Taylor Faucett

Senior Machine Learning Engineer / Physicist

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Professional Summary

Senior Machine Learning Engineer and physicist with 5+ years leading ML development for 3D perception, scene understanding, and geometric reasoning in robotics and advanced manufacturing. Build production ML systems that create learned embeddings from CAD/mesh/point-cloud data, design dataset curation and labeling pipelines, and deploy real-time inference on edge hardware. Deep expertise in geometric deep learning (PointNet-style models, 3D CNNs, graph networks), physics-informed models for material behavior, and multimodal pipelines integrating geometry with LLM-driven agents.

Education

2015 - 2021 | **University of California, Irvine**, Irvine, CA
Ph.D. in Physics

2011 - 2015 | **University of Hawaii, Manoa**, Honolulu, HI
M.S. in Physics

2005 - 2009 | **Westminster College**, Salt Lake City, UT
B.S. in Physics, Minor in Mathematics and Music

Professional Experience

06/2022 - Present | **Machina Labs**
Senior Machine Learning Engineer
- Lead end-to-end ML for industrial robotic sheet-metal forming, from dataset curation and labeling pipelines through model design, evaluation, and deployment on edge hardware for real-time inference.
- Train real-time anomaly detection models deployed on edge devices, enabling in-process quality monitoring and early fault detection during robotic forming operations.
- Develop physics-informed ML models trained on material stamping literature to predict failure likelihood, incorporating material properties and forming parameters to prevent defects.
- Build mesh adjustment models for Double-Sided Incremental Forming (DSIF) that learn springback compensation—predicting geometry corrections so parts resolve to their final desired shape after elastic recovery.
- Create learned embeddings and representations from 3D geometry (meshes, point clouds, CAD) that encode spatial structure and physical constraints for downstream reasoning and path planning.
- Build multimodal pipelines combining geometric context with language-based interfaces for LLM-driven robot operation, focusing on constrained action spaces and operational safety.
- Own data infrastructure (ETL, dataset versioning, metrics/dashboards, monitoring) and mentor junior engineers on ML best practices and geometric data pipelines.
- Partner with robotics, controls, and software teams to integrate ML into safety-critical systems, including CI/CD and infrastructure-as-code for deployed robotic cells.

06/2015 - 06/2022 | **University of California, Irvine**
Graduate Research Assistant & Postdoctoral Researcher
- Researched deep learning and computer vision methods for particle-physics detectors, focusing on robust classification, reconstruction, and anomaly detection under real-world constraints.
- Developed techniques for interpreting ML models and relating learned features to underlying physical mechanisms, improving trust and scientific insight.
- Built end-to-end ML pipelines for large simulated and experimental datasets, covering data generation, preprocessing, feature engineering, model design, hyperparameter optimization, and uncertainty-aware evaluation.
- Collaborated across international experimental collaborations and communicated ML results to both domain experts and non-specialists.

08/2011 - 05/2015 | **University of Hawaii, Manoa**
Graduate Research Assistant
- Designed and implemented numerical simulations of Bose–Einstein condensates for a DoD-funded lattice-gas quantum computing experiment, bridging physics models and high-performance code.
- Integrated analysis and trigger software with FPGA-based readout for a neutrino telescope, working across hardware, firmware, and scientific analysis teams.

09/2009 - 05/2011 | **Northrop Grumman Aerospace**
Systems Engineer
- Designed and deployed secure precision-time (PTP) radio networks for U.S. Air Force installations, focusing on reliability, timing accuracy, and security.
- Held an active Secret security clearance.

Selected Open-Source & Personal Projects

2024 - Present | **Rust 3D Geometry & Robotics Data Stack**
Private (active development; details available upon request)
- Developing a Rust-native alternative to PCL/Open3D for performant, safe mesh/point-cloud processing and geometry utilities.
- Designed for interoperability with robotics workflows and telemetry/visualization platforms (ROS2, Foxglove, Rerun), with a focus on clean APIs and production deployment.

Publications

1. Faucett, T. Decoding Black Box Models to Find New Physics at the LHC. Ph.D. Dissertation, University of California, Irvine (2021). https://escholarship.org/uc/item/63x9r13b
2. Faucett, T., Hsu, SC. & Whiteson, D. Learning to identify semi-visible jets. J. High Energ. Phys. 2022, 132 (2022). https://doi.org/10.1007/JHEP12(2022)132
3. Faucett, T., Thaler, J., Whiteson, D. Mapping machine-learned physics into a human-readable space. Phys. Rev. D 103, 036020 (2021). https://doi.org/10.1103/PhysRevD.103.036020
4. Collado, J., Faucett, T., Witkowski, E. et al. Learning to isolate muons. J. High Energ. Phys. 2021, 200 (2021). https://doi.org/10.1007/JHEP10(2021)200
5. Collado, J., Faucett, T., Howard, J. et al. Learning to identify electrons. Phys. Rev. D 103, 116028 (2021). https://doi.org/10.1103/PhysRevD.103.116028
6. Baldi, P., Cranmer, K., Faucett, T. et al. Parameterized neural networks for high-energy physics. Eur. Phys. J. C 76, 235 (2016). https://doi.org/10.1140/epjc/s10052-016-4099-4

Technical Skills

Languages	●●● Python	●●○ Rust	●●○ JS/TS
	●●○ SQL	●●○ Bash/Shell	●○○ C++
ML Engineering	●●● PyTorch	●●● NumPy	●●● Pandas/Polars
	●●● scikit-learn	●●○ TensorFlow/Keras	●●○ ONNX
	●●○ MLflow	●●○ TensorBoard	●●○ Weights & Biases
	●●○ Optuna	●●○ Torch Lightning	●○○ Ray
3D Geometry & CAD	●●● Mesh/Point Cloud	●●● Coordinate Frames & Kinematics	●●○ CAD / 3D Formats (STEP, STL, OBJ, PLY)
	●●○ SDFs / Occupancy Grids		

Geometric Deep Learning	●●○ PointNet / PointNet++	●●○ 3D CNNs	●●○ Graph Networks
	●○○ 3D Transformers	●○○ Diffusion Models (3D)	
Vision & Perception	●●● 3D Perception Pipelines	●●● Scene Understanding	●●○ Sensor Fusion (3D + time-series)
	●●● Real-time Anomaly Detection	●●○ OpenCV	
Robotics	●●● ROS2	●●○ LLM-Assisted Robot Operation	●●○ Edge/Embedded ML
Physics & Sim	●●○ Material forming behavior	●●○ Physics-informed ML	●●○ Constraints-based optimization
Data & Cloud	●●● ETL Pipelines	●●● Kafka/RabbitMQ	●●● Databricks
	●●○ Azure/AWS	●●○ PySpark	●●○ InfluxDB
DevOps	●●● Docker	●●○ Kubernetes	●●○ Terraform
	●●● CI/CD	●●● Linux/Unix	●●● Git

Honors & Awards

2020 | **Chateaubriand Fellowship**, Chateaubriand Fellowship
Prestigious fellowship awarded by the French Embassy to support research in machine learning and AI at a leading French institution.

2016-2018 | **NRT-DESE: Team Science for Integrative Graduate Training in Data Science and Physical Science**, National Science Foundation
2 year NSF research grant for work in the interdisciplinary field of machine learning and the physical sciences.