Saeid Bayat

Postdoctoral Research Fellow

Oct. 24, 1992
+1 (217) 819 7166
saeidb@umich.edu
www.saeidbayat.com
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** and Lei Zuo. "Multidisciplinary Control Co-Design of a Spar–Torus Hybrid Wind–Wave Energy System." *Journal of Mechanical Design*, accepted (2025).

2025 Vijayasankar, Vishnu, **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 **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**, 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 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 Student 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
- Multidisciplinary design optimization
- Renewable energy systems
- AI-based design
- Data-driven modeling and surrogate modeling
- Mechatronics
- Embedded Systems
- 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**
  Professor, Department of Industrial and Enterprise Systems Engineering
  University of Illinois at Urbana–Champaign
  104 S. Wright Street, Urbana, IL 61801, USA
  Phone: +1 (217) 2444319
  `jtalliso@illinois.edu`
  `http://systemdesign.illinois.edu/home/`
- Dr. **Lei Zuo**
  Professor, Department of Naval Architecture and Marine Engineering
  University of Michigan
  2600 Draper Drive, Ann Arbor, MI 48109, USA
  Phone: +1 (734) 6609328
  `leizuo@umich.edu`
  `https://marine.engin.umich.edu/`
- Dr. **Yong Hoon Lee**
  Assistant Professor, Department of Mechanical Engineering
  The University of Memphis
  375 Dudley Building, 3710 Walker Ave, Memphis, TN 38152, USA
  Phone: +1 (901) 6785004
  `yhlee@memphis.edu`
  `https://yonghoonlee.com/`