

# Saeid Bayat

Postdoctoral Research Fellow

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## Education

- 2024–Now **Research Fellow in Naval Architecture and Marine Engineering**, *University of Michigan*, Ann Arbor, USA
- 2019–2024 **Ph.D. in Industrial and Enterprise Systems Engineering**, *University of Illinois at Urbana–Champaign*, Urbana–Champaign, USA
- 2015–2018 **M.Sc. in Mechanical Engineering (Major: Mechatronics)**, *Sharif University of Technology*, Tehran, Iran
- 2011–2015 **B.Sc. in Mechanical Engineering**, *Iran University of Science and Technology*, Tehran, Iran

## Doctoral Thesis

- title Optimization, control, and knowledge extraction in engineering systems: Applications in vehicle suspension, thermal management, and floating offshore wind turbines.  
[Link](#)
- supervisor Prof. James T. Allison

## Journal Publications

- 2025 **Saeid Bayat**, Jerry Zuo, and Jing Sun. “Modeling and Dynamic Simulation of a Hybrid Floating Wind–Wave Platform with Integrated Flap-Type Wave Energy Converters.” *Ocean Engineering*, Accepted (2025).
- 2025 **Saeid Bayat**, Nastaran Shahmansouri, Satya R. T. Peddada, Alex Tessier, Adrian Butscher, and James T. Allison. “Can Graph Neural Networks Help Identify Promising Thermal Management System Architectures Among Vast Numbers of Possibilities?” *Journal of Mechanical Design*, (2025). [Link](#)
- 2025 **Saeid Bayat** and Lei Zuo. “Multidisciplinary Control Co-Design of a Spar–Torus Hybrid Wind–Wave Energy System.” *Journal of Mechanical Design*, 1–14 (2025). [Link](#)
- 2025 **Saeid Bayat**, Nastaran Shahmansouri, Satya R. T. Peddada, Alex Tessier, Adrian Butscher, and James T. Allison. “Extracting Design Information From Optimized Designs of Power Flow Systems: Application to Multisplit Thermal Management System Configuration.” *Journal of Mechanical Design*, 147(11):112001 (2025). [Link](#)
- 2025 Vishnu Vijayasankar, **Saeid Bayat**, and Lei Zuo. “Development of a Scaled Hydrofoil-Based Marine Energy Converter: Design, Modeling, and Parametric Optimization.” *Journal of Vibration and Acoustics*, 1–12 (2025). [Link](#)

- 2025 Yong Hoon Lee, **Saeid Bayat**, and James T. Allison. "Wind turbine control co-design using dynamic system derivative function surrogate model (DFSM) based on OpenFAST linearization." *Applied Energy*, 396:126203 (2025). [Link](#)
- 2025 **Saeid Bayat**, Yong Hoon Lee, and James T. Allison. "Nested control co-design of a spar buoy horizontal-axis floating offshore wind turbine." *Ocean Engineering*, 328:121037 (2025). [Link](#)
- 2025 **Saeid Bayat** and James T. Allison. "Impact of control strategies on the control co-design of spar floating offshore wind turbines." *Ocean Engineering*, 336:121763 (2025). [Link](#)
- 2025 Yong Hoon Lee, **Saeid Bayat**, James T. Allison, Md. Sanower Hossain, and D. Todd Griffith. "Multidisciplinary modeling and control co-design of a floating offshore vertical-axis wind turbine system." *Journal of Mechanical Design*, 147(6):061702 (2025). [Link](#)
- 2025 **Saeid Bayat** and James T. Allison. "A practical open-source approach to Model Predictive Control using the Legendre–Gauss–Radau pseudospectral method." *Software Impacts*, 100769 (2025). [Link](#)
- 2025 **Saeid Bayat**, Nastaran Shahmansouri, Satya R. T. Peddada, Alexander Tessier, Adrian Butscher, and James T. Allison. "Multi-split configuration design for fluid-based thermal management systems." *Journal of Mechanical Design*, 147(2):021705 (2025). [Link](#)
- 2025 **Saeid Bayat** and James T. Allison. "Control Co-Design with varying available information applied to vehicle suspensions." Accepted in *Journal of Dynamic Systems, Measurement, and Control*.
- 2024 Mohammad Sadman Sakib, D. Todd Griffith, Sanower Hossain, **Saeid Bayat**, and James T. Allison. "Intracycle RPM control for vertical axis wind turbines." *Wind Energy*, 27(3):202–224 (2024). [Link](#)
- 2023 **Saeid Bayat** and James T. Allison. "SS-MPC: A user-friendly software based on single shooting optimization to solve Model Predictive Control problems." *Software Impacts*, 17:100566 (2023). [Link](#)
- 2021 **Saeid Bayat**, H. Nejat Pishkenari, and H. Salarieh. "Observation of stage position in a 2-axis nano-positioner using hybrid Kalman filter." *Scientia Iranica*, 28(5):2628–2638 (2021). [Link](#)
- 2019 **Saeid Bayat**, Hossein Nejat Pishkenari, and Hassan Salarieh. "Observer design for a nano-positioning system using neural, fuzzy and ANFIS networks." *Mechatronics*, 59:10–24 (2019). [Link](#)

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## Conference Publications

- 2025 **Saeid Bayat** and Lei Zuo. "Design of Experiments-Based Analysis of a Hybrid Wind–wave Energy System With a Spar-Torus Combination." Accepted for presentation at the ASME IDETC/CIE 2025 (Paper No. IDETC/CIE2025-168677).
- 2025 Jerry Zuo, **Saeid Bayat** and Jing Sun. "A Hybrid Wind-Wave Energy Converter with Structural and Functional Synergy: Concept Design and Simulation." Accepted for presentation at OCEANS 2025 Great Lakes conference.

