time operations visibility.
- Authored enso (https://github.com/usefulmove/enso), an open-source harness for AI-assisted engineering. It makes workflows persistent, inspectable, and self-improving by keeping context, decisions, and tools explicit on disk.

Experience

Consultant — Oakland, CA

Independent Engineering and Leadership Consultant | Oct 2022 – Present

- Lead software and systems architecture for a 34-axis ROS2/C++ robotic cell with stereo vision and a React/TypeScript operator GUI, defining interfaces across motion control, vision services, real-time camera streaming, and operator workflows.
- Author and maintainer of enso, an open-source harness for AI-assisted engineering. Use it in day-to-day development to persist context, structure discovery, and create reusable tools that improve engineering throughput and reliability.
- Performed data analytics using SQL, DuckDB, and Python (Polars) to develop operations and business insights.
- Developed fine-tuned, deep learning classification models to improve accuracy and robustness on a real-time industrial computer vision robotic cherry-pit detection and removal automation system.
- Provide mentorship and informal coaching for engineers navigating leadership transitions and professional growth.

SummerBio — Menlo Park, CA

Vice President of Engineering | Jan 2022 – Aug 2022

- Directed engineering across lab automation, cloud computing, data systems, and program management for a 24/7, CLIA-certified diagnostic testing lab performing over 20 million PCR tests with industry-leading speed and reliability.
- Owned data reliability and integrity across lab data systems and automation.
- Unified automation systems, the laboratory information management system (LIMS), and data architecture from sample capture to results reporting, enabling traceability and cross-functional visibility through real-time Tableau dashboards.
- Leveraged system data to pinpoint bottlenecks and optimize throughput, achieving a record 128,000 tests per day at an industry-low average of $13 per test (compared with market norm of $38-60 per test).
- Built a data pipeline from the Salesforce LIMS database to a Snowflake data warehouse, improving analytical performance and significantly reducing the load on the mission-critical transactional system.
- Introduced and validated an algorithm to detect false-positive thermocycler results, addressing a systemic flaw in vendor software to reduce unnecessary retests.
- Constructed a framework for prioritization of process improvements across automation and lab operations, guided by system metrics and data analysis.
- Championed a culture of data-informed decision-making, enabling rapid triage, accurate root-cause analysis, and confident cross-functional decisions.
- Standardized engineering and program management practices.

Director of Automation Engineering | Aug 2021 – Jan 2022

- Increased testing capacity by 30% through assay, process, and automation optimizations.
- Developed and validated a variable-ratio sample pooling system, significantly improving throughput capacity.

Johnson & Johnson (Robotics and Digital Solutions) — Santa Clara, CA

Program Manager, Advanced Development | Sep 2020 – Jul 2021

- Led cross-functional system development within the OTTAVA surgical robotics program, integrating systems engineering, data analysis, and clinical insight to accelerate innovation in minimally invasive surgery.
- Managed multiple teams across system architecture, risk management, simulation, and data-driven clinical procedure workspace development.
- Guided the development of system-level requirements, risk assessment, and evaluation, linking design choices to clinical outcomes and program strategy.
- Partnered with technical and program leadership to align engineering objectives with program milestones and business priorities.

Ekso Bionics — Richmond, CA

Director of R&D and Compliance / Director of Medical Products and Systems | Mar 2015 – Sep 2019

- Directed medical device development and regulatory compliance for robotic exoskeletons designed to restore mobility and independence for individuals with neurological injury.
- Established company-wide processes for design control, risk management, clinical evaluation, and complaint handling, enabling CE certification and commercial expansion across 30+ countries.
- Led cross-functional effort to leverage complaint database and risk management and corrective and preventive action (CAPA) processes to identify and prioritize process and design improvements to enhance safety and increase device effectiveness and reliability.

Director of Software Engineering | Jun 2011 – Mar 2015

- Built and led software, controls, and embedded systems teams responsible for core exoskeleton functionality.
- Introduced structured development practices (coding standards, reviews, testing, and release management) to improve reliability and traceability.
- Patent: US10694948B2, "*Methods of exoskeleton communication and control*" (2020).

