Chenchen Huang

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Education

2024 (Expected)	**University of Southern California**, Los Angeles, CA Doctor of Philosophy (Ph.D.), Mechanical Engineering Master of Science (M.Sc.), Computer Science
06/2017	**Jilin University**, Changchun, China Bachelor of Science (B.Sc.), Energy and Power Engineering, Automotive Engine

Work Experience

05/2023 - 08/2023 — **Machine Learning Research Intern**, *TikTok/ByteDance Inc., Seattle*
- Developed a computational model using cloud-based high-performance computing and machine learning.
- Designed and engineered a comprehensive protein force fields generation toolkit:
  - Incorporated a custom database tailored for specific research and development needs.
  - Implemented an automated pipeline to optimize package performance, ensuring seamless execution on high-performance computing platforms, maximizing GPU/CPU computational resource utilization.
- Delivered marked advancements in drug discovery processes by:
  - Significant improvement on adaptability to diverse scenarios, and stability in production environment.
  - Improved simulation accuracy, guaranteeing dependable research outcomes.

08/2019 - Present — **Research Assistant**, *Bio-Inspired Motion Lab, University of Southern California*
- Engineered data-driven models and numerical simulations for large-scale dynamical systems and multi-agent interactions, leveraging high-performance computing (HPC).
- Advanced projects encompassing physics-informed neural networks and deep learning for dynamical systems.
- Conceptualized and executed experimental frameworks focused on underwater instability and object tracking.

Research Experience

08/2019 - Present — **Dynamical System of Multi-Agent Collective Behaviors**
- Developed models to capture patterns and interactions within multi-agent groups, with behavioral analysis.
- Fine-tuned algorithms for enhancing efficiency in real-time simulation of large-scale stochastic systems.
- Applied advanced time-series analysis and dimensionality reduction methods for macro-level data.
- Designed probabilistic models for evolution of dynamics, enabling pattern recognition and prediction.

05/2021 - Present — **Data-Driven Locomotion Control Policy**
- Formualted fluid dynamics model using reduce-order modeling fir analyzing animal locomotion.
- Developed continuous and discrete dynamical models for behavioral prediction algorithms.
- Optimized sensor configurations and control policies through data-driven evaluation.
- Implemented parallel computing simulations for optimal feedback control strategy discovery.

08/2016 - 04/2017 — **Hybrid Vehicle Battery Module Cooling Optimization**
- Analyzed battery specifications using data-driven techniques for optimal selection under specific conditions.
- Engineered a cooling system layout specifically for NiMH battery hybrid vehicles.
- Established a comprehensive testing framework to measure and evaluate cooling efficiency.
- Conducted aerodynamic simulations on battery cooling systems to optimize thermal performance.

Academic Projects

12/2021 — **Deep Operator Network for Physical System**
- Applied deep learning techniques to model mathematical operators in complex nonlinear systems.
- Developed a DeepONet-based framework for parameter inference in partially-observable systems.
- Benchmarked the model on a phase separation evolution system, showcasing robustness and accuracy.

05/2020 — **Epidemic Simulation with Collective Dynamics**
- Developed a data-driven transmission model considering spatial and probabilistic factors.
- Leveraged statistical methods and collective model to simulate the COVID-19 transmission dynamics.
- Conducted analysis on SIR/SEIR and spatial models to derive insights into virus propagation patterns.

05/2018 — **Bio-Inspired Robot** (*Featured in USC news*)
- Acquired and processed gait and joint motion data from Felidae family animals for robotic applications.
- Engineered a quadrupedal robot design inspired by biomechanical analysis of animal locomotion.
- Fabricated robot components using 3D printing (FDM) and integrated motor control using a microcontroller.

Skills

Programming Languages:	Python, MATLAB, C/C++, SQL
Machine Learning Framworks:	TensorFlow, PyTorch, scikit-learn
Libraries:	NumPy, SciPy, pandas, matplotlib, MPI, OpenMP, openMM
Other tools:	git, Linux, LaTeX, GROMACS, AMBER, AutoCAD, CATIA, SolidWorks

Coursework

Viterbi Engineering School

Analysis of Algorithms	Compressible Gas Dynamics
Dynamics of Incompressible Fluids	Engineering Analysis
Engineering Vibrations	Foundations of Artificial Intelligence
High Performance Computing and Simulations	Introduction to Computational Fluid Mechanics
Machine Learning and Computational Physics	Mechanical Behavior of Engineering Materials
Nonlinear Dynamical Systems, Vibrations, and Chaos	Performance Analysis Using Markov Models
Scientific Computing and Visualization	Transition to Chaos in Dynamical Systems
Machine Learning	Database Systems

Dana and David Dornsife Collefe of Letters, Arts and Sciences

Numerical Analysis and Computation	Methods of Computational Physics

Talks/Presentations

Nov. 2021	74th Annual Meeting of the American Physical Society Division of Fluid Dynamics (DFD) "Sensorimotor control of fish rheotaxis"
Aug. 2021	Remote Colloquium on Vortex Dominated Flows (ReCoVor) "Bistability in the collective behavior of confined fish schools"
Nov. 2020	73rd Annual Meeting of the American Physical Society Division of Fluid Dynamics (DFD) "Bistability in the collective behavior of confined fish schools"

Publications

2023	C. Huang, E. Kanso (in prep)., *Phase transition in the collective behavior of confined fish schools*
2023	C. Huang, E. Kanso (in prep)., *Sensorimotor control of fish rheotaxis*

Honors and Awards

The Frist Prize of Scholarship, Jilin University 2014
Excellent Student, Jilin University 2014
The Second Prize of Scholarship, Jilin University 2015
Excellent Student, Jilin University 2015
The Second Prize of Scholarship, Jilin University 2016

Misc. Association

Judge of Undergraduate Symposium for Scholarly and Creative Work, University of Southern California

Lead of PACE (Partners for the Advancement of Collaborative Engineering Education) Center, Jilin University
Projects: Rural Vehicle Market Research, Solar Energy Vehicle

Member of Innovation Center, Jilin University.