

Research Statement

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Research identity. My research develops mathematically grounded, implementation-oriented control and diagnostic methods for nonlinear mechanical and mechatronic systems. I work at the intersection of **control systems, vibration control, fault detection, predictive maintenance, Lyapunov stability, reinforcement learning, fuzzy systems, and intelligent mechatronics**. My long-term goal is to build an internationally visible research group that advances reliable, learning-enabled control and monitoring methods for manufacturing machines, drilling systems, robotic manipulators, electromechanical systems, and other high-performance mechatronic platforms.

[Control Systems](#) [Vibration Control](#) [Fault Detection](#) [Predictive Maintenance](#) [Lyapunov Stability](#) [Reinforcement Learning](#)
[Mechatronics](#) [Manufacturing Systems](#)

Research Overview and Vision

I am a control systems researcher and academic with more than fifteen years of combined teaching, research, supervision, and industry-facing experience across Sweden, the United Kingdom, Mexico, and India. My research has consistently addressed a central engineering question: *how can complex mechanical and mechatronic systems be modelled, controlled, monitored, and made more reliable under nonlinear dynamics, uncertainty, vibration, and changing operating conditions?*

My work combines theoretical modelling, nonlinear control design, Lyapunov-based stability analysis, intelligent control, machine learning, experimental thinking, and simulation-driven validation. I have applied these methods to active vibration control of civil structures, chatter suppression in milling, fault detection in drilling systems, predictive maintenance of manufacturing devices, control of agricultural manipulators, and control-oriented modelling of electromechanical systems. My publication record includes a SpringerBrief book, journal articles in international venues, book chapters, and conference papers in control systems, vibration control, fuzzy control, fault detection, drilling systems, and intelligent engineering systems.

The unifying theme of my research is **intelligent and stability-aware control of uncertain dynamic systems**. I aim to develop methods that are not only high-performing in simulation but also physically interpretable, analytically justified, and suitable for engineering implementation. This vision is especially relevant for modern mechatronic systems, where advanced sensors, real-time computation, digital engineering, and AI methods create new opportunities for controllers and diagnostic systems that learn from data while respecting the physics of the system.

Research Contributions and Current Research Profile

Core research themes

My research contributions can be grouped into four mutually reinforcing themes.

Nonlinear vibration control

Development of PD/PID, fuzzy PD/PID, sliding-mode, discrete-time sliding-mode, and reinforcement-learning-supported methods for attenuation of vibrations in civil, manufacturing, and mechatronic systems.

Fault detection and predictive maintenance

Model-based observers, intelligent diagnostics, vibration-based fault detection, condition monitoring, and remaining useful life prediction for drilling and manufacturing systems.

Lyapunov-stable intelligent control

Stability analysis and controller synthesis using Lyapunov methods, fuzzy systems, nonlinear compensation, sliding-mode control, and adaptive/learning-based control concepts.

Research-informed mechatronics

Application of control theory, simulation, MATLAB/Simulink, LabVIEW, physical modelling, and industrial examples to robotic manipulators, drilling systems, milling processes, gas turbine/transmission systems, and smart manufacturing devices.

Research trajectory

My research trajectory has developed from structural vibration control during my PhD, to manufacturing vibration control during my postdoctoral work in Mexico, to industrial fault detection and predictive maintenance during my postdoctoral work in Sweden, to electromechanical and gas turbine/transmission control during my research fellowship in the United Kingdom, and currently to intelligent control, drilling dynamics, mechatronic systems, and predictive maintenance at Örebro University. This trajectory gives me a broad yet coherent platform for leading an independent research agenda in control systems and intelligent mechatronics.

Research and Academic Experience

Senior Lecturer – Örebro University, Sweden (Apr 2025 – Present)

Department of Mechanical Engineering, Örebro University

Senior Lecturer / Associate Professor

At Örebro University, my role combines research, teaching, supervision, and course development. My research focuses on automatic fault detection, predictive maintenance, vibration control, condition monitoring, nonlinear dynamics, and control-oriented modelling of mechanical systems. I am developing research directions that connect robust control, intelligent diagnostics, digital engineering, and applied mechatronics.

