

ACADEMIC YEAR

2025-2026

NEWSLETTER

INNOVATE. COLLABORATE. IMPACT.



MECHANICAL AND
INDUSTRIAL
ENGINEERING
DEPARTMENT

Newsletter editor: Dr. Sumith Yesudasan



ADVANCING
KNOWLEDGE



EMPOWERING
STUDENTS



DRIVING
INNOVATION



BUILDING A
BETTER FUTURE

Engineering Solutions. Transforming Lives.

ACADEMIC YEAR 2025-2026

NEWSLETTER

MECHANICAL AND INDUSTRIAL ENGINEERING DEPARTMENT



A MESSAGE FROM THE CHAIR

It is my pleasure to welcome you to the Spring 2026 issue of the MIE Newsletter. This has been a remarkable year for our department, and these pages capture only a fraction of the energy, creativity, and dedication our students and faculty bring to their work every day.

This issue's centerpiece is our Capstone Design Expo, where our seniors presented industry-sponsored projects spanning mechanical and industrial engineering. From a polymer rod-end bearing developed with RBC Bearings to a fast active vibration actuator refined with Sikorsky, our students tackled real industry challenges with rigor, ingenuity, and professionalism. These outcomes are a direct reflection of the mentorship our faculty provide and the strength of our industry partnerships. These relationships give our students a genuine bridge from the classroom to the profession.

None of this happens in isolation. I want to thank our instructors, faculty, industry partners, advisory board members and staff for the time and expertise they invest in our students. Their commitment is what makes hands-on learning and real-world problem-solving central to an MIE education.

As you page through this newsletter, I hope you share my pride in what our students and faculty have accomplished this year, and my excitement for what lies ahead as our department continues to grow.

Best wishes,

Ganesh Balasubramanian

Ganesh Balasubramanian, PhD

Chair, Mechanical and Industrial Engineering Department



ENGINEERING SOLUTIONS. BUILDING TOMORROW.

INNOVATE • COLLABORATE • LEAD • IMPACT



University of New Haven Professor Elected to Prestigious Academy

**Ganesh Balasubramanian, Ph.D.,
honored by the Connecticut Academy
of Science and Engineering**



May 4, 2026



By Caitlin Truesdale,
Office of Marketing and Communications

Ganesh Balasubramanian, Ph.D., has been elected to the Connecticut Academy of Science and Engineering (CASE) in recognition of his outstanding contributions to materials science and engineering. The honor highlights the growing research impact of the University of New Haven and its faculty.



Ganesh Balasubramanian, Ph.D.



RECOGNITION AND IMPACT



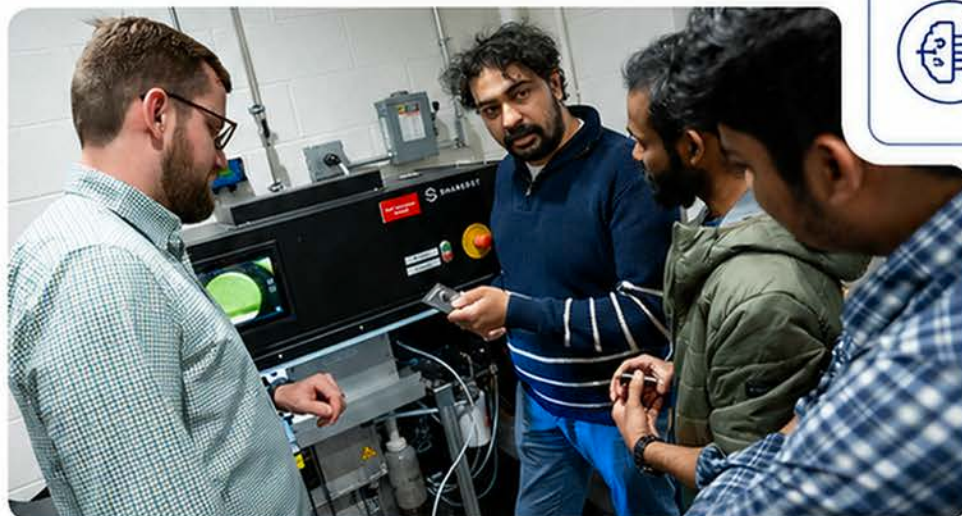
CASE is a highly selective academy that provides scientific and technical guidance to Connecticut.



His research focuses on high-entropy materials with applications in aerospace, medical implants, and clean-energy technologies.



His research uses advanced computational and AI-enabled approaches to accelerate material discovery and additive manufacturing.



Ganesh Balasubramanian, Ph.D., working with students in the lab.

“

Dr. Ganesh Balasubramanian's election to the Academy reflects both the depth of his scholarship and the real-world impact of his work.”

– Amy Howell, Ph.D.
Professor of Chemistry,
University of Connecticut

President of CASE and
Professor in Residence of
Engineering,
University of Connecticut

“

“Being elected to CASE is deeply meaningful to me, both personally and professionally.”

– Ganesh Balasubramanian, Ph.D.



A LEADER. AN INNOVATOR. AN ASSET TO CONNECTICUT.
Advancing Science. Informing Policy.
Inspiring the Next Generation.



CONNECTICUT
ACADEMY OF
SCIENCE AND
ENGINEERING

EPIIC GRANT UPDATE

BUILDING INNOVATION CAPACITY



ADVANCING PARTNERSHIPS. DRIVING INNOVATION. STRENGTHENING CONNECTICUT.

The University of New Haven has been awarded a three-year, \$400,000 grant from the National Science Foundation's Enabling Partnerships to Increase Innovation Capacity (EPIIC) program.



ENABLING PARTNERSHIPS
TO INCREASE INNOVATION
CAPACITY



Leading the EPIIC initiative at the University of New Haven

(from left to right) Chris Standish, Ron Harichandran, Ph.D., P.E., F.ASCE, and Ganesh Balasubramanian, Ph.D.

The University of New Haven, with its internationally recognized faculty researchers, is well on the way to becoming a strong research institution. Through this NSF EPIIC grant, we will build meaningful connections between faculty and industry, strengthen technology transfer, and accelerate innovation across Connecticut.

KEY HIGHLIGHTS



FACULTY-INDUSTRY CONNECTIONS

Introduce faculty in emerging technology areas to stakeholders in industry, universities, and community organizations.



FELLOWSHIP SUPPORT

Faculty will be incentivized to sustain and grow these partnerships through fellowships.



TECHNOLOGY TRANSFER AND COMMERCIALIZATION

Develop infrastructure and tools to move research from the lab to real-world impact.



