

NYI NYI AUNG

Personal Website: <https://nyinyiaung.com>

PUBLICATIONS

- [1] B. Haucke-Korber, **N. N. Aung**, M. Schenke, M. Peña, D. Jakobeit and O. Wallscheid, “Reinforcement Learning-based Direct Torque Control of Externally Excited Synchronous Motors: a Proof of Concept,” *2025 IEEE International Electric Machines & Drives Conference (IEMDC)*, Houston, TX, USA, 2025, pp. 916–921, doi: 10.1109/IEMDC60492.2025.11061093.
- [2] **N. N. Aung**, N. Muralles and A. Stein, “Object Identification Under Known Dynamics: A PIRNN Approach for UAV Classification,” *2025 International Conference on Machine Learning and Applications (ICMLA)*, Boca Raton, FL, USA, 2025, pp. 115–122, doi: 10.1109/ICMLA66185.2025.00022.
- [3] **N. N. Aung**, B. Wight, A. Stein, “Adaptive Input Shaper Design for Unknown Second-Order Systems with Real-Time Parameter Estimation,” *2026 American Control Conference (ACC)*, New Orleans, LA, USA, <https://doi.org/10.48550/arXiv.2601.17210>.
- [4] **N. N. Aung**, H. Shin, A. Lawlor and A. Stein, “Which Hyperparameters Matter? A Game-Theoretic Framework for Interpretable Hyperparameter Sensitivity Analysis,” *2026 International Conference on Machine Learning and Applications (ICMLA)*, Rochester, MI, USA. (Accepted, to appear).

MANUSCRIPTS UNDER REVIEW

- [5] **N. N. Aung** and A. Stein, “Development of a Gain-Modulated PID Framework: Theory and Validation on a Switched Buck Converter,” *IEEE Control Systems Letters (L-CSS)*.

RESEARCH EXPERIENCE

CONTROL SYSTEMS & DATA-DRIVEN METHODS FOR DYNAMICAL SYSTEMS

GRADUATE RESEARCH ASSISTANT | LOUISIANA STATE UNIVERSITY A&M, USA

01/2025 – Present

- **Gain-Modulated PID Control: A Framework for Sensitivity Shaping**
 - Reformulated the ultra-local model of iPID, eliminating the need for real-time estimation.
 - Introduced an additional degree of freedom for direct sensitivity shaping, independent of system models.
 - Emphasized robustness over purely model-free design, improving tracking performance and disturbance rejection under parametric uncertainty.
- **Adaptive Input Shaper for Unknown Single- and Multi-Mode Systems for Vibration Suppression**
 - Developed an online parameter estimation framework for modal identification of unknown systems.
 - Derived closed-form analytical solutions for optimal input shaper design, explicitly incorporating estimation-to-switch timing.
 - Validated the approach on second-order systems and dual spring–mass–damper systems, demonstrating improved vibration suppression performance.
- **Object Identification and Motion Prediction: A PIRNN + EDMD Approach for UAVs**
 - Designed and implemented a Physics-Informed Residual Neural Network (PIRNN) architecture.
 - Developed an encoder–decoder neural network for Extended Dynamic Mode Decomposition (EDMD).
 - Formulated a hybrid loss function integrating data-driven objectives with physics-based regularization.
 - Applied physics-informed classification using softmax-based multi-class confidence estimation.
- **Supervised Undergraduate Students in the Lab**
 - Held weekly meetings to review progress, provide guidance, and plan subsequent tasks.
 - Mentored undergraduate students in simulation and experimental research, leading to co-authored contributions.

ELECTRIC MACHINE DRIVES AND CONTROL

GRADUATE RESEARCH ASSISTANT | PADERBORN UNIVERSITY, GERMANY

03/2024 – 09/2024

- **Reinforcement Learning-based Direct Torque Control of Externally Excited Synchronous Motors**
 - Modeled the Externally Excited Synchronous Motor (EESM) drive system, including a B6 bridge converter for the stator circuit and a four-quadrant converter for rotor excitation, and identified the feasible operating region under voltage and current constraints.
 - Designed and implemented a Reinforcement Learning (RL)-based current control strategy for an EESM.
 - Developed a RL-based sensorless torque control approach for EESM, eliminating the need for a torque sensor.

- Formulated a reward function to balance dynamic performance and efficiency in torque control.

POWER ELECTRONICS & ENERGY CONVERSION

RESEARCH TRAINEE | UNIVERSITY OF OVIEDO, SPAIN

09/2023 – 02/2024

- **PCB Design and Hardware Deployment for Open-Loop Speed Control of Induction Motor (IM)**
 - Designed integrated circuit schematics for sensor signal adaptation with anti-aliasing filters using LTspice.
 - Developed PCB layouts in Altium Designer, implemented and tested physical system.
 - Deployed auto-generated controller code from Simulink to a microcontroller.
 - Validated system performance on an inverter-PCB-microcontroller-IM setup.
- **Battery Charging through HB-LLC Resonant Converter**
 - Modeled the Li-ion battery and designed the resonant tank circuit.
 - Generated PWM schemes for inductive, resistive, and capacitive switching modes.
 - Designed a PID controller for constant-current and constant-voltage charging.

POWER SYSTEMS & RELIABILITY

UNDERGRADUATE RESEARCHER | YANGON TECHNOLOGICAL UNIVERSITY, MYANMAR

03/2017 – 02/2018

- **Effect of Voltage Dip on Sensitive Loads and Countermeasure Methods**
 - Analyzed the impact of protection system failures on the Yangon distribution network during voltage dips.
 - Evaluated the effect of voltage dips on sensitive loads and proposed countermeasures to improve reliability.