- 2025 **Saeid Bayat**, Lei Zuo. "Hybrid Wind–Wave Semi-Submersible with Flap WECs: Dynamic Simulation, Stability, and Energy Assessment." Submitted for presentation at the American Control Conference (ACC) 2025.
- 2023 Abbas Bataleblu, Vedant, **Saeid Bayat**, and James T. Allison. "Control Implementation Challenges of HI-MSAC: Hinge Integrated Multifunctional Structures for Attitude Control." In *Proceedings of the 46th Annual AAS Rocky Mountain Section Guidance and Control Conference* (2023).
- 2022 Yong Hoon Lee, **Saeid Bayat**, and James T. Allison. "Control co-design using a nonlinear wind turbine dynamic model based on OpenFAST linearization." In *Applied Energy Symposium: MIT A+B*, pp. 5–8 (2022).
- 2021 **Saeid Bayat**, Yong Hoon Lee, and James T. Allison. "Control Co-Design of Horizontal Floating Offshore Wind Turbines Using a Simplified Low-Order Model." In *Proceedings of the Wind Energy Science Conference* (2021).

## Honors and Awards

- 2025 **Best Paper Award Winner (1st place)**, *ASME IDETC/CIE 2025 VIB Track*, Anaheim, CA, USA  
"Development of a Scaled Hydrofoil-Based Marine Energy Converter: Design, Modeling, and Parametric Optimization"
- 2018 **Selected Technologist Award**, certificate of commendation from Sharif University of Technology, Tehran, Iran
- 2015 **Direct admission (without entrance exam)**, elite student admission for M.Sc. at Sharif University of Technology, Tehran, Iran
- 2015 **Rank 5 in Bachelor's class**, fifth among all 100 Mechanical Engineering graduates of Iran University of Science and Technology, Tehran, Iran
- 2012, 2014 **Elected as an Elite Student**, by the President of Iran University of Science and Technology, Tehran, Iran
- 2011 **Ranked in the top 0.3%**, among over 350,000 students in the nationwide bachelor's entrance exam, admitted to Iran University of Science and Technology, Tehran, Iran

## Research Focus

- Control co-design
- AI-based design
- Data-driven modeling and surrogate modeling
- Multidisciplinary design optimization
- Renewable energy systems
- Mechatronics
- Dynamics & control
- Hardware-in-the-loop testing and experiments

## Research Experiences

- 2024–Now **Postdoctoral Research Fellow, MaRInE Lab, University of Michigan**, Ann Arbor, USA  
As a postdoctoral researcher at the MaRInE Lab, I focus on the engineering design and system integration of hybrid marine renewable energy systems, including floating wind–wave platforms and wave energy converters. My research combines control co-design, model-based system development, and optimization to enhance dynamic performance, energy efficiency, and structural resilience. I develop and validate simulation frameworks and conduct hardware-in-the-loop experiments to connect computational design models with real-world control systems. I also contribute to ONR, DOE, and NSF proposals and mentor students on system modeling, optimization, and experimental validation.
- 2019–2024 **Research Assistant, Engineering System Design Laboratory (ESDL), University of Illinois at Urbana–Champaign**, Urbana–Champaign, USA  
As a doctoral researcher at the Engineering System Design Laboratory, I worked on the control co-design and optimization of complex mechanical and energy systems, with a particular focus on floating offshore wind turbines. My research examined how system architecture and controller design interact under operational constraints. I developed model-based design frameworks that integrate optimization, control theory, and data-driven methods to enhance performance, reliability, and design efficiency. This work introduced surrogate and graph-based modeling approaches for design knowledge extraction and resulted in several peer-reviewed publications and collaborations across system dynamics, optimization, and intelligent design.
- 2015–2018 **Research Assistant, Nano Robotics Laboratory, Sharif University of Technology**, Tehran, Iran  
As a research assistant at the Nano Robotics Laboratory, I worked on the design and control of an XY nano-positioning robotic stage for precision mechatronic applications. I developed neural network, fuzzy logic, and hybrid observer-based controllers and implemented them on embedded hardware for real-time operation. I also designed graphical interfaces to support experimental testing and data acquisition. This work resulted in several peer-reviewed journal and conference publications and strengthened my expertise in robotics, mechatronic system design, hardware–software integration, and experimental validation.
- 2011–2015 **Research Assistant, Intelligent, Autonomous and Distributed Systems (IDAS) Laboratory, Iran University of Science and Technology**, Tehran, Iran  
As a research assistant at the IDAS Laboratory, I was part of a student team that designed and developed a bio-payload recovery CanSat, which won third place in a national competition. My responsibilities included mechanical design, sensor and actuator integration, and system-level testing under real operating conditions. This project provided early experience in robotics, autonomous systems, interdisciplinary teamwork, and practical design under strict space, weight, and environmental constraints.