STRONGER COLLABORATION, NEW OPPORTUNITIES

Build capacity for innovation, applied research, and future revenue streams.

ALIGNED WITH OUR FUTURE



This initiative aligns with the planned 130,000-square-foot **Center for Innovation and Applied Technology** — a dynamic space that will bring together companies, faculty, and students for groundbreaking collaboration and innovation.

PART OF A NATIONAL COHORT

The University of New Haven is one of five institutions in this cohort, each receiving \$400,000 over three years to advance innovation and research.



University of New Haven



Bradley University



Pennsylvania State University – Harrisburg



Widener University



Wilkes University



CONNECTICUT:
GET READY FOR AN EPIIC ECONOMIC BOOST.





University of
New Haven

MECHANICAL AND
INDUSTRIAL ENGINEERING
DEPARTMENT

BSME

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

DESIGN | ANALYZE | INNOVATE | IMPACT

*Preparing tomorrow's engineers with a strong foundation
in core principles, hands-on learning, and real-world
problem solving.*



SOLID FOUNDATION

Strong core courses
in math, science,
and engineering



HANDS-ON EXPERIENCE

Modern labs, design
projects, and advanced
manufacturing



TEAMWORK & LEADERSHIP

Collaborate, engineer
solutions, and lead
with confidence



GLOBAL PERSPECTIVE

Prepare for diverse
careers and a world
of opportunities

**BUILDING SOLUTIONS.
SHAPING THE FUTURE.**



GO CHARGERS!

CAPSTONE DESIGN EXPO

The 2026 Capstone Design Expo brought together nearly 120 senior students, who presented 29 innovative projects through poster sessions and pitch presentations. The event showcased the creativity, technical expertise, teamwork, and professionalism of students across the engineering disciplines. The top award-winning projects are highlighted below.



Polymer Rod-End Bearing (Mechanical Engineering) Sponsored by RBC Bearings

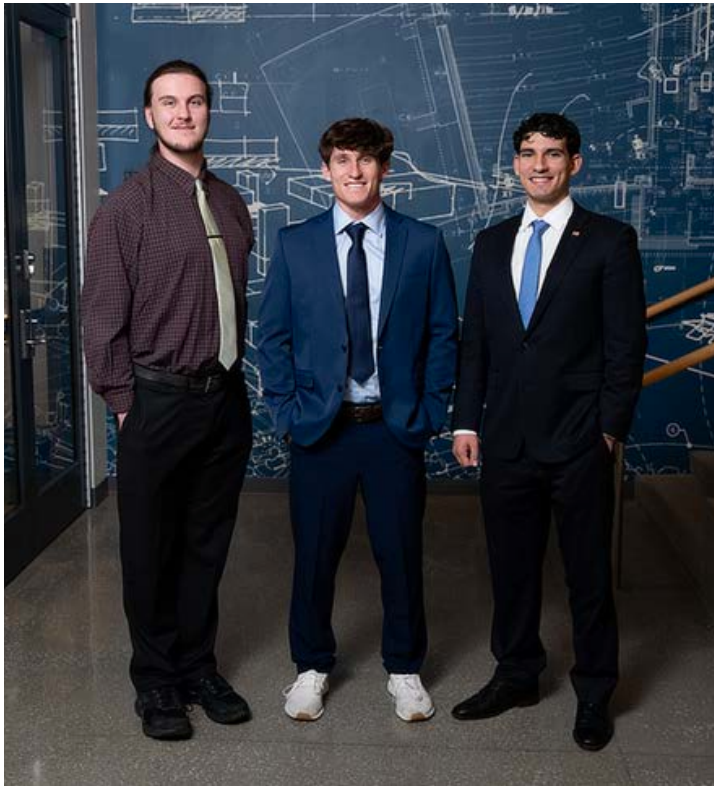
Team Members: Zachary Freedman and George Hallas
Faculty Advisor: Dr. Ismail Orabi

Industry Advisors: Alper Arslan, Mechanical Design Engineer, and Derek Favret, Engineer Recruitment and Development, RBC Bearings

RBC Bearings is a designer and manufacturer of highly engineered precision bearing components and essential systems for the industrial, aerospace, and defense industries.

The team designed a polymer rod-end bearing intended to reduce weight and improve corrosion resistance compared with conventional metal alternatives. The design was required to remain compact, economical, and easy to manufacture while withstanding outdoor conditions, including freezing temperatures, ultraviolet exposure, dust, and moisture.

CAPSTONE DESIGN EXPO



Fast Active Vibration Actuator (Mechanical Engineering)

Sponsored by Sikorsky, a Lockheed Martin Company

Team Members: Kenneth McGovern, Daniel Folloni, and Michael Dos Santos

Faculty Advisor: Dr. Ismail Orabi

Industry Advisors: William Welsh, Senior Technical Fellow; Joe Nicholas, Loads and Criteria Engineer; and Dave Tabak, Senior Nondestructive Test Engineer, Sikorsky/Lockheed Martin

Sikorsky, a Lockheed Martin Company, is a global leader in supporting critical missions, strengthening security, and advancing scientific and technological discovery. The team enhanced a fast active vibration actuator to meet sponsor-defined targets for rig weight, response time, resonance frequency, and actuator force output. The system uses accelerometer and Hall-effect sensor feedback to generate adaptive counter-vibration signals and maintain stable closed-loop control.

We extend our sincere appreciation to the Capstone instructors, faculty advisors, industry advisors, sponsors, community partners, and Dr. Orabi for their exceptional support, guidance, and coordination. Their contributions were instrumental in the success of the Expo and continue to make hands-on learning, industry engagement, and real-world problem-solving central to our students' educational experience.

GaitGuard Wins Third Place at Yale YHack

University of New Haven mechanical engineering student Sam Rosen collaborated with Cornell student developers to create an award-winning wearable physical therapy tool.



At Yale University's 12th annual YHack, GaitGuard earned **third place overall**, second in a separate category, and **\$2,000 in prizes** after being developed in just 24 hours.



3rd
PLACE
OVERALL



\$2,000
IN PRIZES



200+
TEAMS
COMPETED



24
BUILT IN
HOURS

TEAM

The team included Cornell students Arsh Singh '28, Paul Trusov '29, and Jimmy Mulosmani '29, alongside Sam Rosen, a mechanical engineering student at the University of New Haven.