My current activities include:

- developing methods for vibration-based fault detection and remaining useful life prediction in drilling and manufacturing systems;
- advancing control approaches for nonlinear vibration attenuation in rotary-percussive drilling, milling, and related mechatronic systems;
- connecting research outcomes with teaching in dynamics, production development, sustainability, simulation, and mechanical engineering;
- supervising bachelor and master projects and supporting students in the development of research-informed engineering skills;
- preparing a Swedish Docent application as part of my continued development toward research leadership, doctoral supervision, and independent academic qualification.

Assistant Professor – Mälardalens University, Sweden (Aug 2023 – Mar 2025)**Department of Product Design and Development, Mälardalens University** Assistant Professor – Research

At Mälardalens University, I conducted research in control systems with applications in product design and development. My work focused on design optimization, simulation, diagnostics, and the integration of advanced control and analysis methods to support efficient and reliable engineering solutions. I also contributed to teaching in mechanical engineering, production simulation, and dynamical-systems-related subjects, and supervised master projects. This role strengthened my ability to connect mathematical modelling, simulation-driven design, and applied control methods with real engineering product development.

Senior Research Fellow – University of Nottingham, United Kingdom (Jan 2022 – Jul 2023)**Gas Turbine and Transmission Research Centre**

Senior Research Fellow in Control Systems

At the University of Nottingham, I worked on a Cornerstone-funded project in collaboration with the University of Oxford, Imperial College London, and Rolls-Royce, UK. My research focused on optimization algorithms and advanced control strategies for gas turbine systems and mechanical transmissions, with the objective of improving performance, efficiency, and operational reliability. I provided control systems expertise and strategic technical support to collaborative research teams and contributed to teaching activities in dynamical systems.

This experience strengthened my research profile in industrially relevant control systems, prototype test-rig thinking, and cross-institutional collaboration with leading UK universities and a major industrial partner.

Control Engineering Tutor – University of Cambridge, United Kingdom (Jan 2023 – Jul 2023)

I worked as a part-time online Control Engineering Tutor for the University of Cambridge. My responsibilities included teaching support, assessment, monitoring, evaluation, and project guidance in control engineering. This role required clear technical communication and the ability to support students remotely while maintaining strong academic standards.

Assistant Professor in Mechatronics – University of the West of England, UK (Mar 2020 – Jan 2022)

At the University of the West of England, Bristol, I contributed to teaching, research, supervision, curriculum development, and academic leadership. I served as Module Leader for Control Engineering, Programme Leader for a Degree Apprenticeship programme, and Theme Leader for Control Engineering/Mechatronics.

My research during this period included:

1. fuzzy-tuned PID control for vibration control of an envisioned agricultural manipulator;
2. sliding-mode control for robotic/agricultural manipulator systems;
3. automatic fault detection in manufacturing systems using model-based estimators for vibration-based faults in drilling systems.

These projects involved mathematical modelling of dynamical systems, nonlinear compensation, stability analysis, simulation, and implementation-oriented validation. I used MATLAB/Simulink, SolidWorks, LabVIEW, Blackboard, and Canvas in research-informed teaching and project-based education.

Postdoctoral Researcher – Örebro University, Sweden (Nov 2018 – Feb 2020)

At Örebro University, I worked on the project *Fault Detection and Useful Life Prediction of Manufacturing Systems Using Intelligent Techniques*, conducted in collaboration with industrial partners including Epiroc, Alkit Communications AB, LKAB, and Mobilaris AB. The project aimed to improve reliability, efficiency, and predictive maintenance capabilities in mining and manufacturing systems.

My main contribution was the development of a model-based fault detection estimator for identifying vibration-induced faults in drill rigs. I proposed an interval type-2 Takagi–Sugeno fuzzy observer-based fault detection scheme for detecting drill-bit faults in drilling systems. The work combined stability analysis, intelligent uncertainty compensation, condition monitoring, and industrially motivated validation. I also initiated work

on remaining useful life prediction of faulty drill bits using machine learning.

Postdoctoral Researcher – Tecnológico de Monterrey, Mexico (Feb 2018 – Oct 2018)

At Tecnológico de Monterrey, I worked on the project *Intelligent Control of Chatter in Milling Process*, conducted in collaboration with Bocar Group, a leading manufacturing company in Mexico. The project aimed to develop active control strategies for suppressing chatter vibration and improving machining stability.