Program Manager | Jul 2009 – Jun 2011

EksoNR (Class II medical robotic exoskeleton)

- Owned product development end-to-end from NSF-funded proof-of-concept to global commercial launch — the first FDA-cleared robotic exoskeleton for neurological rehabilitation. Made fast decisions under uncertainty across engineering, operations, and clinical constraints.
- Scaled the product globally (ultimately reaching 30+ countries) within months of US launch, building the operational and quality foundation to support it.
- Shipped every device with real-time data telemetry built in from day one — enabling global usage analytics, motion-level diagnostics, and rapid root-cause investigation at scale.
- Closed direct feedback loops between clinical users and engineering — translating real-world usage data into rapid design iteration that improved patient outcomes.
- Established early design controls, human subject testing protocols, and patient-centered development processes.
- Guided global quality management system (QMS) implementation, enabling CE certification three months after FDA clearance.

Human Unified Load Carrier (HULC)

- Directed a $6 million R&D program funded by Lockheed Martin to develop hydraulic exoskeleton prototypes supporting 200-lb load carriage at 3 mph for U.S. military field evaluation.
- Coordinated cross-site engineering, procurement, and production teams to deliver prototype builds on schedule and on budget.
- Implemented Earned Value Management (EVM) reporting for transparent tracking of cost and schedule performance.

Agilent Technologies (formerly Velocity11, acquired in 2008) — Santa Clara, CA

R&D Hardware and Systems Engineer, Agilent Automation Solutions | Oct 2006 – Jul 2009

- Designed and developed an innovative 5-axis direct-drive microplate-handling robot (DDR) used in global life-science automation platforms.
- Developed embedded motion control and path planning software with built-in diagnostics and exception handling.
- Built a custom unit-testing framework and diagnostic tool that reduced downtime and improved serviceability.

Berkeley Process Control — Richmond, CA

Program Manager / Controls Engineer | Sep 1999 – Oct 2006

- Led robotics and motion control projects for semiconductor automation, from concept through production.
- Designed and implemented machine control and scheduling software and motion control algorithms for high-precision wafer-handling systems.
- Developed robust, automated machine-to-machine calibration (autocalibration) algorithms, improving throughput and reliability.

Texas A&M University (Vibration Control and Electromagnetics Lab) — College Station, TX

Undergraduate Research Assistant | Nov 1997 – Aug 1998

Advisor: Dr. Alan B. Palazzolo
Undergraduate Thesis: "*Fuzzy Logic Expert System Control of Magnetic Bearings on High-Energy Energy Storage Flywheels.*"

Skills

Leadership & Strategy:
Engineering leadership, organizational scaling, data-informed decision-making, medical device development, QMS, design controls, risk management, regulatory compliance, lab automation, 0-to-1 product development, data systems, Objectives & Key Results (OKRs), program and project management (MS Project, Smartsheet), cross-functional alignment, agile development (Kanban, Scrum), executive communication, coaching and team development.

Technical & Tools:
Systems engineering, robotics, automation, mechatronics, embedded systems (C, C++, Rust, Linux), full-stack development (React, Node.js, JavaScript/TypeScript, Figma, Material UI), AI-assisted software engineering, LLM context engineering and agentic AI systems, data analysis and visualization (SQL, PostgreSQL, DuckDB, Python, Polars, R), machine learning/deep learning (PyTorch), computer vision (Torchvision), simulation and system modeling, analytics-driven operations improvement, CI/CD (Bitbucket Pipelines), ROS2, WebSocket protocols, real-time camera streaming, Android kiosk / WebView deployment.

Standards & Compliance:
21 CFR 820 (QSR), ISO 13485 (QMS), Medical Device Directive 93/42/EEC, IEC 62304 (Software Development), ISO 14971 (Risk Management), IEC 60601-1 (Safety and Essential Performance), HIPAA, MEDDEV 2.7/1 (Clinical Evaluation).

Education

University of California — Berkeley, CA

Graduate Studies, Mechanical Engineering — Advanced Control Systems | 1998 – 1999

3.78 GPA. Passed Preliminary Examinations for PhD candidacy.

Texas A&M University — College Station, TX

Bachelor of Science, Mechanical Engineering — Dynamics and Control Systems | 1993 – 1998

3.96 GPA (major). 3.93 GPA (overall). Graduated *summa cum laude.*