WHAT GAITGUARD DOES



Wearable rehab system for physical therapy

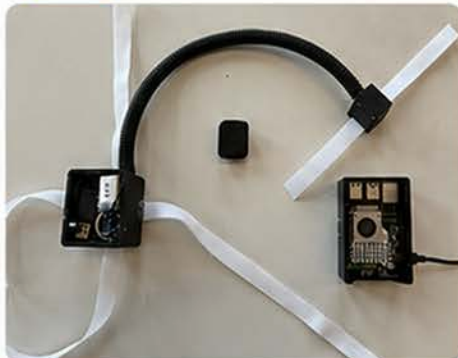


Builds a personalized digital twin of correct movement



Gives real-time haptic feedback when movement is off

HARDWARE / HOW IT WORKS



Three wearable sensor units



ESP32, IMUs, Raspberry Pi processing



Custom 3D-printed enclosures



Real-time motion analysis and feedback

WHY IT MATTERS



Inspired by real rehab-center experience, GaitGuard helps patients continue exercises at home while still receiving immediate corrective feedback.

WHAT'S NEXT



Clinical validation with therapists



More on-device intelligence



Expanded support for additional rehab exercises





University of
New Haven

MECHANICAL AND
INDUSTRIAL ENGINEERING
DEPARTMENT

LEARN.
CONNECT.
LEAD.

STUDENT CLUBS

BUILDING COMMUNITY.
INSPIRING EXCELLENCE.

Our student clubs provide opportunities to explore interests, apply knowledge, develop leadership skills, and make a lasting impact—on campus and beyond.



WHY GET INVOLVED?



BUILD COMMUNITY

Connect with peers who share your passion for engineering.



GAIN EXPERIENCE

Work on real projects that enhance your skills and resume.



COMPETE & ACHIEVE

Participate in regional and national competitions and showcase your talent.



LEAD & GROW

Take on leadership roles and develop skills that last a lifetime.



MAKE AN IMPACT

Serve the community and contribute to a better world.

EXPLORE.
ENGAGE.
ENGINEER.

From technical societies to outreach initiatives, our clubs welcome all students—freshmen to graduate—to get involved, collaborate, and thrive.



TECHNICAL
SOCIETIES



DESIGN &
COMPETITIONS



OUTREACH &
SERVICE



RACING &
AUTOMOTIVE



CULTURE &
GLOBAL

GET INVOLVED. FIND YOUR PASSION. **SHAPE YOUR FUTURE.**



TOGETHER,
WE INNOVATE.
WE INSPIRE.
WE ENGINEER SOLUTIONS.



BE A PART OF
SOMETHING BIGGER.

GO CHARGERS!





Small But Mighty Mars Rover Team Excels on International Stage

University of New Haven students advanced to the international finals of the University Rover Challenge and delivered an impressive finish against teams from around the world.



OVERVIEW

Out of 116 teams representing 28 countries that initially entered the competition, the University of New Haven Mars Rover Team advanced to the international finals and placed 20th among the 38 teams worldwide that qualified.

The team outperformed teams from Harvard, Yale, Penn, and UC Berkeley, among others much larger in size.

The competition is organized by The Mars Society and held at the Mars Desert Research Station in Hanksville, Utah.



RESULTS & KEY ACHIEVEMENTS



20th
OVERALL



11th
IN SCIENCE
MISSION



92/100
SCIENCE MISSION
SCORE



38
TEAMS
FINALISTS



116
TEAMS FROM
28 COUNTRIES



TEAM MEMBERS



Samuel Rosen, BSME '27
Awwal Lawal, BSME '27
Christian Pereira, BSME '26



The team of five worked throughout the academic year designing the rover's mechanical, electrical, software, communications, and science subsystems, followed by stress testing, integration, troubleshooting, and trials.



The University of New Haven Mars Rover Team proudly competed in the 2026 International University Rover Challenge.



DETERMINATION. INGENUITY. IMPACT.

This was a small but resilient team competing against much larger teams, some with hundreds of students and dedicated sponsors. The competition included four missions: Science Mission, Autonomous Navigation, Equipment Servicing, and Extreme Delivery.

Against a field of top universities from around the world, our students represented the University with determination and integrity.



"Watching the rover successfully operate in the Utah desert after a full year of work was an incredibly rewarding experience."

— Samuel Rosen



"We overcame challenges throughout the process and represented our University well."

— Awwal Lawal

IISE UNH STUDENT CHAPTER AI, PROFESSIONAL GROWTH, AND COMMUNITY



Reflecting on impactful events that empowered students, built connections, and inspired growth.



FALL 2025 NEWSLETTER



1 Received Gold Award



The IISE University of New Haven Student Chapter is proud to announce that it has been awarded the 2025 GOLD Award through the national IISE Chapter Recognition Program. This distinction honors the chapter's outstanding performance, sustained engagement, and year-long commitment to excellence.

We extend our sincere appreciation to the previous leadership team for their dedication and service, and to our Faculty Advisor, Dr. Marzieh Soltanolkottabi, for her continued guidance and support. This achievement reflects the collective effort of our entire chapter and celebrates the high standard of excellence we strive to uphold.



2 IISE Annual Conference & Expo 2025



ANNUAL
CONFERENCE & EXPO 2025

May 31 – June 3, 2025

Renaissance Atlanta Waverly Hotel &
Convention Center
Cobb Galleria Centre | Atlanta, Georgia

#IISEAnnual2025

Our university featured two presentations at the IISE Annual Conference in May 2025:

- Dr. Nadiye Erdil co-led the “Engineering Unleashed” workshop. This collaborative session provided participants with practical tools to drive innovation and organizational value.
- Dr. Marzieh Soltanolkottabi presented her paper on optimizing referral strategies for lung cancer diagnosis. Co-authored with F. Ghalenoei and H.A. Khorshidi, the research used data-driven optimization to improve diagnostic pathways.



3 Industrial & Systems Engineering Day



Industrial Engineering was recently ranked as the top engineering field in the United States by U.S. News. To celebrate this achievement, IISE established September 15th as the inaugural Industrial & Systems Engineering (ISE) Day.

We were honored to host our own celebration at the University of New Haven. Dr. Marzieh Soltanolkottabi and Dr. Narjes Sadeghiamirshahidi spoke about how IE skills drive system-level efficiency and highlighted the immense value industrial and systems engineers bring to organizations. Sponsored by Jaya's Kitchen, the event fostered student connection and left the community feeling inspired about the future of the profession.



4 Lean Six Sigma Green Belt Certificate



From November 7-9, the IISE Student Chapter at the University of New Haven, in collaboration with the Institute of Industrial and Systems Engineers, hosted a transformative Six Sigma Green Belt Certification event. Over three days, attendees gained valuable skills to drive process improvement, enhance operational efficiency, and make a lasting impact in their professional fields.

A heartfelt thank you to Dr. Brian Galli for leading these insightful and interactive sessions, and to all participants for their enthusiasm and dedication.



