

Taylor Faucett

Senior Machine Learning Engineer / Physicist

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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

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| 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

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| 06/2022 - Present | Machina Labs
<i>Senior Machine Learning Engineer</i> <ul style="list-style-type: none">- 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> <ul style="list-style-type: none">- 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> <ul style="list-style-type: none">- 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 <i>Private (active development; details available upon request)</i> - 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	●●○ 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	●●● Meshes & Point Clouds	●●● Coordinate Frames & Kinematics	●●○ CAD / 3D Formats (STEP, STL, OBJ, PLY)
GEOMETRIC DEEP LEARNING	●●○ PointNet / PointNet++	●●○ 3D CNNs	●●○ Graph Networks
	●●○ 3D Transformers	●●○ Diffusion Models (3D)	
VISION & PERCEPTION	●●● 3D Perception Pipelines	●●○ Sensor Fusion (3D + time-series)	●●○ Anomaly Detection
	●●○ OpenCV		
ROBOTICS	●●● ROS2	●●○ LLM-Assisted Robot Operation	●●○ Edge/Embedded ML

PHYSICS & SIM	••○ Material behavior	forming	••○ 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.