The work had two phases:

- **Phase 1:** I proposed an active control strategy using PD/PID controllers integrated with type-2 fuzzy logic to attenuate chatter vibration in milling. The stability of the controller was analysed using Lyapunov methods.
- **Phase 2:** I developed a discrete-time control strategy combining discrete sliding-mode control with type-2 fuzzy systems. The time-varying gain in the sliding-mode framework helped reduce chattering while improving vibration attenuation and robustness.

This work contributed to improved machining stability, better surface quality, and increased process reliability in manufacturing systems.

Doctoral Research – CINVESTAV-IPN, Mexico (2014 – 2018)

PhD in Control Systems

Thesis: Bidirectional Seismic Analysis and Structural Control

My doctoral research focused on active vibration control of building structures under bidirectional earthquake excitation. I developed control methods for structural uncertainty, designed active vibration controllers, and validated closed-loop stability theoretically and experimentally. The work involved sensing, data acquisition, MATLAB/Simulink, C/C++, AutoCAD, SolidWorks, and real-time implementation.

A major experimental contribution was the development of a two-floor structural test setup on a bidirectional shake table. I implemented an active mass damper and designed a torsional actuator based on a motor-disc arrangement for torsional vibration control. Controllers used in this research included PD/PID, type-2 fuzzy PD/PID, and sliding-mode control.

Early Academic and Research Foundations – India (2009 – 2013)

Before my PhD, I worked as an Assistant Professor in Mechanical Engineering at Sikkim Manipal Institute of Technology and Sir Padampat Singhanian University. I taught courses in instrumentation and control, hydraulic machines, fluid mechanics, thermodynamics, machine drawing, solar energy, mechatronics, linear and nonlinear control, solid mechanics, strength of materials, engineering drawing, and elements of mechanical engineering.

My early research included the *Conceptual Design and Development of an Automated Drilling System*. This work involved mechanical design in PRO-E, actuation using DC motors, PLC programming, and prototype development for efficient and accurate drilling. My master's thesis also contributed to this applied research foundation through the development of a prototype safety system for workers in robotic manufacturing environments using PLCs and Automation Studio.

Research Mobility and Funding

Erasmus Mundus Funding and International Research Mobility

In May 2024, I received Erasmus Mundus funding through an EU initiative and visited the University of Central Florida, Orlando, USA, as a guest researcher at the Rehabilitation Engineering and Assistive Device Lab (REAL), Burnett School of Biomedical Sciences. This international research mobility expanded my engagement with interdisciplinary control, rehabilitation engineering, assistive devices, and applied dynamic systems.

CONACYT PhD Scholarship

I received the Consejo Nacional de Ciencia y Tecnología (CONACYT) PhD full scholarship in Mexico, covering my doctoral studies in control systems. This award supported my development in advanced control theory, nonlinear dynamics, vibration control, and experimental validation.

Future Research Agenda

Reinforcement Learning-Enabled Lyapunov-Stable Control for Intelligent Mechatronic Systems

My future research agenda will extend my current expertise in nonlinear vibration control, Lyapunov stability, fuzzy systems, fault detection, and predictive maintenance toward a broader and highly timely direction: **reinforcement learning-enabled Lyapunov-stable control for intelligent mechatronic systems**.

Modern mechatronic systems are increasingly sensor-rich, computationally capable, and exposed to uncertain operating environments. Examples include robotic manipulators, drilling systems, milling machines, production equipment, electromechanical actuators, rehabilitation devices, and autonomous mechanical platforms. These systems often exhibit nonlinear dynamics, coupled vibration modes, friction, impacts, contact changes, actuator constraints, and degradation. Conventional controllers can work well near fixed operating points, but they struggle when dynamics change, disturbances are uncertain, and performance requirements vary over time. Reinforcement learning offers a powerful way to improve performance through interaction and adaptation, but it must be combined with physics-informed modelling and Lyapunov-based guarantees to become credible for engineering systems.

Research hypothesis

The central hypothesis of this future research programme is that *physics-informed reinforcement learning, embedded within Lyapunov-stable control architectures, can produce controllers that improve vibration attenuation, tracking performance, robustness, and energy efficiency in nonlinear mechatronic systems while remaining mathematically interpretable and engineering-ready*.

