Sun Minghui

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Summary

Third-year undergraduate student majoring in Physics. Strong academic background in computational and atomic physics, with experience in experimental courses. Possess solid knowledge of machine learning and mechanical structure design, along with laboratory research and teamwork experience. Research interests focus on tunable lasers and physics-informed neural networks (PINNs).

Education

B.S., Changchun University of Science and Technology, School of Physics, Major in Applied Physics

- Rank : 1 / 46

Research Experience

Modeling and Optimization of Tunable Solid-State Lasers Based on Seed Injection Locking, Project Leader

CUST
Jan. 2025 to Present
12 months

- Construction of physics-based models for seed injection locking in tunable 2-µm solid-state lasers is realized, and the dynamic coupling between seed light and resonator modes is systematically analyzed.

- Nonlinear dynamics during multi-wavelength tuning and thermo-optical coupling effects are investigated based on analytical modeling and numerical simulations, providing guidance for improving frequency stability and spectral purity.

- Parameter optimization and minimum injection power prediction are explored to support experimental design and performance optimization.

Physics-Informed Neural Network Modeling for Sodium-Ion Battery Systems, Project Leader

CUST
Sept. 2023 to Feb. 2025
18 months

- Construction of a physics-informed neural network (PINN) framework for the single-particle model (SPM) of sodium-ion batteries is realized by explicitly embedding electrochemical governing equations and boundary conditions.

- A residual-coupled attention PINN (RCA-PINN) architecture is developed to address large voltage prediction errors and low computational efficiency of conventional models under high-rate operating conditions.

- High-accuracy and real-time voltage prediction are achieved, with prediction errors reduced by over 50% and computational performance reaching approximately 0.01 s per time step, enabling real-time state estimation for battery management systems.

Additional Experience And Awards

Granted Invention Patent ×1
Invention Patents under Review ×2 (including 1 as **First Inventor**)
Utility Model Patents under Review ×3 (including 1 as **First Inventor**)

National Undergraduate Innovation Training Program (Key Project), Project Leader, 2025
Provincial-Level Undergraduate Innovation Project, Core Member, 2024 (Project Initiation)
Provincial-Level Undergraduate Innovation Project, Core Member, 2025 (Project Completion

National :
China Undergraduate Engineering Practice and Innovation Competition: Second Prize, 2025
China Robot and Artificial Intelligence Competition: Third Prize, 2025
Global Campus Artificial Intelligence Algorithm Competition: Excellence Award, 2025

Provincial / Regional Level :
Jilin Provincial Undergraduate Engineering Practice and Innovation Competition: Grand Prize, 2025
National Undergraduate Optoelectronic Design Competition : Second Prize
"Saibo Cup" Intelligent Robot Creative Competition : Second Prize, 2025
China Robot and Artificial Intelligence Competition : Second Prize
Global Campus Artificial Intelligence Algorithm Competition: Second Prize, 2025
National 3D Digital Design Innovation Competition : Third Prize
China (International) Sensor Innovation and Entrepreneurship Competition : Third Prize

Technologies

Languages: Solidworks, Python, Matlab, Keyshot, Overleaf
Software:

Proficient in Python (PINNs, deep learning for computer vision) and MATLAB (physical and laser simulations). Experienced in SolidWorks for mechanical design and motion simulation, with KeyShot for rendering. Familiar with Overleaf for academic writing