Matthew Bitterman

50 Landing Rd. Southport, ME 04576
matthew.bitterman@gmail.com
919.649.0337

Robotics Design & Product Engineer

Life-long maker and entrepreneurial technologist focused on building impactful tools and products. Creating value for robotics initiatives, startups, incubators, and companies where success depends on excellence in solving complex multidisciplinary problems, learning and executing quickly, and being trusted to deliver no matter the odds.

Summary of Qualifications

Individual contributor and proven innovator with an extremely diverse toolset in mechanical and hardware engineering, through which I have been able to provide strategic leadership in product development and technical project management. 12 years experience in robotics, 20+ in hardware prototyping within various industries (agriculture, industrial automation, advertising, building science, boatbuilding, and architecture) and at a great range of scales. Technical skills range from industrial or mechanical design of parts & assemblies, to computational design, electrical engineering, and software. Prototyping tools & processes, industrial robotics, embedded systems, sensor integration/calibration, CAD/CAM systems, data collection & management in lab & field, machine learning applications. SW Experience in Linux, Bash, Python, and ROS. Enthusiastic team player, and a curious life-long learner.

Professional Experience

Trim Tab Robotics - Self-Employed Advisor & Independent Contractor

Oct 2022 - Present | 1 year, 5 months | Southport, ME

- Adaviv - MIT startup developing IEC tools & hardware for farmers in Boston, MA - Advisor
- Arcadia Tractor - AGV startup in Silicon Valley - Advisor
- Robust AI, Third Wave Automation - Independent Contractor - Industrial Design / MechE Prototyping

Farm-ng - Co-Founder, Lead Hardware Engineer

May 2020 - Oct 2022 | 2 years, 6 months | Watsonville, CA

- Co-founded company in 2020 with Ethan Rublee.
- Designed & engineered the “Amiga” platform across 7 major hardware revisions - a small electric vehicle for farms, consisting of a modern modular IP65 hardware ecosystem and bus architecture creating an outdoor, ruggedized, robotics “kit-of-parts.” Led the development of many application-specific farm tools, seeing the product through the first 100 units delivered and operating in customer fields.
- Led 10,000 sq.ft tractor factory build-out, with complete in-house sheet metal and machining manufacturing capabilities via partnership with the amazing team at Precision Ag Services. Created SOPs for wiring harnesses, electronics assembly, test, etc., as well as systems for inventory mgmt, purchasing, ecommerce, and supply-chain operations.
- Led hardware engineering through company's growth from 0 to 16 FTE, participated in raising two seed rounds ~= $2M
- World Ag Expo Top 10 new Ag products winner!

Stable Auto - Foundational Mechatronics Engineer

Nov 2018 - Sept 2019 | 11 months | San Francisco, CA

- Mechanical/hardware engineering of robotic tooling and industrial controls for the first autonomous L3 electric charging station. Managed MechE & EE consultants and contractors throughout system architecture and design.

(Google) X, ‘The Moonshot Factory’ - Senior Design Engineer, Robotics

Jan 2016 - Feb 2018 | 2 years, 2 months | Mountain View CA

Research & Development, Hardware Engineering (Robotics), and Product Development in X's early stage pipeline (Rapid Evaluation & Foundry).

- Co-founded R&D moonshot in agriculture, developing tools for farmers to better understand their crops using robotics and AI. Pitch awarded 10 headcount & $3.5M opex over 18 months. Project advanced from ‘Investigation’ to ‘Foundry’ project in an unprecedented 7 months. Helped build a team of 11 engineers across multiple applications in the ag space. Project broke the mold for project development at X, and contributed to a radical overhaul of the early-phase pipeline.
- Created relationships with industry leaders early in program development, helped set strategy and target real-world applications for near-term product development. Focused on immediate value-creation leading to revenue in excess of $500k after only one season, while maintaining ‘moonshot’ trajectory & aspirations.
- Delivered software and hardware solutions for two discrete robot prototypes in one growing season.
    - Built ROS (rospy) system architecture and integration of motor controls, RF comms, various sensors including cameras (vis and multi-spectral), RTK-GPS, etc.
    - MechE/Hardware design and build of initial prototypes. Led team (TPM) of 3-5 engineers (MechE/EE) for second season iterations, as well as managed external contractors and suppliers on tight deadlines.
    - Led all field & lab data collection efforts, data QC, and sensor calibration/testing. Assisted SWE’s on data ingest for ML pipelines.

Google Robotics - Hardware Engineer
Dec 2013 - Jan 2016 | 2 years, 2 months | Mountain View, CA
Mechanical and hardware engineering, technical project management, and product development in robotics.

- Lead MechE and Technical Project Manager on a handheld, haptic, robotic product.
    - Worked with experts across disciplines internal and external to Google to deliver an elegant product design marrying form & function in under a year, despite an under-resourced team of < 4 FTE.
    - Lined up CM's and contracts for various components, prototype production runs in the 100's of units.
    - Technical challenges included: development of a wireless inductance ring (to pass data across a spinning interface), a non-canonical resistive touch-screen (cylindrical), and custom BLDC rotor/stator design. Other criteria that required some finessing were for RF and EMI mitigation (motor!), high speed data/comms, heat dissipation, power limitations over PoE, and institutional chaos... etc.
    - Managed external Industrial design company 'HUGE,' from schematic design to final CMF.
- Managed 2 full-time employees (HWEs, machinists) for ~≈4 years, 100% retention.

Dirty Robot Brew Works - Co-Founder
Aug 2012 - Dec 2019 | 7 years, 5 months | San Francisco, CA

- Some info here...