Key research questions

The future programme will address four linked research questions:

1. How can reduced-order models preserve the instability-generating mechanisms of nonlinear mechatronic systems while remaining tractable for learning-based feedback synthesis?
2. How can reinforcement learning be integrated with Lyapunov-based controller design so that learned policies improve performance without losing analytical structure?
3. How can observers, residuals, and condition-monitoring signals be used to guide adaptive control, fault detection, and remaining useful life prediction in real time?
4. How transferable are the resulting methods across drilling systems, milling processes, robotic manipulators, electromechanical actuators, and other intelligent mechatronic platforms?

Proposed research directions

1. **Physics-informed reduced modelling for learning control.** I will develop model classes for nonlinear mechatronic systems that retain key physical mechanisms such as impact, friction, contact switching, coupled axial-torsional dynamics, actuator limitations, and vibration-growth mechanisms.
2. **Reinforcement learning with Lyapunov-stable controller structures.** I will design controller architectures in which reinforcement learning tunes or augments baseline controllers such as PID, sliding-mode, adaptive, and state-feedback controllers, while Lyapunov tools provide mathematical performance and boundedness analysis.
3. **Learning-based vibration suppression and precision control.** Applications will include chatter mitigation in milling, drilling vibration attenuation, robotic manipulator control, and electromechanical actuator regulation.
4. **Fault-aware control and predictive maintenance.** I will connect control and condition monitoring by using residuals, observer estimates, vibration features, and RUL predictions as decision variables for adaptive learning-based controllers.
5. **Benchmarking, validation, and reproducibility.** The research will produce reusable simulation and software-in-the-loop benchmark environments using MATLAB/Simulink, Python, and real-time validation tools where feasible.

Why this agenda is distinctive

This agenda is distinctive because it does not treat AI as a black-box replacement for control theory. Instead, it uses reinforcement learning as a performance-improving layer built on top of mechanical modelling, nonlinear control, Lyapunov analysis, and experimental engineering insight. The research is therefore attractive to departments seeking expertise in classical control, AI for engineering systems, intelligent manufacturing, robotics, mechatronics, and predictive maintenance.

Expected outcomes

The expected outcomes include:

- new reinforcement-learning-supported controllers for uncertain nonlinear mechatronic systems;
- Lyapunov-based analytical results for learning-enabled vibration control;
- validated methods for chatter suppression, drilling vibration control, robotic/manipulator control, and electromechanical systems;
- integrated diagnostic-control frameworks linking fault detection, condition monitoring, and adaptive control;
- external grant proposals in AI-enabled control, intelligent mechatronics, smart manufacturing, and predictive maintenance;
- high-quality journal and conference publications and opportunities for PhD and postdoctoral research projects.

Research Leadership, Doctoral Supervision, and Docent Preparation

Preparation for Docent qualification in Sweden

I am currently preparing my application for Docent qualification in Sweden. This process reflects my continued development as an independent researcher, supervisor, and academic leader. The Docent preparation brings together my research outputs, teaching qualifications, supervision experience, international collaborations, grant activity, and future research agenda in control systems, intelligent mechatronics, vibration control, and predictive maintenance. It also supports my long-term goal of building an independent research group and strengthening my contribution to doctoral supervision, research funding, and international academic collaboration.

Research supervision training

In 2026, I completed the course *Supervising PhD Students* at Örebro University, equivalent to three weeks of full-time study. The purpose of the course was collegial development of knowledge about research supervision and contribution to a strong supervisory and postgraduate culture at the university.

The course consisted of two strands. The first focused on public service obligations: the responsibilities placed on those involved in PhD education by society, as outlined in national and local regulations. The second focused on the pedagogical role of the supervisor, addressing opportunities, challenges, and issues that PhD supervisors may encounter in different supervisory situations. This training strengthens my readiness for doctoral supervision, Docent qualification, and future research group leadership.

Collaborative Research Work and Impact

Academic collaborations

My research has benefited from collaboration with universities and research environments in Sweden, the United Kingdom, the United States, Mexico, and India. These include:

- University of Oxford, UK;
- Imperial College London, UK;
- Rolls-Royce-connected Cornerstone research collaboration, UK;
- University of Nottingham, UK;
- University of Cambridge, UK;
- University of the West of England, UK;
- University of Central Florida, USA;
- Örebro University, Sweden;
- Umeå University, Sweden;
- Mälardalens University, Sweden;
- University of Leeds, UK;
- Tecnológico de Monterrey, Mexico;
- CINVESTAV-IPN, Mexico.