THANK YOU | TO OUR MEMBERS, SPEAKERS, AND SUPPORTERS | **YOU MAKE IISE UNH STRONGER!**

IISE UNH STUDENT CHAPTER AI, PROFESSIONAL GROWTH, AND COMMUNITY

Reflecting on impactful events that empowered students, built connections, and inspired growth.



 **SPRING 2026 NEWSLETTER**



HUMAN + AI: The Future of Decision Making in Engineering Systems



Our panelists, **Dr. Marzieh Soltanolkottabi**, **Dr. Vahid Behzadan**, and **Dr. Shivanjali Khare**, shared valuable insights during the IISE UNH Student Chapter's "Human + AI" panel discussion, hosted in celebration of Engineering Week.



The discussion focused on how artificial intelligence is transforming the way engineers work, solve problems, and make decisions. A key takeaway was that the value of engineers is no longer limited to solving problems, but also includes using professional judgment to know when AI is accurate and when human expertise is needed.



The event emphasized that even as technology continues to advance, the human element remains essential in engineering decision-making. We thank everyone who attended and helped make this event one of the highlights of the semester.



AI Tools Bootcamp: From Zero to Useful

The IISE UNH Student Chapter hosted "AI Tools Bootcamp: From Zero to Useful," an interactive event focused on helping students understand how AI tools can support academic success and professional growth.

During the session, participants explored nine different AI tools, compared their strengths, and discussed how these tools can be used for learning, productivity, research, communication, and career development. The event encouraged students to think practically and responsibly about how emerging technologies can improve daily academic and professional tasks.

The discussion was highly engaging, with students sharing their own experiences, ideas, and perspectives on the benefits of using AI. A big thank you to everyone who attended and contributed to making the session meaningful and valuable.

EXPLORED. COMPARED. EMPOWERED.



ChatGPT
Ideas & Writing



Gemini
Research & Summaries



Perplexity
Information & Discovery



Claude
Analysis & Writing



Copilot
Productivity & Assistance



Notion AI
Organization & Notes



Elicit
Research Assistant



QuillBot
Paraphrasing & Refinement



Canva AI
Design & Presentations



Empowering students to work smarter, learn better, and grow further.



Networking Event



The IISE UNH Student Chapter concluded an incredible 2025–2026 academic year with a memorable Networking Event. Students came together to reflect on the year's highlights, celebrate key milestones, build connections, and enjoy an engaging Myth Buster Challenge.



A special thank you to Dr. Emre Tokgoz for his inspiring industry expert session, where he shared practical career advice, insights from his Ph.D. journey, and valuable real-world industrial experiences.



We also sincerely thank Dr. Marzieh Soltanolkottabi, our faculty coordinator, for her continuous guidance and support throughout the year.



As the chapter comes to a close, we are proud of the learning, leadership, connections, and memories built together. Here's to an even brighter future!



University of
New Haven

**MECHANICAL AND
INDUSTRIAL ENGINEERING
DEPARTMENT**

MSME

MASTER OF SCIENCE IN MECHANICAL ENGINEERING

ADVANCE | SPECIALIZE | INNOVATE | TRANSFORM

An advanced graduate program that empowers engineers to solve complex challenges, drive innovation, and make an impact in a technology-driven world.



ADVANCED KNOWLEDGE

Deepen your expertise in core areas and emerging technologies.



RESEARCH & INNOVATION

Engage in cutting-edge research and develop solutions that matter.



CAREER GROWTH

Build the skills and credentials to excel in your career.



GLOBAL IMPACT

Collaborate across disciplines to address real-world challenges.

**ENGINEER SOLUTIONS.
LEAD THE FUTURE.**



GO CHARGERS!

MS in Mechanical Engineering Program Highlights



Student achievement, research dissemination, and graduate pathways



Coordinated by **Dr. Cheryl Q. Li**



Fall 2025 – Spring 2026

1 Intern – Summer 2026



Hirpara, Aryan Rameshbhai

Summer 2026, Applied Materials,
Santa Clara, CA



Sonara, Shubham Jitendrabhai

Summer 2026, Bevin Bros. Mfg. Co., CT



2 Publication / Conference Presentation

Fall 2025 – Spring 2026



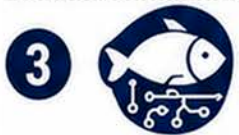
Control of dual robotic arms via marker-less hand tracking,

K. Matheswaran, C. Q. Li, ASME 2025 International Design Engineering
Technical Conferences & Computers and Information in Engineering
Conference (IDETC/CIE2025).



Investigating multimodal non-contact assistive devices using a robotic cat head prototype,

Bhaskar Seelu, Sai Ratna Venkat Akhilaswar Vuppala, Keerthivaasan Matheswaran,
Cheryl Q. Li, ASME 2025 International Design Engineering Technical Conferences &
Computers and Information in Engineering Conference (IDETC/CIE2025).



A robotic fish processing line enhanced by machine learning,

S. Mainali, C. Li, *Aquacultural Engineering* 108, 102481.



Jatin Kumar has made strong progress in his thesis research on the anisotropic
micro-milling behavior of additively manufactured SS316L, successfully completed
his thesis defense, and prepared a first-author journal manuscript now in final preparation.

3 PhD Study, Fall 2025



**Mohammed,
Mamshad Musharaf**
University of Louisville



**Hasan,
Dewan Wardy**
Iowa State University



**Matheswaran,
Keerthivaasan**
University of Connecticut



Teaching & Research Activities

Advanced Manufacturing Highlights, 2025–2026



1 TEACHING ACTIVITIES

FA 2025 – MECH 3351 Modern Manufacturing

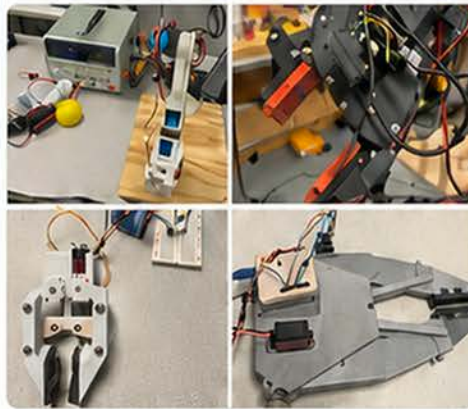


Students in MECH 3351 visited CCAT, the Connecticut Center for Advanced Technology, during Fall 2025. The field trip exposed students to advanced manufacturing processes including DED, SLM, and hybrid manufacturing.

The course is also being revised with Professor Nadiye Erdil to integrate model-based design concepts.

Professor Erdil served as a CCAT Faculty Fellow during 2024–2025.

