DENG HAOPENG

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Looking for MPhil opportunities in Intelligent Transportation Systems

EDUCATION

Guangzhou Maritime University **09/2022-07/2026**
School of Intelligent Transportation and Engineering
B.Eng. in Engineering Management Average Score: 82.79

PUBLICATIONS

- **Deng, H.**, Zheng, F., Ma, K., & Xia, X. (2025). Adaptive Truncated Schatten Norm for Traffic Data Imputation with Complex Missing Patterns. *The 25th COTA International Conference of Transportation Professionals*, Guangzhou, China. DOI: 10.21203/rs.3.rs-6804022/v1
- **Deng, H.**, Zheng, F., & Zhan, L. (2024). Application of Markov Processes in Traffic Signal Control. *International Core Journal of Engineering*. DOI: 10.6919/ICJE.202411_10(11).0015
- Wang, Q., **Deng, H.**, Deng, H., Cai, J. et al. (2025). Research on the incentive mechanism of a comprehensive carbon pricing system for carbon emission reduction and carbon sink enhancement. *Journal of Guangzhou Maritime University*. Available on CNKI
- Wang, Y., Gao, Z., & **Deng, H.** (2024). An Analytical Exploration of Limits and Infinitesimals. *World Scientific Research Journal*. Corresponding Author. DOI: 10.6911/WSRJ.202409_10(9).0003
- Wang, Y., Zhang, H., Zhou, Y., **Deng, H.**, et al. (2025). Exploring the 2-Part of Class Groups in Quadratic Fields: Perspectives on the Cohen–Lenstra Conjectures. *Mathematics*. DOI: 10.3390/math13010051

MANUSCRIPTS

- Wang, Y., Li, L., **Deng, H.**, et al. (2025). Sparse Stochastic Optimal Control under Control-Depen dent Diffusion and Time-Varying Dynamics. Under review at *SIAM Journal on Control and Optim ization*. DOI: 10.21203/rs.3.rs-6612631/v1

RESEARCH EXPERIENCES

Guangdong Provincial Special Fund for Science and Technology Innovation Strategy **07/2024-present**
Title: *Cooperative Game-Based Network Traffic Assignment Mechanisms for Enhancing Urban Transportation Efficiency* | *Project Leader*

- Developed a unified VI-based DTA model capturing UE–SO continuous spectrum across dual time scales, integrating collaboration ratio γ, altruistic weight ρ, learning rate λ, and information completeness β.
- Analysed nonlinear dynamics in γ–ρ–λ–β 4D control parameter space of mixed CAV–HDV networks, revealing Hopf bifurcations patterns and diagnosing chaotic attractors via Lyapunov exponents.
- Authored a systematic review on mixed-traffic DTA, synthesizing insights from 80+ studies on modeling paradigms, equilibrium evolution, solution algorithms, and emerging research trends.
- Direct team task delegation, milestone tracking, and mentoring of junior members; coordinate regular progress meetings to align efforts and ensure on-schedule research deliverables.

Guangdong Provincial College Student Innovation and Entrepreneurship Training Program **11/2024-present**
Title: *Intelligent Recognition of Urban Traffic Equilibrium States under Air-Ground Collaborative Monitoring* | *Core Member (Second Rank)* | *Instructor: Prof. Xinhai Xia*

- Integrating heterogeneous data sources from roadside sensors, probe vehicles, and UAVs to construct high-dimensional traffic flow tensors, supporting accurate traffic equilibrium state recognition.
- Formulated three representative real-world data loss structures—element-wise, fiber-wise, and mixed—within urban traffic flow tensors, serving as a rigorous testbed for refining data recovery algorithms.
- Developed an adaptive truncated Schatten norm-based low-rank tensor completion model to effectively fill gaps in traffic datasets with complex missing patterns, improving MAPE by 10.6% and RMSE by 6.1%.
- Facilitated industry-academia partnership for traffic survey equipment and training, guided junior students in fieldwork to create datasets for analysing traffic flow dynamics and defining equilibrium states.

The Hundred Thousand Talent Plan **07/2024**

Title: *Investigation and Research on Traffic Safety and Planning in Kaiping City | Project Leader*

- Collaborated with the Municipal Transportation Department to analyse traffic accident and violation data, identifying accident hotspots and associated hazard types, and designing two targeted questionnaires.
- Led a seven-person team to conduct on-site surveys, interviews, inspections, and drone photography, collecting data on traffic flow, vehicle management, pedestrian movement, and infrastructure.
- Utilised SPSS and LLM tools for analysis of survey data and interview recordings, uncovering key issues and proposing actionable solutions that provided insights into the city's traffic safety and planning.
- Authored two technical documents: one analysing the relationship between traffic safety behaviour, attitude, and cognition using Structural Equation Modeling; the other assessing Kaiping City's traffic governance through Grey Relational Analysis and Fuzzy Evaluation. The project's final report was subsequently adopted by the Municipal Transportation Bureau.

INTERNSHIP

Guangzhou Xueshujia Software Technology Co., Ltd. **01/2025-05/2025**

Simulation Assistant Engineer

- Deployed a multi-agent reinforcement learning framework for CAV control within the company's traffic simulation software, to dissipate shock waves on smart highways.
- Benchmarked the software against leading simulation platforms like SUMO and CityFlow, and raised optimisation suggestions to enhance product competitiveness.
- Researched a wide range of traffic-related competitions and conferences, analysing the technical trends in intelligent transportation, vehicle-infrastructure cooperation, and big data applications, providing strategic insights for industry-academia collaboration.

EXTRACURRICULAR ACTIVITIES

Innovation and Entrepreneurship Incubation Park **03/2024-03/2025**

AIGC Imaging and Media Entrepreneurial Project | Founder and Technical Lead

- Designed customized image generation workflows based on Stable Diffusion, providing AIGC solutions for clients in industries such as shipping logistics and sports apparel.
- Developed special effect workflows for E-commerce model clothing changes, product rendering, and cosplay photo effects, centred on ComfyUI and combined with Flux and Midjourney, estimated to cut costs by ~20% and boost efficiency by ~30%.

Voluntary Teaching Programme at Maoming Country Primary School **07/2023**

- Designed and delivered interactive lessons to primary school students; engaged with local communities to gather insights on rural revitalisation and industrial development.
- Wrote a community report and four promotional articles to publicise local industries and rural life, inspiring more students to participate in volunteer education programmes.

AWARDS & HONOURS

- Meritorious Winner (M Award), Interdisciplinary Contest in Modeling (ICM), COMAP, 2025.
- Third Prize, China Undergraduate Mathematical Contest in Modeling, Guangdong Division, 2024.
- Second Prize, 19th College Students Transportation Science and Technology Competition, 2024.
- Third Prize, 18th "Challenge Cup" College Students' Extracurricular Academic Science and Technology Works Competition, Guangdong Division, 2024.
- Merit Scholarship (Third Class), Guangzhou Maritime University, 2023.

SKILLS & INTERESTS

- **Technical Tools:** Python, MATLAB, SUMO, LaTeX, Git, SPSS, Photoshop, Illustrator
- **Research Interests:** Intelligent Transportation System, Urban Mobility Modelling, Multi-agent Control, Mixed Traffic Dynamics, Spatiotemporal Data Analysis, Applied Mathematics