

# Jonathan M. Salfity

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Austin, TX | U.S. Citizen

## SUMMARY

- Robotics & AI/ML PhD student with 6 years of corporate R&D experience.
- Strong systems and control theory background.
- Research interests and experience in AI/ML learned-based systems and robust control policy development through deep reinforcement learning.
- Industry experience from high-level systems design to implementation in hardware and in simulation.

## SOFTWARE & SKILLS

Python, C++, MATLAB, Docker | Robot Operating System (ROS), Gazebo | PyTorch, TensorFlow  
Robotic Mapping & Autonomy, Robotic Manipulation | Reinforcement Learning, Machine Learning  
Simulation | Systems Analysis, Mechatronics, Control Engineering | Edge Compute & Cloud Compute  
Technical Writing | Conference Publications | Patents | Leadership | Business Stakeholder Management

## EDUCATION

**M.S., Mechanical Engineering, *UCLA***, Systems & Control, *Department Fellowship*, 2014  
**B.S., Mechanical Engineering, *UCLA***, *Cum Laude*, 2013

## EMPLOYMENT

**AI & Emerging Compute Lab, HP Labs | *HP Inc.*** Palo Alto, CA | 2016 - 2020  
Robotacist & AI Researcher

- Investigated robotic control through deep reinforcement learning (DRL), focusing on robustness and generalization. Reviewed state-of-the-art in robotic control mechanisms based on DRL.
- Designed and conducted experiments extending OpenAI Baselines & OpenAI Gym Environments, improved DRL training schedules for robust and generalizable learned-based control policies. Contributions include an adversarial curriculum learning algorithm and sensitivity/robustness explainability.
- Designed and implemented proof of concepts (PoCs) for mobile robots, often with compute-constrained on-board processors utilizing off-board ML servers.
- Enhanced various layers of the robotics stack through software development and PoCs, including semantic mapping, autonomy, policy management, and human-robot interaction. Technologies developed led to patent filings and demonstrations for corporate executive stakeholders.
- Programmed with ROS middleware, developed APIs and data visualization software tools to integrate with on-premise and cloud ML servers. Used Turtlebot2, Turtlebot3, and Fetch Freight in hardware and in Gazebo simulation.

**Digital Manufacturing Lab, HP Labs | *HP Inc.*** Palo Alto, CA & Singapore | 2019 - 2020  
Robotics Principal Investigator for 3D-Printing

- Led technical team of robotics and AI researchers from Prof. Phạm Quang-Cương's CRI Group at Nanyang Technological University (NTU) with the objective to bridge university research to HP 3D-Print post-processing automation challenges and limitations.
- Developed manipulator robotic system for cleaning 3D-Printed parts. Contributed to state-chart algorithm, patent filing, and conference publication. Hosted demonstrations for business partners.
- Conducted preliminary research and demonstrations in robust 3D-object classification, 3D-part cleanliness evaluation, and visual-servoing for precise manipulation.
- Collaborated across HP 3D-Print R&D and product teams to develop robotics and AI software and solutions for automated post-processing. Strategized longer term research proposals, plans, and results.

**Hardware R&D, HP-3D Print | *HP Inc.***  
Control System and Servo Engineer

San Diego, CA | 2014 - 2016

- Designed and implemented HP Fused-Deposition-Modeling 3D-Printer prototype from first principles.
- Simulated digital twin of hardware with MATLAB and Simulink to conceptualize and prototype multi-input, multi-output control laws for three spatial-axes (xyz), extruder nozzle, and temperature.
- Translated theoretical control laws to discrete algorithms for real-time implementation in C.

**Department of Mechanical Engineering | *UCLA***

Los Angeles, CA | 2013 - 2014

Teaching Assistant for MAE107: Modeling and Analysis of Dynamic Systems

- Led lab and discussion sections, held 1-1 tutoring.
- Taught MATLAB and Simulink programming, impulse response, convolution, frequency response, 1st- and 2nd-order ODEs, block diagram representations, etc.

**Material Science Lab | *The Aerospace Corporation***

Los Angeles, CA | 2010 - 2012

Undergraduate Research Intern

- Examined particle impacts in rocket engines using a modified shock tube.
- Fabricated and investigated plasma treatment on carbon-fiber reinforced composites.

## PUBLICATIONS & REPORTS

- **J Salfity**, A Iyer, H Horii, C Makaya, M Athreya, M Anthony Lewis. Robotics Proof of Concept Roadmap for HP Inc. *HP Labs Internal Report*, Palo Alto, CA, June 2020
- **J Salfity**, A Iyer, H Horii, C Makaya, M Athreya, M Anthony Lewis. Robotics: The Bridge from 3D-Print to a Digital Manufacturing Solution. *HP Labs Internal Report*, Palo Alto, CA, June 2020
- C Makaya, A Iyer, **J Salfity**, M Athreya, M Anthony Lewis. Cost-effective Machine Learning Inference Offload for Edge Computing. <https://arxiv.org/abs/2012.04063>, under submission, June 2020
- H Nguyen, N Adrian, JLX Yan, **J Salfity**, W Allen, QC Pham. Development of a Robotic System for Automated Decaking of 3D-Printed Parts. *International Conference on Robotics and Automation (ICRA)*, Paris, France, May 2020
- **J Salfity**, D Murphy, M Anthony Lewis. Robust Reinforcement Learning Based Policy Development through Internal, External Parameter Variation. *HP Data Science & Knowledge Discovery Summit*, Vancouver, WA, August 2019
- W Staehler, **J Salfity**, T Paula, D Murphy. Multiple Policy Management for Multi-Skilled Agents. *HP Data Science & Knowledge Discovery Summit*, Vancouver, WA, August 2019
- **J Salfity**, H Horii, W Allen. Smart Mobile Robots with Human Emotion Detection. *HP Data Science & Knowledge Discovery Summit*, Vancouver, WA, May 2018
- **J Salfity**, D Murphy. Mobile Robot Map Building with the Automatic Exclusion of Known Objects using Object Recognition through Computer Vision. *HP Data Science and Knowledge Discovery Summit*, Vancouver, WA, May 2018
- RJ Zaldivar, **J Salfity**, G Steckel, B Morgan, D Patel, JP Nokes, HI Kim. Bondability of TC410 composites: the surface analysis and wetting properties of an atmospheric plasma-treated siloxane-modified cyanate ester composite. *Journal of Composite Materials* 46(16):1925-1936, August 2012

## PATENTS

In total, 12 patents filed across robotics, 3D-Print, and AI. Shown below are on Google Patents.

- W Allen, **J Salfity**, Mobile Autonomous Fleet Control, WO2020122953A1
- K Erickson, **J Salfity**, L Zhao, Modules of Three-Dimensional Printers, WO2020046267A1
- **J Salfity**, W Allen, H Horii, Control System for Mobile Robots, WO2019088990A1
- **J Salfity**, D Murphy, Mobile Robots to Generate Reference Maps for Localization, WO2019089018A1
- **J Salfity**, D Murphy, W Allen, Mobile Robots to Generate Occupancy Maps, WO2019089017A1
- S Stodder, **J Salfity**, M Majette, Correction of Filament Parameters, WO2017086908A1