

Saeid Bayat

Postdoctoral Research Fellow

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Google Scholar

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 (DFSMD) 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](#)

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, MaRIInE Lab, *University of Michigan*, Ann Arbor, USA**

As a postdoctoral researcher at the MaRIInE 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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