Bot & Dolly - Design Technologist (Acquired by Google 2013)
Apr 2012 - Dec 2013 | 1 year 9 months | San Francisco, CA
Role : Creative Technologist & Engineer, Mechanical, Software, and Hardware Prototyping

- Built software & IP in robotic manufacturing methods at Bot & Dolly that is now an X 'moonshot' project employing 50+ engineers partnered with various multi-nationals in the industrial automation space. Software engineering, product development, and tech demos to build Rhino/Grasshopper plugin 'bdBuild,' a toolset for creatives linking parametric design tools to automation equipment.
- Delivered creative technical/engineered solutions on many high-profile film, live-stage, and installation projects up to $12M on tight production schedules.
- Managed fabrication and shop staff on all projects. Also managed several clients directly on smaller projects <$300k. Bot & Dolly clients included Google, Zazzle, Scion, Warner Brothers, Blue Man Group, Disney, Nike, Audi, Jambox, Autodesk, etc.
- Designed and produced workshop 'Craft Class for Robots,' for RobArch Conference 2013, using motion capture for path planning and debuting our new robot programming plugin 'BdBuild,' teaching robots how to paint.
- Created prototypes (hw/sw) for robot controllers of various types and form factors (mostly knob-like, 1-DOF devices).

Foster & Partners Architects, Apple Campus Design - Associate Architect
Dec 2011 - Apr 2012 | 5 months | Cupertino, CA
Construction administration for executive building mockups, design detailing, and putting out fires - Apple's new campus in Cupertino.

- Installed the largest piece of glass in the world while on-site construction admin for mockups - with a burn rate of $140k/day (!!). We built full-scale mockups to inform construction process engineering, design detailing, material performance, and aesthetic evaluation of building design.

Loisos & Ubbelohde Architecture + Energy - Associate (Energy & Building Science Consultancy)
Jul 2009 - Jul 2011 | 2 years 1 month | Alameda, CA
Hardware engineering, computational design, and CAD/CAM. Building monitoring systems, light fixture prototyping, boatbuilding.

- 2011 - Built research-grade building monitoring and control system with Loisos & Ubbelohde, giving buildings a brain prior to "smarthome" and IoT product boom. Still collecting data/in use in some buildings across the US.
- 2010 - Created process for the mass-customization of cast bronze structural components. Engineered & built CNC router and SW design-to-production workflows for machining foundry sand molds, saving thousands and reducing waste.
- Developed passive (non-mechanized) solar concentrator for daylighting interior spaces.

University of California, Berkeley - Graduate Student Instructor
Jul 2008 - Jan 2009 | 7 months | Berkeley, CA

- Taught the first year graduate students in Architecture with Professors Nicholas De Monchaux, and Ron Rael, with a focus on digital design tools and representation. Worked with Professor Lisa Iwamoto to build CAD/CAM student resources and the CNC Routing facility at Berkeley, 2007 - 2009.

Pearce Brinkley Cease + Lee Architects - Intern Architect
Jun 2006 - Jun 2007 - 1 year 1 month | Raleigh, NC

- Produced construction documents for 2 college campus buildings in North Carolina and Maryland in Revit.

Bennett Brothers Yachts - Boatbuilder and Craftsman
Jun 2001 - Aug 2005 - 4 years 3 months, summer employment during college

- Worked across the trades from marine system integration to fine carpentry.

Melaragno Design Build - Carpenter and Craftsman
Jun 1996 - May 2006 - 10 years, Intermittent employment

- Residential construction - during school breaks, holidays, and one summer.

Education

University of California at Berkeley, 2007-2009; Masters of Architecture. Focus on computational design, CAD/CAM, and DfM.
North Carolina State University, 2001-2006; Bachelor of Environmental Design in Architecture (BEDA)

Published Patents (15)

Runtime controller for robotic manufacturing system | Patent Issued Dec 17, 2019, us 10509392
Capture of ground truthed labels of plant traits method and system | Patent Issued Dec 3, 2019, us 10492374
Software interface for authoring robotic manufacturing process \ Patent Issued Nov 26, 2019, us 10486308
On-demand protective structures for packaging items in a container \ Patent Issued Aug 6, 2019, US 10370136
Plant phenotyping techniques using optical measurements... | Patent Issued Jun 27, 2019, US 20191091632
Plant phenotyping techniques using mechanical manipulation... | Patent Issued Jun 27, 2019, US 20190191631
Augmented-human field inspection tools for automated phenotyping systems... | Patent Issued Jun 27, 2019, US 20190191630
Actuated molding device for construction of packaging structures | Patent Issued Oct 18, 2018, US 20180297266
Closed-loop control system for robotic operation | Patent Issued Jun 12, 2018, US 9993924
Kinematically linked optical components for light redirection | Patent Issued May 3, 2018, US 20180119911
Error accrual and mitigation during robotic process | Patent Issued Feb 1, 2018, US 20180029235
Adhering modular elements for packaging structures | Patent Issued Dec 12, 2017, US 9840347
Visual cards for describing and loading operational modes to motorized interface element | Patent Issued Aug 22, 2017, US 9737987
Automated distribution of control functions between multiple knob controllers ... | Patent Issued March 17, 2020; US10589428B1,
Modular Vehicle System and Wheel Assembly | Patent Issued March 02, 2023; WO2023027720A1

Wanderings

- Rode a bicycle 4200 miles across the United States (2007.) *We were running out of time so we took a bus across Kansas!
- Sailed an 18' beach catamaran (Hobie Cat) from Key West to NYC (2011)
- Sailed most of the west coast of North America in a 38' heavy displacement cutter (2015, 2019).

References available upon request! Thank you for your time.