Jaime Alon Berkovich

DoD NDSEG Fellow & Ph.D. Candidate, MIT DMSE & LAMM
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Education

Massachusetts Institute of Technology, Cambridge, MA — Sept. 2023 – Exp. May. 2028
Ph.D. Materials Science & Engineering; GPA 4.5/5.0. Minor: Nonlinear Dynamics. Advisor: Prof. Markus J. Buehler.

Northwestern University, Evanston, IL — Sept. 2019 – Jun. 2023
B.S. Materials Science & Engineering (Honors Program); GPA 3.76/4.00. Minor: Critical Theory.

Honors & Awards

- *Best Systems Engineering Award*, NASA BIG Idea Challenge, Lunar Forge Forum at NASA Glenn Research Center (2023)
- Department of Defense *National Defense Science and Engineering Graduate (NDSEG) Fellowship* (2023)
- *National Finalist*, NASA BIG Idea Challenge – *ACRE: Autonomous Casting RovEr* (2023)
- Graduated with Honors, McCormick School of Engineering and Applied Science (2023)
- Five-time *Dean's List* (Honors Recognition), McCormick School of Engineering and Applied Science (2019–2023)
- *First Place Oral Presentation*, Querrey Simpson Institute for Bioelectronics Summer Symposium (2021)

Talks & Presentations

- MIT AI Hardware Symposium (2025) – Poster: *Extracting Cellular Automaton Rules from Biological Systems with Generative Pretrained Transformers*
- Materials Research Society Fall Meeting & Exhibit (2024) – Oral: *Predicting Emergent Behavior in Cellular Automata and 3D-Printed Bioinspired Hierarchical Architected Metamaterials with Generative Pre-Trained Transformer Models*
- Workshop on Biomaterials Modeling (2024) – Oral: *LifeGPT: Topology-Agnostic Generative Pretrained Transformer Model for Cellular Automata*
- NASA Lunar Forge Forum (2023) – Oral & Poster: *ACRE: Autonomous Casting RovEr*

Selected Work Experience

Wearifi, Inc. — Evanston, IL — Jun. 2021 – Sept. 2022
Engineering Team Lead (Jun. 2022 – Sept. 2022)
Engineering Intern (Jun. 2021 – Jun. 2022)

- Reduced measurement variance of hydration sensors by ∼60% via compliant mounting mechanism; results published in *Adv Healthc Mater*.
- Led full-stack device fabrication: SMT, laser cutting, CNC, SLA printing, sputter coating, micro-soldering, flashing, software-debugging.
- Managed and mentored four interns; introduced scalable TPU encapsulation for skin-hydration sensors; results published in *Adv Mater Technol*.
- Designed 3D-printed charging case and new hydration sensor geometries to accommodate trans-epidermal water loss sensing.

Exicure, Inc. — Chicago, IL — Sept. 2020 – Feb. 2021
R&D Intern

- Developed mathematical models for predicting size distributions of spherical nucleic acid (SNA) nanoparticles.
- Presented novel nanoparticle stability study on extreme temperature storage at company-wide meeting—showed SNAs could survive extreme temps depending on oligonucleotide chemistry and loading.

Selected Research Experience

MIT Buehler Group/Laboratory for Atomistic and Molecular Mechanics (LAMM) — Cambridge, MA — Sept. 2023 – Present
Ph.D. Candidate & DoD NDSEG Fellow

- Developing GPU-accelerated cellular automata (CA) framework in JAX (CAX) coupled with GPT mutation oracles and JAX-FEM to evolve bioinspired hierarchical metamaterials.
- Architected/trained GPT model using PyTorch for forecasting CA time-evolution given rules and initial conditions, and for inferring rules from spatiotemporal data.
- Authored *AutomataGPT* (under revision, *Adv Sci*) and *LifeGPT* (in press, *npj AI*).
- Supervised 6 undergraduates and 1 high school (MIT *Research Science Institute*) intern on projects involving: transformer neural networks, genetic algorithm optimization, growing fungal materials, 3-D printing, custom Raspberry Pi hardware/software integration, and Python-API-integrated finite element method simulations. Several undergrads awarded MIT *Undergraduate Research Opportunities Program* (UROP) grants.
- Environmental health and safety (EHS) representative: ensuring hazardous waste management and lab safety compliance.

Northwestern University NASA 2023 B.I.G. Idea Challenge Team Evanston, IL Sept. 2022 – Nov. 2023
Founder, Team Lead, Head Captain

- Founded and led Northwestern's first-ever NASA BIG Idea Challenge team; recruited 24 students (22 UG, 2 G) and partnered with NUSTARS and the Society of Women Engineers to promote inclusive participation.
- Obtained faculty sponsorship (Prof. Ian McCue) and approval from the Illinois Space Grant Consortium; managed safety compliance, purchasing workflows, and facility access throughout the 13-month project.
- Authored the ACRE concept: solar-powered *in situ* casting of lunar regolith using parabolic mirrors, optical waveguides, a YSZ crucible, and a robotic plow.
- Led proposal writing, research strategy, and production of the three-minute proposal video; chaired weekly design reviews and served as engineering lead during three months of prototyping and experimentation.
- Secured industry support from ANSYS (multiphysics licenses), Rexnord Aerospace (lathed parabolic mirrors), Questek (metallurgical consulting), and Wearifi (fabrication).
- **One of seven national finalists**; secured **$167,928.38 NASA funding**, presented oral and poster work at NASA's Lunar Forge Forum at Glenn Research Center.
- Authored 55-page final technical report; won the ***Best Systems Engineering Award*** (2023) and built lasting institutional momentum—after my departure from Northwestern, team returned in 2024 to win the ***Artemis Award***.

