

# ROWAN ROLARK

Northwestern University, Department of Mechanical Engineering

2145 Sheridan Road, Tech Room B214, Evanston, IL 60208 · (808)541-7943 · rolark@u.northwestern.edu

## EDUCATION

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### Northwestern University

Expected: 06/2027

Ph.D. in Mechanical Engineering

Specialization: Directed energy deposition, design for additive manufacturing, functionally graded materials

### University of Hawai'i at Mānoa

05/2022

B.S. in Mechanical Engineering

GPA: 3.70

## RESEARCH EXPERIENCE

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### Graduate Researcher

05/2022 - Present

*Advanced Manufacturing Processes Laboratory, Northwestern University*

*Evanston, IL*

- PI: Dr. Jian Cao
- Developing advanced metal additive manufacturing processes for powder-blown laser-based directed energy deposition
- Identifying multi-physic relationships between fundamental process parameters, material properties, and part performance
- Implementing a control framework for precise material deposition to fabricate multi-material parts

### Materials Engineering Research Intern

06/2022 - 08/2022

*Lawrence Livermore National Laboratory*

*Livermore, CA*

- PI: Dr. Maxim Shusteff, Mentor: Michael Triplett
- Prototyped a dual-use chamber for printing and cell growth for the development of bioprinted lung models as a platform for studying SARS-CoV-2 infection
- Designed a process workflow that integrated computed axial lithography with projection micro-stereolithography to achieve high-resolution, multiscale prints

### Research Associate

07/2020 - 08/2022

*Ray Research Group, University of Hawai'i at Mānoa*

*Honolulu, HI*

- PI: Dr. Tyler Ray
- Led a research project fabricating 3D-printed microfluidic devices for smart wearables that collect and analyze sweat to diagnose diseases
- Operated and maintained first-class additive manufacturing platforms (including digital-light processing, stereolithography, and liquid-crystal display 3D printing technologies)
- Utilized high-precision metallurgical microscopes for imaging and the characterization of 3D-printed samples

### Undergraduate Research Fellow

08/2021 - 07/2022

*NASA Hawai'i Space Grant Consortium*

*Honolulu, HI*

- Co-authored a proposal to the Hawai'i Space Grant Consortium, supported by NASA, to pursue the design and manufacturing of customized life-detection instruments in a simulated Martian rover
- Design lead engineer and systems integrator for the rover's science payload involving the collection, preparation, and testing of mineralogical samples for signs of life
- Researched and developed robotic methods for soil chemical assays conducted on-site

## RESEARCH GRANTS

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### **Design and Development of a Low Cost Life-Detection Payload for the Investigation of a Simulated Martian Environment (\$12,000)**

**01/2022 - 06/2022**

*NASA Hawai'i Space Grant Consortium*

*Honolulu, HI*

- PI: Dr. Frances Zhu
- Role: Co-author. The research I led focused on integrating and implementing life detection instruments (Raman spectroscopy and microfluidic devices) on space exploration rovers. I contributed toward idea conception, guided the project goals, and co-authored the grant proposal.

## FELLOWSHIPS & AWARDS

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<b>2025</b>	<b>Leadership Service Award</b> , NSF HAMMER Engineering Research Center
<b>2025</b>	<b>Outstanding Paper Award</b> , North American Manufacturing Conference 53
<b>2024</b>	<b>The Graduate School Conference Travel Grant</b> , Northwestern University
<b>2024</b>	<b>Predictive Science and Engineering Design Certificate</b> , Northwestern University
<b>2024</b>	<b>Leadership Service Award</b> , NSF HAMMER Engineering Research Center
<b>2023-2024</b>	<b>Predictive Science and Engineering Design Fellowship</b> , Northwestern University
<b>2022-2023</b>	<b>Walter P. Murphy Fellowship</b> , Northwestern University
<b>2021-2022</b>	<b>NASA Hawai'i Space Grant Consortium Fellowship</b> , University of Hawai'i at Mānoa

