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   James T. Allison

Journal Publications

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   **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**, 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** 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**, 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. "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*.

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?" Accepted in *Journal of Mechanical Design* (Manuscript ID MD-24-1910).

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.

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 **Rank 1 in Master's class**, *first among eight Mechatronics Engineering graduates of Sharif University of Technology*, Tehran, Iran

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
- Offshore Wind Turbine Modeling and Optimization
- Multi-Disciplinary Analysis and Optimization
- Wave Energy Converter Design and Control
- Model Predictive Control
- Optimal Control
- Surrogate Modelling
- Machine Learning

Research Experiences

2024–Now	**Postdoctoral Research Fellow, MaRInE Lab**, *University of Michigan*, Ann Arbor, USA

As a postdoctoral researcher in the MaRInE Lab, my work focuses on the control co-design of hybrid wind–wave energy systems as well as riverine and wave energy converters. I develop and implement advanced control strategies aimed at improving the efficiency, stability, and robustness of these renewable energy systems in dynamic marine environments. In addition to research, I have played a key role in leading the preparation of several interdisciplinary research proposals, contributing technical insight, writing, and strategic direction under the supervision of Prof. Lei Zuo. This experience has strengthened my skills in collaborative research and competitive proposal development.

2019–2024	**Research Assistant, Engineering System Design Laboratory (ESDL)**, *University of Illinois at Urbana-Champaign*, Urbana-Champaign, USA

I specialized in Control Co-Design (CCD) for floating offshore wind turbines, with a focus on integrating Model Predictive Control (MPC) and surrogate modeling into the design process. My work aimed to simultaneously optimize plant and controller parameters while accounting for system dynamics and operational constraints. I also developed machine learning approaches to extract design knowledge from optimization results, enabling data-driven exploration of novel system architectures.

2015–2018	**Research Assistant, Nano Robotics Laboratory**, *Sharif University of Technology*, Tehran, Iran

I designed and implemented hybrid Kalman filter observers and controllers based on neural networks, fuzzy logic, and ANFIS for an XY nano-positioning system. I developed a custom PCB using an STM32 microcontroller to implement real-time control and designed a graphical user interface for intuitive operation of the system.

2011–2015	**Research Assistant, Intelligent, Autonomous and Distributed Systems (IDAS) Laboratory**, *Iran University of Science and Technology*, Tehran, Iran

As part of a team project, I contributed to the design and development of a bio-payload recovery CanSat that earned third place in a national competition. The project provided valuable hands-on experience in sensor and actuator integration, as well as teamwork, leadership, and engineering design under real-world 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

2024, 2023 **Teaching Assistant**, *Mechatronics*, Industrial & Enterprise Systems Engineering, University of Illinois Urbana–Champaign

2023 **Teaching Assistant**, *Digital Control Systems*, Industrial & Enterprise Systems Engineering, University of Illinois Urbana–Champaign

2017, 2018 **Teaching Assistant**, *Mechatronic Systems*, Department of Mechanical Engineering, Sharif University of Technology

2014 **Instructor**, *MATLAB Software*, Department of Mechanical Engineering, Iran University of Science and Technology

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. **Lei Zuo**
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○ Dr. **James T. Allison**
Associate Professor, Department of Industrial and Enterprise Systems Engineering
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http://systemdesign.illinois.edu/home/

○ Dr. **Yong Hoon Lee**
Assistant Professor, Department of Mechanical Engineering
The University of Memphis
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https://yonghoonlee.com/