Northwestern University Rogers Group/Querrey Simpson Institute for Bioelectronics (QSIB) Evanston, IL Jun. 2020 – Dec. 2022
Student Researcher (Sept. 2022 – Dec. 2022)
Student Researcher (Jun. 2020 – Jun. 2021)
Part-time Research Intern (Paid) (Sept. 2020 – Jun. 2021)
Summer Undergraduate Research Grant Intern (Jun. 2020 – Sept. 2020)

- Investigated inductive charging schemes for a wireless, battery-free vitals sensor for fetal surgery; simulated inductive coupling performance in *Ansys Maxwell 3D* as part of senior honors project in materials science and engineering.
- Independently proposed, fabricated, and tested bioresorbable induction coils for a heart strain sensor using solvent lamination, heat pressing, and 3D printing; measured Q factors via network analyzer.
- Developed a beeswax–shellac encapsulation technique for molybdenum–candelilla-wax solder junctions to improve bioresorbable device robustness.
- Performed laser ablation structuring of silicon and magnesium films in class-100 cleanroom (NUFAB); characterized ablation depth, resolution, and surface roughness using AFM and optical profilometry. Results published in *Nat Commun*.

Journal Articles

1. **Berkovich, J. A.**; David, N. S.; Buehler, M. J. *AutomataGPT: Forecasting and Ruleset Inference for Two-Dimensional Cellular Automata*. *Advanced Science*, under revision (2025). DOI: 10.48550/arXiv.2506.17333
2. **Berkovich, J. A.**; Buehler, M. J. *LifeGPT: Topology-Agnostic Generative Pretrained Transformer Model for Cellular Automata*. *npj Artificial Intelligence*, in press (2025). DOI: 10.48550/arXiv.2409.12182
3. Luu, R. K.; Arevalo, S.; Lu, W.; Ni, B.; Yang, Z.; Shen, S. C.; **Berkovich, J.**; Hsu, Y.-C.; Zan, S.; Buehler, M. J. *Learning from Nature to Achieve Material Sustainability: Generative AI for Rigorous Bio-Inspired Materials Design*. *MIT Exploration of Generative AI* (2024). DOI: 10.21428/e4baedd9.33bd7449
4. Dickey, A. K.; **Berkovich, J.**; Leaf, R. K.; Jiang, P. Y.; Lopez-Galmiche, G.; Rebeiz, L.; Wheeden, K.; Kochevar, I.; Savage, W.; Zhao, S.; Campisi, E.; Heo, S. Y.; Trueb, J.; LaRochelle, E. P. M.; Rogers, J. A.; Banks, A.; Chang, J.-K. *Observational Pilot Study of Multi-Wavelength Wearable Light Dosimetry for Erythropoietic Protoporphyria*. *International Journal of Dermatology* (2024). DOI: 10.1111/ijd.17166
5. Wu, Y.; Liu, C.; Lapiere, M.; Ciatti, J. L.; Yang, D. S.; **Berkovich, J.**; Model, J. B.; Banks, A.; Ghaffari, R.; Chang, J.; Nuzzo, R. G.; Rogers, J. A. *Thermoplastic Elastomers for Wireless, Skin-Interfaced Electronic and Microfluidic Devices*. *Advanced Materials Technologies* (2023). DOI: 10.1002/admt.202300732
6. Shin, J.; Wang, H.; Kwon, K.; Ostojich, D.; Christiansen, Z.; **Berkovich, J.**; Park, Y.; Li, Z.; Lee, G.; Nasif, R.; Chung, T. S.; Su, C. J.; Lim, J.; Kubota, H.; Ikoma, A.; Lu, Y. A.; Lin, D. H.; Xu, S.; Banks, A.; Rogers, J. A. *Wireless, Soft Sensors of Skin Hydration with Designs Optimized for Rapid, Accurate Diagnostics of Dermatological Health*. *Advanced Healthcare Materials* (2023). DOI: 10.1002/adhm.202202021
7. Yang, Q.; Hu, Z.; Seo, M.-H.; Xu, Y.; Yan, Y.; Hsu, Y.-H.; **Berkovich, J.**; Lee, K.; Liu, T.-L.; McDonald, S.; Nie, H.; Oh, H.; Wu, M.; Kim, J.-T.; Miller, S. A.; Jia, Y.; Butun, S.; Bai, W.; Guo, H.; Rogers, J. A. *High-Speed, Scanned Laser Structuring of Multi-Layered ECO/Bioresorbable Materials for Advanced Electronic Systems*. *Nature Communications* 13, 34173 (2023). DOI: 10.1038/s41467-022-34173-0

Patents

1. Buehler, M. J.; **Berkovich, J. A.**; David, N. S. *Systems and Methods for Forecasting Using Cellular Automata.* U.S. Provisional Patent Application No. 63/825,225, filed June 17, 2025.

Skills

Materials/Simulation: TetGen, Comodo.jl, FEBio, JAX-FEM, ANSYS; 3-D printing; CA modeling. **Programming:** Python, Julia, MATLAB, C++ (basics); PyTorch, JAX, TensorFlow, x-transformers; NumPy, pandas; Matplotlib, PyVista. **Tools:** Git/GitHub, VS Code, Jupyter, Conda; ParaView; AutoCAD, Fusion 360, Inventor, SOLIDWORKS. **Design & Media:** Blender (3-D animation), Adobe Illustrator; videography & video editing; Logic Pro X (digital music production); graphic design; technical drawing. **Communication:** Technical & persuasive writing; public speaking & policy debate; philosophy. **Languages:** English (native), Russian (intermediate).