

Taylor Faucett

Senior Machine Learning Engineer / Physicist

Los Angeles, USA

taylorfaucett@gmail.com | [+1 \(801\) 633-4509](tel:+1(801)633-4509) | taylorfaucett.github.io | github.com/taylorfaucett |
linkedin.com/in/taylorfaucett | orcid.org/0000-0003-3917-975X

Professional Summary

Senior Machine Learning Engineer and physicist specializing in 3D perception and geometric representations for robotics and advanced manufacturing. Build production ML systems that ingest CAD/mesh/point-cloud data for computational geometry, create datasets and labeling workflows, and deploy low-latency inference on robotic hardware. Experienced with geometry/physics constraints (material behavior in forming), geometric deep learning (PointNet-style models, 3D CNNs, graph networks), and LLM-driven robot operation.

Education

2015 - 2021	University of California, Irvine , Irvine, CA <i>Ph.D. in Physics</i>
2011 - 2015	University of Hawaii, Manoa , Honolulu, HI <i>M.S. in Physics</i>
2005 - 2009	Westminster College , Salt Lake City, UT <i>B.S. in Physics, Minor in Mathematics and Music</i>

Professional Experience

06/2022 - Present	Machina Labs <i>Senior Machine Learning Engineer</i> - Lead end-to-end ML for industrial robotic sheet-metal forming, from 3D data capture/labeling through model design, evaluation, and deployment on on-prem/edge hardware. - Build geometry tooling (CAD/mesh/point cloud manipulation, coordinate-frame transforms, kinematics-aware features) used across perception, mesh prep and path planning. - Develop models that reason about geometry, physics, and constraints for forming processes; incorporate material behavior and simulation/measurement signals to train and validate models for double-sided incremental forming. - Create multimodal pipelines that combine geometric context with language-based interfaces for LLM-driven robot operation, focusing on constrained action spaces and operational safety. - Own data and experimentation infrastructure (ETL, dataset versioning, metrics/dashboards, monitoring) to support rapid iteration and reliable inference in production. - Partner with robotics, controls, and software teams to integrate ML into safety-critical systems, including CI/CD and infrastructure-as-code for deployed cells.
06/2015 - 06/2022	University of California, Irvine <i>Graduate Research Assistant & Postdoctoral Researcher</i> - 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 <i>Graduate Research Assistant</i> - 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.

	<ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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 <i>Private (active development; details available upon request)</i> <ul style="list-style-type: none"> - 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.
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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](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](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 ••○ SQL	••○ Rust ••○ Bash/Shell	••○ JS/TS •○○ C++
ML ENGINEERING	••• PyTorch ••• scikit-learn ••○ MLflow ••○ Optuna	••• NumPy ••○ TensorFlow/Keras ••○ TensorBoard ••○ Torch Lightning	••• Pandas/Polars ••○ ONNX ••○ Weights & Biases •○○ Ray
3D GEOMETRY & CAD	••• Mesh/Point Cloud	••• Coordinate Frames & Kinematics	••○ CAD / 3D Formats (STEP, STL, OBJ, PLY)
GEOMETRIC DEEP LEARNING	••○ PointNet / PointNet++ •○○ 3D Transformers	••○ 3D CNNs •○○ Diffusion Models (3D)	••○ Graph Networks
VISION & PERCEPTION	••• 3D Perception Pipelines ••○ OpenCV	••○ Sensor Fusion (3D + time-series)	••○ Anomaly Detection

ROBOTICS	••• ROS2	••◦ LLM-Assisted Robot Operation	••◦ Edge/Embedded ML
PHYSICS & SIM	••◦ Material behavior forming	••◦ Physics-informed ML	••◦ Constraints-based optimization
DATA & CLOUD	••• ETL Pipelines ••◦ Azure/AWS	••• Kafka/RabbitMQ ••◦ PySpark	••• Databricks ••◦ InfluxDB
DEVOPS	••• Docker ••• CI/CD	••◦ Kubernetes ••• Linux/Unix	••◦ Terraform ••• 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.