Industrial collaborations

I have worked with or within projects connected to several industrial partners:

- **Rolls-Royce, UK:** advanced control and optimization within gas turbine/transmission research collaboration.

- **Epiroc, Sweden:** mining, infrastructure, and drilling equipment, connected to condition monitoring and fault detection research.
- **LKAB, Sweden:** mining and iron ore processing, connected to industrial predictive maintenance contexts.
- **Alkit Communications AB, Sweden:** communication and collaboration technology within industrial research projects.
- **Mobilaris AB, Sweden/USA:** location-based intelligence and decision-support solutions.
- **Bocar Group, Mexico:** manufacturing collaboration for chatter vibration control in milling.

These collaborations have shaped my research style: mathematically rigorous, but always oriented toward real engineering systems, industrial constraints, implementation tools, and measurable performance improvement.

Conference Participation and Research Dissemination

I actively disseminate my work through international conferences, workshops, and collaborative research events. Selected participation includes:

- Resilience Week (RWS), Philadelphia, PA, USA, 2015.
- 13th International Conference on Electrical Engineering, Computing Science and Automatic Control (CCE), Mexico City, Mexico, 2016.
- 5th International Conference on Mechatronics and Control Engineering, Italy, 2016.
- IEEE International Conference on Industrial Technology (ICIT), Canada, 2017.
- 7th International Conference on Control, Mechatronics and Automation (ICCMA), TU Delft, Netherlands, 2019.
- Cornerstone Conference with University of Oxford, Imperial College London, and Rolls-Royce, Queen's University Belfast, Northern Ireland, 2022.
- DSM 2025 Conference – Integrating Systems Across Multiple Domains, Stevens Institute of Technology, Hoboken, New Jersey, USA, 24–26 September 2025.
- 12th International Conference on Mechatronics and Robotics Engineering (ICMRE 2026), University of Oldenburg, Oldenburg, Germany, 2–4 March 2026.
- 10th International Conference on Robotics, Control and Automation (ICRA 2026), Osaka, Japan, 28–30 March 2026.
- 67th International Conference of Scandinavian Simulation Society (SIMS 2026), International Federation of Automatic Control (IFAC), accepted contribution.

Reviewer Assignments, Memberships, and Service

Assignments as reviewer

I have reviewed for international journals and conferences, including:

- *Mechanical Systems and Signal Processing* (Elsevier);
- *Advances in Science, Technology and Engineering Systems Journal*;
- *Applied Mathematical Modelling* (Elsevier);
- *IFAC Journal of Systems and Control*;
- *Applied Sciences*;

- *Mathematics*;
- *Micromachines*;
- *Designs*;
- *Energies*;
- *Journal of Marine Science and Engineering*;
- various international conferences.

Memberships and committees

- Associate Editor, The 67th International Conference of the Scandinavian Simulation Society, SIMS 2026, Eskilstuna, Sweden, 16–17 September 2026.
- Fellow of the Higher Education Academy (FHEA), Advance HE, United Kingdom.
- Technical Committee Member, 7th International Conference on Control, Mechatronics and Automation, TU Delft, Netherlands, 6–8 November 2019, co-sponsored by TU Delft, IEEE Control Systems Society, and IEEE Robotics and Automation Society.

Fit for Assistant and Associate Professor Roles

My research profile is well aligned with Assistant and Associate Professor positions in mechanical engineering, mechatronics, control engineering, robotics, intelligent systems, manufacturing, automation, and systems engineering. I bring:

- a coherent independent research agenda in control systems and intelligent mechatronics;
- a strong publication base in vibration control, fuzzy control, sliding-mode control, fault detection, and predictive maintenance;
- international experience from Sweden, the United Kingdom, Mexico, India, and the United States;
- industrial collaboration experience with Rolls-Royce, Epiroc, LKAB, Mobilaris, Alkit Communications, and Bocar Group;
- strong preparation for doctoral supervision, Docent qualification, and research group development.

Publications

BOOK

1. Yu, W., & Paul, S. (2020). *Active Control of Bidirectional Structural Vibration*. SpringerBriefs in Applied Sciences and Technology, Springer International Publishing.