SP 2026 – MECH 3340 Integrated Design for Manufacturing



A KEEN Learning Module, *Learning from Failure*, was introduced in Spring 2026. Students used an iterative design process to evaluate their initial robot gripper concepts and develop improved second designs.

SP 2026 – MECH 3353 Advanced Machining



MECH 3353 Advanced Machining is a newly launched course supporting the Advanced Manufacturing concentration. A desktop CNC machine was introduced to make CNC coding and hands-on machining practice safer and more accessible.



2 RESEARCH ACTIVITIES

Collaboration Research

Collaborative research has continued with the University of Wisconsin–Madison, the University of Cincinnati, Korea Aerospace University, Shinhan Diamond Company, and Yale University, with collaboration from **Dr. Suk Bum Kwon (University of New Haven)**.

Research areas include ultra-precision machining, milling, and semiconductor wafer processing. This work has led to continued presentations, including an invited keynote at the international PRESM conference.

UNH Research

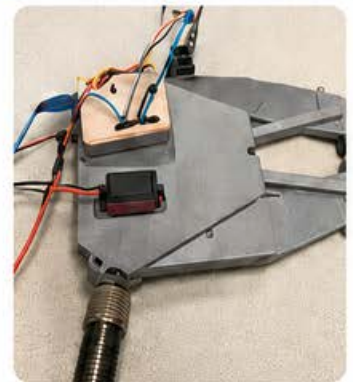
At the University of New Haven, research on the post-processing machining behavior of 3D-printed metal samples is being actively conducted with support from Makerspace Director Walker Fuchs and Associate Lab Supervisor John Kelley.

The work uses the DMLS metal 3D printer installed in November 2025 and the 2.5 μm -resolution CNC machine in the machine shop.



Post-Processing Machining Behavior with Jatin Kumar, Zach Freedman, Kenneth McGovern, and George Hallas

- Addresses surface-integrity challenges in metal 3D printing for micro-scale components.
- Yale facilities supported metrology and microstructural characterization.
- Journal manuscript is in final preparation.
- Future work will integrate vibration and force sensors with AI-based models.



Wettability with Jaimin Bhoi and Samuel Rosen

- Explores wettability control using 3D printing and machined micro-scale structures.
- Supported by a CT NASA grant from June 2026 to June 2027.



3D-Printing Database Supported by a summer research grant and research support.

- Builds a database linking 3D-printing process conditions with crystallographic and microstructural data.
- Enables future data-driven and AI-enabled manufacturing research.



In collaboration with: Dr. Suk Bum Kwon (University of New Haven)



Advanced Manufacturing Activities

Industry engagement, grant support, and scholarly output

1 ADVANCED MANUFACTURING ACTIVITIES



EPIIC

Building on expertise in ultra-precision machining, participation in EPIIC activities is helping explore collaboration opportunities with external organizations and industry partners for UPM pilot research.



Additive Manufacturing Competition at RAPID + TCT Conference in Boston

Three undergraduate students—Zach Freedman, Kenn McGovern, and George Hallas—participated in the third Metal 3D Printing Competition organized by America Makes, the first Manufacturing USA institute established by the U.S. Department of Defense. With support from Dr. Adak and Makerspace Director Walker Fuchs, and in collaboration with **Dr. Suk Bum Kwon (University of New Haven)**, the students designed a daily-use tool using metal 3D printing while meeting the given design requirements. With collaboration and support from the University of Texas at El Paso, the students successfully printed their design and participated in the additive manufacturing competition at the RAPID + TCT Conference in Boston.



(a)



(b)



(c)



(d)

Figure. (a)-(b) captures the final build orientation and support design in the software before printing, and (c)-(d) the final product after printing (capture provided by UTEP).



In collaboration with: Dr. Suk Bum Kwon (University of New Haven)

2 GRANT SUPPORT



EPIC Beneficiary

As one of the first beneficiary faculty members of the EPIC proposal, I have been involved in activities that support faculty engagement with external organizations and industry partners.



KEEN Beneficiary

The Learning from Failure module was incorporated into MECH 3340 Integrated Design for Manufacturing with support from KEEN. This activity helped students engage more actively in failure analysis, design modification, and continuous improvement.



Summer Research Grant and Research Grant

Supports the development of a 3D-printed metal database linking process parameters and resulting material properties, providing high-quality foundational data for future research and data-driven AI applications in additive manufacturing.



CT NASA Grant

Supports research on wettability control through hybrid manufacturing. This project combines 3D printing and machining to control liquid-solid contact mechanisms at the micro scale and modify surface wetting characteristics.

3 PUBLICATIONS AND CONFERENCE PRESENTATIONS



Conference Presentation [1]

Dae Nyoung Kim, Suk Bum Kwon, and Sangkee Min, "Anisotropic Material Behavior Considering Crack Generation Mechanism in Yttria-Stabilized Zirconia," KSPE (Korean Society for Precision Engineering) Fall Conference, 2025.



Conference Presentation [2]

Dae Nyoung Kim, Suk Bum Kwon, and Sangkee Min, "AI-Driven Prediction of Critical Depth of Cut in Single-Crystal Sapphire Ultra-Precision Machining," invited keynote presentation, PRESM 2026: International Conference on Precision Engineering and Sustainable Manufacturing, Singapore, June 28-July 3, 2026.



Conference Presentation [3]

Kawshik Selvaraj, Suk Bum Kwon, and Sangkee Min, "Deep Learning-Based Anomaly Detection for Electroplated Layer Thickness Evaluation Using Modulated Photothermal Radiometry," KSPE (Korean Society for Precision Engineering) Spring Conference, 2026.



Journal Publication

Dae Nyoung Kim, Suk Bum Kwon, and Sangkee Min, "AI-driven prediction of critical depth of cut in ultra-precision machining of single crystal sapphire," *The International Journal of Advanced Manufacturing Technology*, 2026.
doi:10.1007/s00170-026-18348-3

COMPUTATIONAL FLUID DYNAMICS

MECH 4421 Student Project Highlights • Taught by Dr. Sumith Yesudasan

Mechanical and Industrial Engineering Department • Academic Year 2025–2026

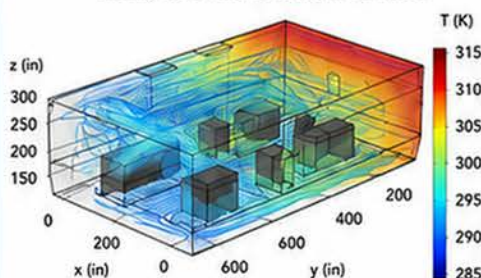


Students applied CFD, heat transfer, and COMSOL Multiphysics to real-world problems in buildings, electronics cooling, and thermal systems. The selected projects below highlight modeling, meshing, boundary conditions, simulation, and engineering interpretation.

