MATTHEW PAN

+1-609-917-6958 | mpan2@andrew.cmu.edu | LinkedIn | GitHub

EDUCATION

Carnegie Mellon University **Pittsburgh, PA**
B.S. Statistics & Machine Learning and Computer Science May 2028
- Selected Coursework: Computer Systems (15-213), Discrete Math (21-127), Imperative Computation (15-122)

EXPERIENCE

Undergraduate Researcher **Pittsburgh, PA**
Machine Learning Department, CMU May 2025 - Present
- Developing a multi-agent LLM system for clinical decision support, enabling real-time collaboration across diagnosis, treatment planning, and literature retrieval - in collaboration with Microsoft and Harvard Medical School
- Engineered an automated MCP orchestrator with a pipeline for discovering, configuring, and validating medical MCP servers via scraping, config generation, and Docker-based sandbox testing
- Second author on *NeurIPS 2025 GenAI4Health Workshop*; system slated for implementation at UPenn and the Children's Hospital of Philadelphia (CHOP), with open-source release planned

Undergraduate Researcher **Pittsburgh, PA**
McWilliams Center for Cosmology and Astrophysics, CMU January 2025 - Present
- Developing a novel Graph Neural Network cosmological simulator for complex physical systems that predicts particle accelerations and temperature evolution using an encode–process–decode architecture
- Improved simulation fidelity by 15–20% over prior GNN-based simulators (e.g., DeepMind's GNS), enabling stable rollouts across >1,000 timesteps
- First author on submission to *The Astrophysical Journal*; open-source release planned

Blockchain Research Intern **Taipei, Taiwan**
Academia Sinica June 2023 - July 2024
- Designed and implemented stochastic blockchain network simulators, improving predictive accuracy by 54% using reinforcement learning and Monte Carlo optimization
- Executed MEV mitigation experiments, analyzing transaction ordering, latency, and topology across five blockchain architectures, enabling more stable and fair transaction processing

Web3 Analyst Intern **Taipei, Taiwan**
AppWorks Venture August 2023 - December 2023
- Built and deployed a full Cosmos-based blockchain network to benchmark Skip Protocol's MEV SDK and interoperability features, assessing feasibility for production use, leading to an investment decision
- Conducted due diligence on 30+ AI/Web3 startups in Greater SEA, assessing technical feasibility, market potential, and risk through structured founder interviews

PUBLICATIONS

Li, Y., **Pan, M**., Liu, C., Zhu, H. *Medical Deep Research: Orchestrating LLM Agents and Resources for Medical Investigation*. **NeurIPS 2025 GenAI4Health Workshop (Poster)**.

Pan, M., Catalano, A., Zhang, X., Croft, R. *Learning the Evolution of Large-Scale Cosmological Structure via Graph-Based Deep Learning.* **The Astrophysical Journal (Under Review)**.

SKILLS

Programming: Python, Java, JavaScript, C++, R, Go
Frameworks: PyTorch, TensorFlow, scikit-learn, Hugging Face Transformers, NetworkX, NumPy, Matplotlib
Tools: Git, Docker, Supabase, Next.js, Vercel, Slurm, Linux
Topics: Graph Neural Networks, Large Language Models, Physics-Informed Neural Networks, Model Evaluation

LANGUAGES

English (Native), Mandarin (Native)