Daniel (Hao-Yun) Tsen 曾浩允

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EDUCATION

Li Po Chun United World College of Hong Kong Aug 2024 – May 2027

- IB Diploma. Physics HL, Chemistry HL, Math AA HL, Economics SL, Chinese A Language and Literature SL, English A Language and Literature SL

Taipei Wego Private Senior High School, Taiwan Sep 2023 – Jun 2024

National Tsing Hua University, Gifted Physics Program, Taiwan Sep 2023 – Jun 2024

- Introductory Linear Algebra with Applications, Matrix, Multivariate Differential Calculus, Newtonian Mechanics, Lagrangian Mechanics

StanCode SC101, Taiwan Feb 2024 – Jun 2024

- Course adapted from Stanford CS106B (continuation of CS106A); awarded Turing Certificate for top-scoring students and a scholarship

StanCode SC201, Taiwan Jul 2024 – Sep 2024

- CS221 Artificial Intelligence / CS229A Applied Machine Learning / CS230 Deep Learning / CS231N Convolutional Neural Networks for Visual Recognition

RESEARCH & TECHNICAL EXPERIENCE

MIT City Science Lab @ Taipei Tech — Research Trainee, Urban Informatics Jul 2026 – Present

- Developed a multi-agent pedestrian simulation of Taipei's Da'an District, where LLM-driven agents plan daily schedules, navigate a real ~6,800-node street network via A* pathfinding, and interact socially, with server-side congestion feedback shaping routes.
- Designed the agent-to-agent interaction gating system governing when nearby agents converse, and built a deterministic engine enabling byte-identical replay of any simulation run.
- Implemented research infrastructure including content-addressed LLM response caching, per-tick run snapshots, and a fork-and-compare system for injecting events (e.g., road closures) mid-simulation and visually diffing how agent behavior diverges across branched timelines.
- Extended the system to sub-hour event granularity and multi-day simulation with cross-day agent memory, using Next.js/TypeScript, Mapbox GL, and a lab-hosted vLLM inference backend.
- Integrated OpenTripPlanner multimodal routing (walk, bike, metro, bus, car) with travel-time-based transport decisions and end-of-day mode-share tracking.

NASA Data Science Analysis and Scholarly Research Paper Writing Young Scholars Internship, George Mason University Jun 2025 – Sep 2025

- Worked with professional exoplanet time-series datasets using Python, Jupyter, and AstroImageJ for quantitative light curve analysis.
- Conducted ground-based follow-up observations and time-series photometry for TESS Object of Interest TOI 5147.01, reducing telescope images, generating calibrated light curves, and checking for nearby eclipsing binaries to support TESS validation efforts.

NextGen Science: Machine Learning & Bioinformatics, George Mason University Oct 2025 – Dec 2025

- Designed and optimized an end-to-end Orange Data Mining pipeline (feature preprocessing, model selection, cross-validation, visualization) using supervised and unsupervised methods to analyze biological sequence data and predict self-assembling peptide behavior.

Hong Kong Young Physicists' Tournament — Team Lead Sep 2024 – Feb 2025

- Developed and tested experimental setups for the Ruler Cannon and Wirtz Pump, from theoretical modeling through data collection and analysis.
- Presented and defended results in physics “fights”; achieved a Top-6 finish in Hong Kong and a Silver Medal.

PUBLICATIONS & PRESENTATIONS

- “Generative Agents City Simulation” — first-author paper accepted after peer review for a long oral presentation at the TAAI 2026 High School Special Session (International Conference on Technologies and Applications of Artificial Intelligence); presenting November 2026.
- “Predicting Peptide Self-Assembly Using Machine Learning: A Comparative Study of Sequence-Based Feature Representations” — with Christopher Lockhart, George Mason University Young Scholars Research Program, January 2026. DOI: 10.13021/MARS/15267.

SELECTED COMPETITIONS & AWARDS

- Hong Kong Young Physicists' Tournament 2025 — Silver Medal, 6th in Hong Kong (team lead)
- HiMCM 2024 — Honorable Mention, top 25% worldwide (team lead)
- AMC 12B 2024 — First Place at test center; qualified for AIME 2025
- UKMT Senior Mathematical Challenge 2024 — Gold
- Stanford Math Tournament 2024 — Honorable Mention in Algebra
- VEX Robotics (2023–2025) — Inspire Award and Top-4 at the VEX V5 Taiwan Open; Design Award; qualified for regionals and quarter-finals
- Taipei Robotech 2023 — 5th place in Taipei City (EV3 robot)
- Wego School-wide Science Exhibition (hydraulic jump) — Second Prize
- Taiwan Scientific Measurement Competition — 7th place overall

LEADERSHIP & ACTIVITIES

LPC Robotics Club — Founder & Mentor Sep 2024 – Present

- Teach peers Python programming, Arduino, and electronics while leading projects that build robots from recycled materials.

LPC Aeromodelling Club — Co-Leader Sep 2024 – Present

- Design and build remote-controlled model aircraft using reused materials and basic aerodynamics principles; co-lead weekly club sessions and iterative test flights.

LPC Astronomy Club — Leader Sep 2026 – Present

- Lead weekly sessions introducing students to observational astronomy, night-sky navigation, and telescope use.

LPC Dragon Dance — Member Sep 2024 – Present

- Perform traditional dragon dance at school events to share Chinese culture and develop teamwork, coordination, and physical endurance.

Project Week — Student Leader, Taiwan Trip Oct 2024 – Mar 2025

- Proposed, budgeted, and organized a fully student-led Project Week trip to Taiwan, coordinating routes, food, transport, and partner schools; led the group in Taipei and eastern Taiwan, adapting plans in real time and managing safety and logistics.
- Collaborated with a Paiwanese tribal elementary school to co-run an Arduino-based robotics lesson and cultural exchange, translating between languages and facilitating activities.

Taipei Wego VEX Robotics Team — Founder & Mechanics Lead Jun 2023 – Dec 2024

- Led mechanical design for competition robots and mentored younger members (Grades 8–10) in engineering fundamentals and hardware assembly.

Taipei Wego Robotics Club — Founder & Mentor Jan 2023 – Sep 2024

- Coached students to build EV3 robots for competitions such as Taipei Robotech, focusing on iterative design and debugging.

Anyone Can Teach (ACT) — Teaching Volunteer Jun 2023 – Sep 2024

- Taught science and other topics at rural elementary schools during summer and winter breaks to increase access to engaging STEM education.

SKILLS

Programming: Python (strong), TypeScript/Next.js, C/C++, Java (intermediate).

Software: VS Code, PyCharm, Jupyter Notebook, Orange Data Mining, Blender, OBS, Fusion 360, Onshape, AstroImageJ, MS Office.

Technical: Machine learning, deep learning, CNNs for visual recognition, agent-based simulation, Monte Carlo modeling, data structures and algorithms, web scraping, basic electronics and soldering, observational astronomy and time-series analysis.

Languages: Mandarin, Taiwanese, English (native); Cantonese (intermediate); German (A2.2).

Interests: Robotics, aeromodelling, telescope observation, PC building, taekwondo (black belt), gym and boxing, e-sports (Valorant, Immortal rank), dragon dance.