1 Maritime Vessel Engine Room Cooling Optimization

Team 08

Timothy Silva, Matt Fermo, Jakub Czachor

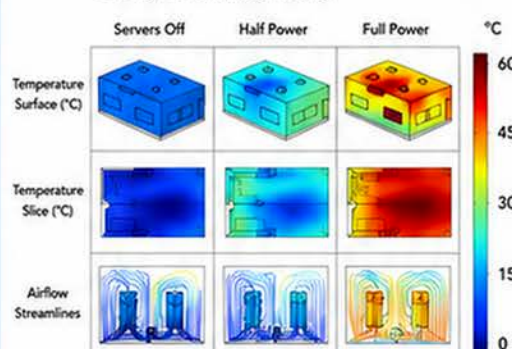


This project studied airflow and temperature inside a marine engine room with major heat sources such as engines and generators. The team investigated how changing airflow direction and encouraging cross-flow could reduce hot spots near critical equipment and improve cooling performance without major hardware changes.

2 Ventilated Server Room Under Variable Operating Conditions

Team 04

Beverly O. Ukoha, Ryan Barry

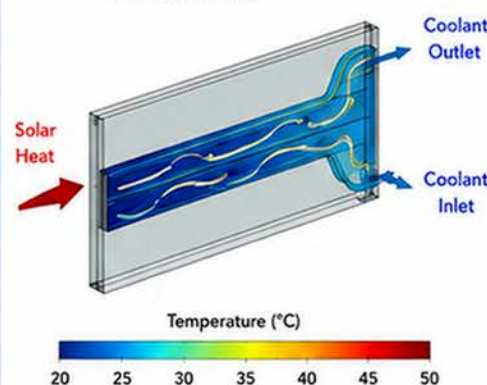


This project modeled a data-center-style server room under different server loads, from idle to full power. The simulations showed how stronger internal heat generation creates hotter regions and changes airflow patterns, helping illustrate the cooling demands of modern computing spaces.

3 Heat Gain Mitigation Through Liquid-Cooled Windows

Team 03

Oluwasegun Ashley

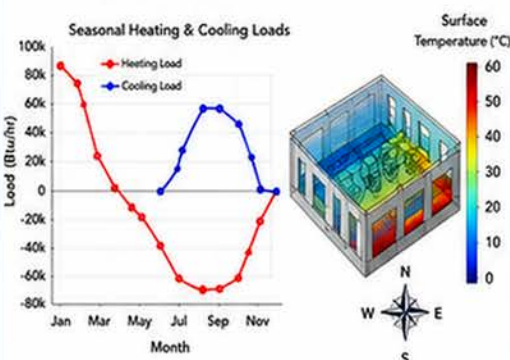


This project explored a water-cooled window concept for reducing solar heat gain in buildings. The CFD model tracked heat transfer and fluid motion in the cooling cavity and showed that active circulation can lower peak window temperatures and improve thermal performance.

4 Seasonal Thermal Load Analysis of the UNH Rec Center Upper Fitness Room

Team 02

Michel P. Louissaint

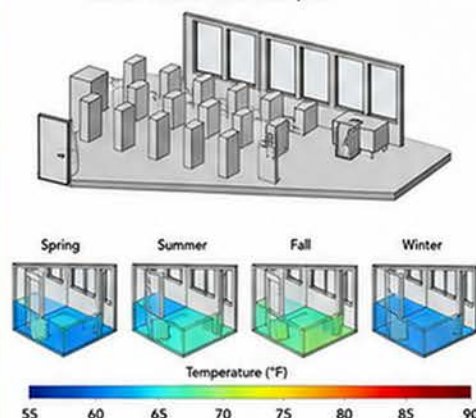


This project examined how seasonal conditions and window shading affect heating and cooling demand in a highly glazed fitness space. The results demonstrated that summer creates the greatest cooling demand, while winter requires significant heating, offering insight into energy-efficient building operation.

5 Seasonal Cost Analysis of Indoor Comfort in a Large Windowed Space

Team 06

Markus Schuele, Jack Thompson

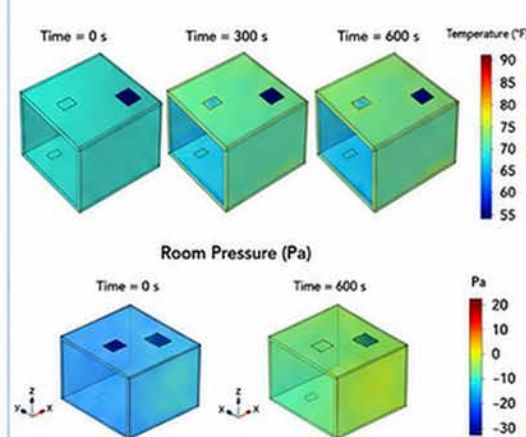


This project analyzed how seasonal outdoor temperatures affect thermal comfort and energy cost in a large-window classroom, modeled after Kaplan Building Room 101 at the University of New Haven. By simulating heat transfer, airflow, and internal heat sources across spring, summer, fall, and winter, the team estimated comfort trends and the energy needed to maintain indoor conditions.

6 Thermal Impact of Windows on an Unoccupied Room

Team 05

Sara Connelly, Alexis Fernandez



This project examined how window condition influences the thermal response of an air-conditioned but unoccupied room. The simulations compared different window scenarios and showed how window integrity can affect temperature distribution, airflow behavior, and cooling effectiveness.



FACULTY RESEARCH HIGHLIGHTS

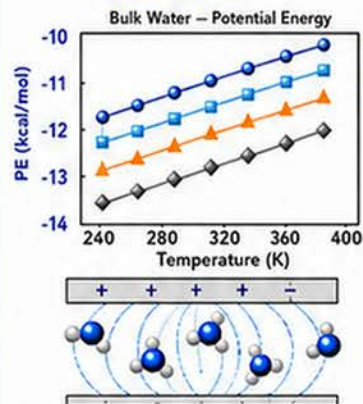
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1 Water Evaporation under Electric Fields

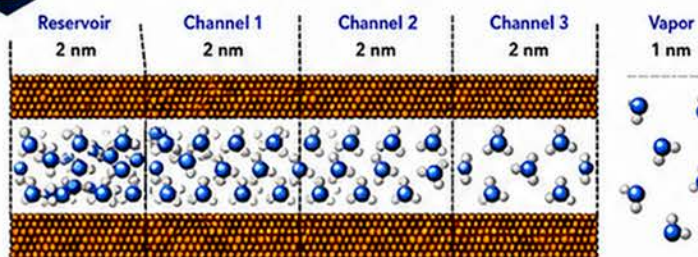
A collaborative research study by Dr. Sumith Yesudasan (UNH) and Dr. Diana-Andra Borca-Tasciuc (Rensselaer Polytechnic Institute, RPI).