INTERNATIONAL JOURNALS

1. Paul, S. (2026). A Vibration Control Method for Chatter Mitigation in Milling Process Based on Sliding Mode Control and Reinforcement Learning. *Scientific Reports*, Springer Nature.
2. Paul, S., & Löfstrand, M. (2026). A Review on Condition Monitoring and Control of Industrial Drilling Systems: Fault Detection, Fuzzy Control, and Human-Induced Faults. *Frontiers in Mechanical Engineering*.
3. Sabahno, H., Paul, S. and Khodadad, D., 2025. Adaptive resolution in speckle displacement measurement using optimized grid-based phase correlation and statistical refinement. *Sensing and Bio-Sensing Research, ELSEVIER*, 48, p.100790.
4. Khodadad, D., Tayebi, B., Saremi, A. and Paul, S., 2023, October. Digital holography for temperature investigations in space and transparent media. In *Remote Sensing of Clouds and the Atmosphere XXVIII* (Vol. 12730, pp. 191-196). SPIE.
5. Turnbull, R., Rahmani, R., Paul, S., & Rahnejat, H. (2023). Electrotribodydynamics of ball bearings in electrical machines. *Tribology International*, ELSEVIER, 108817.

6. Khodadad, D., Tayebi, B., Saremi, A., & Paul, S. (2023). Temperature Sensing in Space and Transparent Media: Advancements in Off-Axis Digital Holography and the Temperature Coefficient of Refractive Index. *Applied Sciences*, 13(14), 8423.
7. Moradi, M., Karamimoghadam, M., Meiabadi, S., Casalino, G., Ghaleeh, M., Baby, B., Paul, S., & Khodadad, D. (2023). Mathematical modelling of fused deposition modeling (FDM) 3D printing of poly vinyl alcohol parts through statistical design of experiments approach. *Mathematics*, 11(13), 3022.
8. Paul, S., Arunachalam, A., Andreasson, H., Khodadad, D., & Rubanenko, O. (2021) Fuzzy TunedPID controller for Envisioned Agricultural Manipulator, *International Journal of Automation and Computing*, Springer.
9. Paul, S., & Morales-Menendez, R. (2019). Chatter mitigation in milling process using discrete time sliding mode control with type 2-fuzzy logic system. *Applied Sciences*, 9(20), 4380.
10. Paul, S., Yu, W., & Li, X. (2019). Discrete-time sliding mode for building structure bidirectional active vibration control. *Transactions of the Institute of Measurement and Control*, 41(2), 433-466.
11. Paul, S., & Morales-Menendez, R. (2018). Active control of chatter in milling process using intelligent PD/PID control. *IEEE Access*, 6, 72698-72713.
12. Paul, S., & Jafari, R. (2018). Recent advances in intelligent-based structural health monitoring of civil structures. *Advances in Science, Technology and Engineering Systems*, 3(5), 339-353.
13. Paul, S., Yu, W., & Jafari, R. (2018). A method for bidirectional active vibration control of structure using discrete-time sliding mode. *IFAC-PapersOnLine*, 51(13), 361-365.
14. Paul, S., Yu, W., & Li, X. (2018). Bidirectional active control of structures with type-2 fuzzy PD and PID. *International Journal of Systems Science*, 49(4), 766-782.
15. Paul, S., & Yu, W. (2018). A method for bidirectional active control of structures. *Journal of Vibration and Control*, 24(15), 3400-3417.
16. Paul, S., Yu, W., & Li, X. (2016). Recent advances in bidirectional modeling and structural control. *Shock and Vibration*, 2016, 1-17.
17. Paul, S., Gupta, P. Singh, M. & Singh, N. (2013). Conceptual design and development of automated drilling system. *International Journal of Scientific & Engineering Research*, 4(7).
18. Paul, S. (2013). Automatic control and monitoring system for safer working environment in oil collecting station. *International Journal of Emerging Technology and Advanced Engineering*, 3(4).
19. Kuchanskyy, V., Paul, S., Rubanenko, O., & Hunko, I. (2020). Measures and technical means for increasing efficiency and reliability of extra high voltage transmission lines, *Przegląd Elektrotechniczny*.

MANUSCRIPTS UNDER REVIEW

1. Paul, S., Löfstrand, M., & Khodadad, D. (2026). Hybrid PID-Reinforcement Learning Control for Active Vibration Suppression in Milling Processes. Springer. Under Review.
2. Paul, S. (2026). Robust Vibration-Based Fault Detection for Rotary-Percussive Drilling Using IT2 T-S Fuzzy Modeling and Sliding Mode Observer. Springer. Under Review.