## Computer Skills

Programming Languages	C++/C, Python
Mathematical Analysis	MATLAB (M-File, Simulink, GUI)
Machine Learning	PyTorch
CAD Tools	CATIA, SOLIDWORKS

Simulation Tools OpenFAST, WEC-Sim, Capytaine, OpenMDAO, Dymos

Hardware STM Microcontroller, TI Microcontroller

Real-Time Control Speedgoat, TwinCAT, Beckhoff

## Teaching Experiences

- 2025 **Guest Lecturer (1 lecture)**, NA 540: *Marine Dynamics III*, University of Michigan, Ann Arbor, USA
- 2025 **Guest Lecturer (1 lecture)**, NA 499/599: *Marine Energy and the Blue Economy*, University of Michigan, Ann Arbor, USA
- 2024 **Co-Instructor**, *Mechatronics*, Industrial & Enterprise Systems Engineering, University of Illinois Urbana–Champaign, USA
- 2023 **Guest Lecturer (4 lectures)**, SE 498: *Control Co-Design*, University of Illinois Urbana–Champaign, Urbana–Champaign, USA
- 2023 **Teaching Assistant**, *Mechatronics*, Industrial & Enterprise Systems Engineering, University of Illinois Urbana–Champaign, USA
- 2023 **Teaching Assistant**, *Digital Control Systems*, Industrial & Enterprise Systems Engineering, University of Illinois Urbana–Champaign, USA
- 2022 **Guest Lecturer (4 lectures)**, SE 498: *Control Co-Design*, University of Illinois Urbana–Champaign, Urbana–Champaign, USA
- 2017, 2018 **Teaching Assistant**, *Mechatronic Systems*, Department of Mechanical Engineering, Sharif University of Technology, Tehran, Iran
- 2014 **Instructor**, *MATLAB Software*, Department of Mechanical Engineering, Iran University of Science and Technology, Tehran, Iran

## Proposal Contributions

- 2025 **Lead Author**, *Naval STEM proposal: Workforce Development through Research Immersion and Mentorship for Students, Teachers, and Early-Career Scientists*, N0001425SF0006  
Proposed budget: \$700,000 (36 months). Status: Under Review.
- 2025 **Lead Author**, *ONR white paper proposal: Hybrid Floating Wave–Wind Platform for Resilient Power at Navy Facilities*, RWP No. N11011-25-RP-00001  
Proposed budget: \$19.15M (ROM price). Status: Under Review.
- 2025 **Co-author**, *NSF TTP-E proposal: Experimental Validation of a Floating Flap Wave Energy Converter with Active Mechanical Motion Rectifier for Ocean Observation Applications*, NSF 25-540  
Proposed budget: \$600,000 (24 months). Status: Under Review.
- 2025 **Co-author**, *NSF CPS-Medium proposal: Collaborative Research: All-weather Coastal Environmental Monitoring and Communications through Hybrid Wind–Wave Energy Harvesting (Marinet)*, NSF CPS Program  
Proposed budget: Multi-million (36 months). Status: Under Review.

- 2025 **Co-author**, *DOE proposal: An Innovative and Self-Sustained Depth-Cycling Offshore Farm for Maximized Macroalgae Production*, FOA No. DE-FOA-0003520, Topic Area: Algal System Yield Optimization  
Proposed budget: \$2.0M Federal + \$500,000 cost share (total \$2.5M, 36 months). Status: Under Review.
- 2025 **Co-author**, *DOE proposal: Wave-Powered & Counterbalanced: A Sustainable Depth Cycling System for High-Yield Seaweed Farming*, FOA No. DE-FOA-0003536, Technical Category B.1: Offshore Engineering – Depth Cycling  
Proposed budget: \$1.8M Federal + \$180,000 cost share (total \$1.98M, 36 months). Status: Under Review.
- 2024 **Co-author**, *DOE proposal: Drivetrain Condition Monitoring and Prognostics for Floating Offshore Wind Turbines*, FOA No. DE-FOA-0003334, Topic Area 1b: Next-Generation Integrated Floating Turbine/Platform Research  
Status: Under Review.
- 2024 **Lead Author**, *DOE WPTO full proposal: Wave Energy Converter for Sustainable Aquaculture Monitoring (WECSAM)*, FOA No. DE-FOA-0003415, Application Control No. 3415-1-0062  
Proposed budget: \$3.2M Federal + \$355,556 cost share (60 months). Status: Under Review.

## Professional Development

- 2025 Completed the Postdoctoral Short Course on College Teaching in STEM, Center for Research on Learning and Teaching (CRLT), University of Michigan, Ann Arbor

## References

- **Dr. James T. Allison**  
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