We used molecular dynamics simulations to see how electric fields change the energy required for water to evaporate in bulk water and at liquid–vapor interfaces. The results show that electric fields can noticeably change how water behaves at the interface, which is important for technologies involving thermal systems, energy harvesting, and electro-fluidic devices.

Journal of Heat and Mass Transfer (Paper No: HT-26-1028), 2026.
DOI: 10.1115/1.4072133.

2 Evaporation in Confined Nanochannels



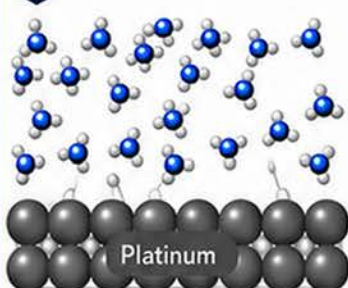
We simulated water inside tiny copper nanochannels to understand how evaporation starts and develops over time. The study reveals phase changes in nanoscale cooling systems and offers insights helpful for designing more efficient micro-thermal devices, heat spreaders, and electronic cooling solutions.

This study was led by Dr. Sumith Yesudasan and involved graduate and undergraduate students of the University of New Haven.

Journal of Nuclear Engineering, 6(4), 43.

DOI: 10.3390/jne6040043

3 Do Simulation Settings Really Matter?



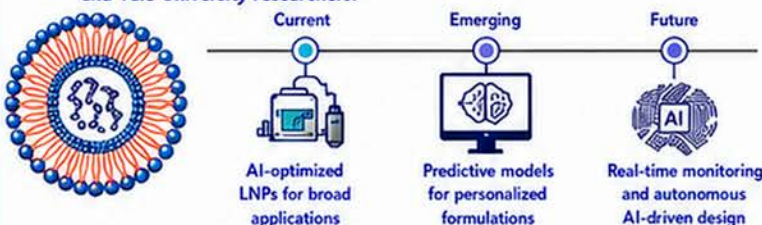
This study tested how different simulation choices—such as temperature control methods and interaction models—affect the predicted behavior of water at interfaces. It provides practical guidance for reliable results without unnecessary complexity, saving time and computational cost.

Frontiers in Mechanical Engineering, 11.
(Dr. Sumith Yesudasan is the sole author.)

DOI: 10.3389/fmech.2025.1690974

4 AI for Lipid Nanoparticle Design

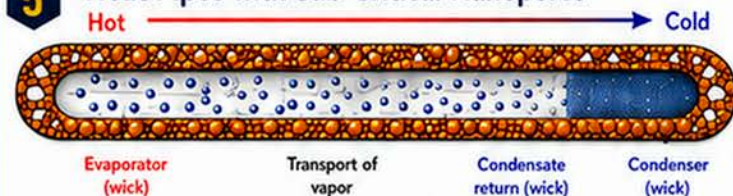
A collaborative study by Dr. Sumith Yesudasan (UNH), Dr. Kagya Amoako (Biomedical Engineering, UNH), and Yale University researchers.



We reviewed how artificial intelligence can accelerate the design of lipid nanoparticles used to deliver genetic medicines. The paper explains how AI-driven models can predict performance, streamline formulation design, and support the next generation of targeted therapies.

Frontiers in Medical Technology, 7, 1591119.

5 Heat Pipes with Sub-Critical Nanopores



This research explores how water evaporates and moves in heat pipes that contain very small nanopores. It helps us understand how pore size, water filling, and temperature affect heat transfer in extreme miniaturized systems such as compact electronic cooling and space applications.

Molecular Physics. DOI: 10.1080/00268976.2025.2427975
(Dr. Sumith Yesudasan is the sole author.)

ACCESS PROJECT AWARD

ACCESS project for Dr. Sumith Yesudasan's MELT Lab: "Coarse-Grained Molecular Dynamics of Fibrinogen Activation and Early Protofibril Assembly"
Project ID: CHE260048

Start Date: April 18, 2026

End Date: April 17, 2027

Award: 750,000 ACCESS Credits

These high-performance computing resources enable large-scale molecular dynamics simulations and related workflows in MELT Lab.

ASME SUMMER HEAT TRANSFER CONFERENCE

ASME SHTC 2026
Bellevue, WA

July 26–30, 2026

Dr. Sumith Yesudasan is serving as Co-Chair for K8-03: AI Workforce Panel.

Dr. Sumith Yesudasan is serving as Session Chair for technical presentations.

Engaging with global experts and showcasing our department's leadership in heat transfer and thermal sciences.

JOURNAL PUBLICATIONS

- Sumith Yesudasan, Diana-Andra Borca-Tasciuc, Molecular Dynamics Study Comparing the Enthalpy of Vaporization of Water under Electric Fields in Bulk and Interfacial Systems, Journal of Heat and Mass Transfer (Paper No: HT-26-1028), 2026. DOI: 10.1115/1.4072133.
- Sumith Yesudasan, Mohammed Mamshad, Joseph Marcello, Mark Taylor, Evaporation Behavior of Water in Confined Nanochannels Using Molecular Dynamics Simulation, Journal of Nuclear Engineering, 6(4), 43. DOI: 10.3390/jne6040043.
- Sumith Yesudasan, Thermostating Strategies and Interaction Potentials in Interfacial Water Simulations: Are They Really Needed?, Frontiers in Mechanical Engineering, 11. DOI: 10.3389/fmech.2025.1690974.
- Amir Mokhammad et al., Enhancing Nucleic Acid Delivery via Lipid Nanoparticles: Integrating Artificial Intelligence for Predictive Modeling in Formulation Design, Frontiers in Medical Technology, 7, 1591119.
- Sumith Yesudasan, Evaporation Characteristics of Heat Pipes with Sub-Critical Nanopores, Molecular Physics. DOI: 10.1080/00268976.2025.2427975.



University of
New Haven

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to support innovation, safety, and
excellence in teaching and research.



ASME STUDENT CHAPTER ACTIVITIES

The American Society of Mechanical Engineers (ASME), along with Make:space Coordinator Wake Forest, toured the Trumpf Lasers manufacturing facility to explore some of the world's most advanced metal cutting technologies.