CONFERENCE PUBLICATIONS

1. Paul, S., & Löfstrand, M. (2026). Vibration-Based RUL Prediction for Deep-Hole Drilling Using Support Vector Machines. Accepted at the 67th International Conference of Scandinavian Simulation Society (SIMS 2026), International Federation of Automatic Control (IFAC).
2. Paul, S., Löfstrand, M., & Eklund, P. (2026). Interval Type-2 Fuzzy PID Control for Negative-Damping Torsional Vibrations in Rotary-Percussive Drilling. 10th International Conference on Robotics, Control and Automation (ICRA 2026), Osaka, Japan, March 28-30, 2026. IEEE Conference Proceedings.
3. Paul, S., & Löfstrand, M. (2026). Vibration-Based Automatic Fault Detection for Rotary-Percussive Drilling via IT2 TS Fuzzy Modelling and Adaptive Observer. 12th International Conference on Mechatronics and Robotics Engineering (ICMRE 2026), University of Oldenburg, Oldenburg, Germany, March 2-4, 2026. IEEE Conference Proceedings.
4. Eklund, P., Löfstrand, M., Paul, S. & Goodarzi, M., 2025. DSM relational structures extended with fuzzy sets of higher types. Presented at the DSM 2025 Conference - Integrating Systems Across Multiple Domains, 24-26 September, Stevens Institute of Technology, Hoboken, NJ, USA.
5. Paul, S., Arunachalam, A., Khodadad, D., & Rubanenko, O. (2020). Fuzzy tuned PID controller for vibration control of agricultural manipulator. In 2020 International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), IEEE.

6. Paul, S., & Lofstrand, M. (2020). Intelligent fault detection scheme for drilling process. In *2019 7th International Conference on Control, Mechatronics and Automation (ICCMA)*, IEEE.
7. Jafari, R., Razvarz, S., Gegov, A., & Paul, S. (2018). Modeling and Control of Uncertain Nonlinear Systems. In *2018 International Conference on Intelligent Systems (IS)*, IEEE.
8. Paul, S., & Yu, W. (2017). Type-2 fuzzy PID for active control of bidirectional structures. In *2017 14th International Conference on Electrical Engineering, Computing Science and Automatic Control (CCE)*, IEEE.
9. Jafari, R., Paul, S., & Yu, W., A., & Paul, S. (2018). Modeling and Control of Uncertain Nonlinear Systems. In *2018 International Conference on Intelligent Systems (IS)*, IEEE.
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12. Paul, S., & Yu, W. (2015). Advances in bidirectional modeling and structural control. In *2015 Resilience Week (RWS)*, IEEE.

BOOK CHAPTERS

1. Jafari, R., Razvarz, S., Gegov, A., & Paul, S. (2021). Modeling of uncertain nonlinear system with Z-numbers. In *Encyclopedia of Information Science and Technology* (290-314). IGI Global.
2. Paul, S., & Lofstrand, M. (2020). Discrete time sliding mode control of milling chatter. *Advances in Intelligent Systems and Computing*, 1121 AISC, 381-390, Springer.
3. Paul, S., Yu, W., & Jafari, R. (2020). Stability Analysis and Bidirectional Vibration Control of Structure. In: Babu K., Rao H., Amarnath Y. (eds) *Emerging Trends in Civil Engineering*. Lecture Notes in Civil Engineering, vol 61. Springer, Singapore.
4. Jafari, R., Razvarz, S., Gegov, A., Paul, S., & Keshtkar, S. (2019). Fuzzy modeling for uncertain nonlinear systems using fuzzy equations and Z-numbers. In: Lotfi A., Bouchachia H., Gegov A., Langensiepen C., McGinnity M. (eds) *Advances in Computational Intelligence Systems*. UKCI 2018. Advances in Intelligent Systems and Computing, vol 840. Springer, Cham.
5. Jafari, R., Razvarz, S., Gegov, A., Paul, S., & Keshtkar, S. (2019). Fuzzy Sumudu Transform Approach to Solving Fuzzy Differential Equations With Z-Numbers. In *Advanced Fuzzy Logic Approaches in Engineering Science*, (18-48). IGI Global.
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