## PROJECTS

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### **Predictive Maintenance Program**

**01/2022 - 05/2022**

*Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility*

*Honolulu, HI*

- Established an innovative predictive maintenance program to monitor and analyze the health of shipyard equipment to prevent machine failures
- Conducted market research on solutions for installing a sensory suite (measuring usage, temperature, vibration, and sound) and analyzing condition monitoring data

## PUBLICATIONS

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Y.-P. Chen, V. Karkaria, Y.-K. Tsai, **F. Rolark**, D. Quispe, R. X. Gao, J. Cao, W. Chen, "Real-time Decision-Making for Digital Twin in Additive Manufacturing with Model Predictive Control using Time-Series Deep Neural Networks," *Journal of Manufacturing Systems*, vol. 80, pp. 412–424, Jun. 2025, doi: 10.1016/j.jmsy.2025.03.009.

## PRESENTATIONS

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**F. Rolark**, R. Zha, K.H. Ryou, J. Jeong, J. Cao, "Developing Powder Flow Control for Precise Functionally Graded Materials via Laser Directed Energy Deposition," *Solid Freeform Fabrication Symposium 2024*, Austin, TX, USA, 2024

**F. Rolark**, T.R. Ray, "High precision 3D-printed molds for soft lithography of epidermal microfluidic devices," *University of Hawai'i at Mānoa Summer Undergraduate Research Experience Symposium*, Honolulu, HI, USA, 2021

## COMMUNITY ENGAGEMENT

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### President

05/2024 - Present

*Student Leadership Council, NSF HAMMER Engineering Research Center*

*Columbus, OH*

- Established infrastructure for new student organization spanning across 5 universities and facilitated communication between students, center administration, and industry partners
- Created alumni program that recognized cohorts of graduating students who were actively engaged in center activities, promoting student involvement and built the foundation for the center's alumni network
- Collaborated between other NSF engineering research centers to build a best practices manual on how to lead successful interdisciplinary engineering research centers
- Organized annual outreach events such as Women in Manufacturing Day, where HAMMER students engaged with 250+ female high school students and exposed them to advanced manufacturing and research opportunities

### President

01/2024 - 12/2025

*Mechanical Engineering Graduate Student Society, Northwestern University*

*Evanston, IL*

- Managed department events and initiatives by communicating with department leadership and facilitating efforts for student community building

### Activity Coordinator

01/2023 - 03/2023

*Unseen Identities in STEM, Northwestern University*

*Evanston, IL*

- Organized events centered on uplifting underrepresented minority groups in STEM, such as discussion panels featuring industry professionals and senior graduate students

### Diversity, Equity, and Inclusion Seminars

12/2016 - 07/2020

*Teach for America*

*Honolulu, HI*

- Lectured and informed 30+ educators on how to be inclusive and how to create safe spaces and address conflict in a classroom setting to support underrepresented students
- Held multiple interactive one-hour seminars at Chaminade University of Honolulu and a local middle school
- Hosted a supplemental question-and-answer session on how to curate a safe environment for underrepresented students

## PROFESSIONAL DEVELOPMENT

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### Research Experience Mentor

06/2024 - 07/2024

*Northwestern University*

*Evanston, IL*

- Mentored Eve Maramba, an undergraduate students from the University of Florida. I helped her develop an individual development plan and coached her on how to present research. She was awarded People's Choice Winner of NSF HAMMER-ERC's 2024 Perfect Pitch Competition
- Project: LabVIEW processing of multiple in-situ data streams for directed energy deposition

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## TECHNICAL SKILLS

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### Programming Languages

MATLAB, Python, R, C++, G-Code, Java

### CAD Modeling

AutoCAD, SolidWorks, Fusion360, Google Sketchup, Meshmixer

### Software & Tools

ImageJ, nTopology, ABAQUS, ParaView, Altair