The visit provided an up-close look at state-of-the-art laser manufacturing systems and the innovative processes shaping the future of precision metal fabrication.



BUILDING
CONNECTIONS
with industry leaders



EXPLORING
INNOVATION
through cutting-edge
technologies



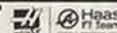
INSPIRING
THE FUTURE
of mechanical
engineering



PROFESSIONAL TRAINING ACTIVITIES PURSUED IN 2025-2026 AY

- | | | | |
|---|--|---|-------------------|
| 1 | | CT State Community College – Housatonic
CNC Level 2 | 1/25 – 5/25 |
| 2 | | Mastercam Mill Essentials Training | 3/10/25 – 3/13/25 |
| 3 | | Haas-Certified Basic Mill Operator Course
Completed April 23, 2025 | 3/25 – 4/25 |
| 4 | | HFO Trident HAAS DemoDay Seminar | 7/23/25 |
| 5 | | CT State Community College – Housatonic
CNC Level 3 | 8/25 – 12/25 |
| 6 | | University of New Haven –
Advanced Machining MECH 3353 (3 credits) | 1/26 – 5/26 |
| 7 | | Mastercam camInstructor 101
To teach ME 1001 – Freshman | 7/26 |
| 8 | | Operating the Boston Dynamics Spot Robot –
Basic Training | 11/17 – 18/26 |

CERTIFICATE OF COMPLETION



THIS CERTIFICATE IS PRESENTED TO:

JOHN KELLEY

HAAS BASIC MILL OPERATOR

PRESENTED ON
APRIL 23, 2025



HAAS FACTORY OUTLET
HFO/HARTFORD-CT

TEST ADMINISTRATOR



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Through continuous learning and hands-on experience,
we build the skills and knowledge that drive
innovation in education, research, and industry.

“

Investing in today's skills
builds the foundation for
tomorrow's innovation.



RESEARCH. INNOVATION. IMPACT.

Celebrating the achievements and contributions of our graduate researchers in 2025–2026.



DR. BASIT AKRAM

PhD DEFENDED



Thesis Title:
**PREDICTIVE COMPOSITE MANUFACTURING:
ADVANCING MATERIAL AND PROCESS DESIGN
USING MACHINE LEARNING**



Defense Date: March 26, 2026



PUBLICATIONS (2025–2026)

- Akram, M. B., Gilarno, C., et al. "Machine learned and explainable prediction of melt pressure and temperature for polypropylene extrusion." *Journal of Intelligent Manufacturing*, 2025. DOI: 10.1007/s10845-025-02647-9
- Bezik, C. T., Akram, M. B., et al. "Predicting ultimate tensile strength of SiC/SiC mini-composites via machine learning." *Ceramics International*, 2025. DOI: 10.1016/j.ceramint.2025.05.091
- Banerjee, T., Akram, M. B., et al. "Predicting binding strength and dissociation kinetics of HIV-1 protease inhibitors Ritonavir, XK-263, and AHA-001 by molecular simulations." *Journal of Molecular Graphics and Modelling*, 2025, 140, 109110. DOI: 10.1016/j.jmgm.2025.109110
- Akram, M. B., Balasubramanian, G. "Advanced Time Series Forecasting for Process Optimization: A Hybrid SARIMA and Machine Learning Approach." *Journal of Process Control*, 2026. DOI: 10.1016/j.jprocont.2026.103698
- Adak, D., Akram, M. B., Roy, S., Balasubramanian, G. "Neural Network Enabled Process Parameter Optimization for Laser Powder Bed Fusion of Inconel 718." *J. Manuf. Mater. Process.*, 2026, 10(7), 219. DOI: 10.3390/jmmp10070219



CONFERENCES & PRESENTATIONS (2025–2026)

- **Poster Presentation** – ASEE-NE Section Conference, 2025 University of Bridgeport, Bridgeport, CT
- **Technical Presentation** – APS March Meeting, 2025 Anaheim, CA
- **Poster Presentation** – AIChE Annual Meeting, 2025 Boston, MA
- **Technical Presentation** – ASME IMECE, 2025 Memphis, TN
- **Poster Presentation** – NSF Student Poster Competition, ASME IMECE, 2025 Memphis, TN



DR. DEBAJYOTI ADAK

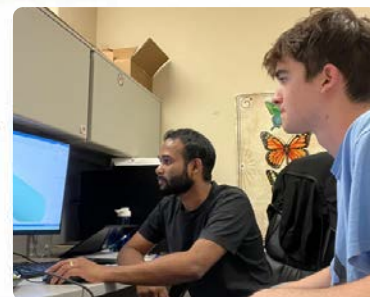
POSTDOCTORAL RESEARCHER



MENTORING EXCELLENCE

Mentored Aidan O'Driscoll, a Masuk High School (Monroe, CT) student, who completed a Capstone Project with the research group of Prof. Ganesh Balasubramanian at the University of New Haven.

- ✓ Worked with ANSYS for mechanical process simulations
- ✓ Built 3D models and analyzed stress & temperature profiles
- ✓ Presented his work and developed a strong understanding of modeling & simulation for engineering analysis
- ✓ Demonstrated dedication, curiosity, and analytical thinking throughout the project



PUBLICATIONS (2025–2026)

- Adak, D., Akram, M. B., Roy, S., & Balasubramanian, G. (2026). Neural Network Enabled Process Parameter Optimization for Laser Powder Bed Fusion of Inconel 718. *Journal of Manufacturing and Materials Processing*, 10(7), 219. <https://doi.org/10.3390/jmmp10070219>
- Adak, D., Roy, S., & Balasubramanian, G. (2025). Process parameter optimization for predictive melt-pool morphology in laser powder bed fusion for Inconel 718. *The International Journal of Advanced Manufacturing Technology*, 139(11), 5527-5543. <https://doi.org/10.1007/s00170-025-16155-w>
- Adak, D., Roy, S., & Balasubramanian, G. (2025). Prediction of Melt Pool Morphology and Defect Formation in Single-Track LPBF of Inconel 718. In: *Proceedings of the 28th National and 6th International ISHMT-ASTFE Heat and Mass Transfer Conference*, December 9-12, 2025, IIT Jodhpur, India. Begel House Inc. DOI: 10.1615/IHMT-2025.1300



PRESENTING ON THE GLOBAL STAGE

Presented research at the 28th National and 6th International ISHMT-ASTFE Heat and Mass Transfer Conference December 9–12, 2025 | IIT Jodhpur, Rajasthan, India



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Through continuous learning, impactful research, and global collaboration, we advance knowledge and shape the future of engineering.



Innovation distinguishes between a leader and a follower.

– Steve Jobs