



PEILUN (TOMMY) LI

2301 Vanderbilt Pl, Nashville, TN, 37235

✉ peilun.li@vanderbilt.edu  [peilun-tommy-li.github.io](https://github.com/peilun-tommy-li)  [linkedin.com/in/peilunli777/](https://www.linkedin.com/in/peilunli777/)

Biography

I am a senior undergraduate student pursuing double majors in Computer Science (Honors track) and Mathematics (Honors track) at Vanderbilt University. I am passionate about understanding and developing novel data-driven approaches to analyze Cyber-Physical Systems with reliability, generalizability, and interpretability. Some of my recent works focus on combining Bayesian learning with physics prior knowledge to model physical systems.

Research Interests: Physics-Informed Learning, Uncertainty Quantification, Machine Learning, Robotics.

Education

Vanderbilt University

Aug 2021 – May 2025

B.S. in Computer Science (Hons) and Mathematics (Hons) (Double Majors)

GPA: 3.924/4.00

- **Research advisor:** Prof. Thomas Beckers
- **Major advisors:** Prof. Gautam Biswas, Prof. Glenn Webb
- **2025 CRA Outstanding Undergraduate Researcher Award Nominee**
- **Selected coursework:** numerical linear algebra, numerical modeling with differential equations, real and complex analysis, (scientific) machine learning, statistical inference and probability, topology, discrete math.

Publications

1. K. Tan, **P. Li**, J. Wang, and T. Beckers. “PnP-PIML: Physics-informed Learning of Outlier Dynamics using Uncertainty Quantified Port-Hamiltonian Models”. IEEE International Conference on Robotics and Automation (**ICRA**), 2025. (**under review**)
2. **P. Li**, K. Tan, and T. Beckers. “PyGpPHs: A Python Package for Bayesian Modeling of Port-Hamiltonian Systems”. In: Proceedings of the 8th IFAC Workshop on Lagrangian and Hamiltonian Methods for Nonlinear Control (**LHMNC**). 2024.
3. K. Tan, **P. Li**, and T. Beckers. “Physics-Constrained Learning for PDE Systems with Uncertainty Quantified Port-Hamiltonian Models”. In: Proceedings of the 6th Conference on Learning for Dynamics and Control (**L4DC**). 2024.

Research Experiences

Department of Computer Science, Vanderbilt University

May 2023 – Present

Research Assistant, VUSE Summer Fellowship '23 '24

Nashville, TN

- Project topics: Physics-Informed Bayesian Modeling, Uncertainty Quantification on Cyber-Physical Systems
- Collaborator: Kaiyuan Tan (Ph.D. Student); Mentor/PI: Prof. Thomas Beckers
- Current projects involve developing uncertainty-aware Model-Predictive Control (MPC) and outlier dynamics detection algorithms based on conformal prediction. One of the projects resulted in a paper [1] submitted to ICRA under review.
- Designed, developed, and maintained PyGpPHs, a Python package based on GP-PHS (Gaussian Process port-Hamiltonian System), that shows high accuracy, efficiency, and generalizability in modeling non-linear dynamics. This project resulted in a publication [2] in the IFAC workshop on LHMNC and a public, well-maintained toolbox.
- Studied and expanded Bayesian modeling approaches to distributed Port-Hamiltonian System (dPHS). Collaborated in implementing GP-dPHS models. This project culminated in a publication [3] in the L4DC conference.

Department of Mathematics, Vanderbilt University

Jan 2023 – May 2023, Aug 2024 – Present

Research Assistant

Nashville, TN

- Project: Math Modeling of Disease Biology with Systems of Ordinary and Partial Differential Equation (ODE and PDE)
- Mentor/PI: Prof. Glenn Webb
- Currently exploring the models of vaccine hesitation and analyzing mathematical properties of such models.
- Studied mathematical theories of disease modeling with ODEs and PDEs. Developed theory and constructed population age-structured, compartmentalized systems of ODEs that considers social contacts. Presented my findings and system of ODEs at Shanks Workshop on mathematical biology.

Data Science Institute, Vanderbilt University

Jan 2023 – May 2023

Research Assistant

Nashville, TN

- Project: Dialogic Questioning AI Product Using GPT Models for Improving Reading Comprehension among Children
- PI: Prof.Jesse Spencer-Smith, Dr.Umang Chaudhry
- Utilized Chat-GPT API for building a interactive dialogic questioning AI product. Improved the performance through prompt engineering and fine-tuning techniques.

Vanderbilt University Medical Center

Aug 2022 – Feb 2023

Research Assistant

Nashville, TN

- Project: Identification of Geometry-Defining Protein sub-chains using Neural Networks
- PI: Dr.Richard Stein, Prof.Hassane Mchaourab
- Studied basics of protein biology and neural networks, utilized tools like Omega-fold, protein library, and dimension reduction to engineer a learning framework for identifying and analyzing geometry-defining protein sub-chain.

Teaching Experiences

Department of Computer Science, Vanderbilt University

Aug 2022 – Present

Teaching Assistant and Grader

Nashville, TN

- CS4262/5262: Foundation of Machine Learning, Fall 2024
- CS3251/5251: Intermediate Software Design, Fall 2023, Spring 2024
- CS/DS1100: Applied Programming and Problem Solving with Python, Fall 2022

Department of Mathematics, Vanderbilt University

Aug 2024 – Present

Teaching Assistant and Grader

Nashville, TN

- Math3620/5620: Intro to Numerical Math, Fall 2024

Presentations

16th World Congress on Computational Mechanics (WCCM)

Jul 2024

Oral Presentation

Vancouver, British Columbia

- Presented our paper on PyGpPHs toolbox for Bayesian Modeling of Port-Hamiltonian Systems
- Presented our paper on Physics-Constrained Learning for PDE Systems with Uncertainty Quantified PHS

Institute for Software Integrated System (ISIS) 25th Anniversary Celebration

Aug 2023

Poster Presenter

Nashville, TN

- Presented our recent work on “Bayesian Physics-Informed Models for Soft Robotics.”

Shanks Workshop on Advances in Theoretical Biology and Mathematical Biology

Mar 2023

Poster Presenter

Nashville, TN

- Presented my work on Age-Structured Systems of Ordinary Differential Equation Modeling on COVID-19.

Awards and Honors

CRA Outstanding Undergraduate Researcher Award Nominee

Oct 2024

Computing Research Association (CRA)

- Selected as 1 of the top 4 undergraduates by the Department of Computer Science for excellence in research, representing Vanderbilt University in the award recognition among North American colleges and universities.

VUSE-ISIS Summer Research Fellowship (\$8000)

Mar 2024

Vanderbilt University

School of Engineering Research Travel Grant (\$500)

Feb 2024

Vanderbilt University

Tennessee Beta Chapter of Tau Beta Pi (TBP) at Vanderbilt University

Dec 2023

Tau Beta Pi (TBP)

- Award extended to undergraduate engineering majors who are in the top 12.5% of Class of 2025.

School of Engineering Award Undergraduate (\$6000)

May 2023

Vanderbilt University

- Scholarship award to 40 excelling undergraduate students in the School of Engineering.

American Mathematics Competition Honor Roll

Feb 2021

AMC10, AMC12

- Achieved top 5% score in the AMC 12 competition and AMC 12 Honor Roll; qualified for AIME.