LOUIS SUNGWOO CHO

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RESEARCH INTERESTS

Autonomous Mobility	Digital Twin Modeling	Traffic Flow Modeling
Intelligent Transportation Systems (ITS)	Reinforcement Learning	Urban Network Science

EDUCATION

University of Illinois at Urbana–Champaign Aug 2020 – May 2025
M.S. in Civil Engineering (Transportation), GPA: 3.46/4.00
Thesis: *Evaluating and Comparing Longitudinal Control Strategies for Autonomous Vehicles*
Advisor: Prof. Alireza Talebpour

B.S. (Honors) in Civil Engineering (Transportation), GPA: 3.55/4.00
Minor in Computer Science
Advisor: Prof. Alireza Talebpour

EXPERIENCE

Graduate Research Assistant Jul 2024 – May 2025
University of Illinois Urbana–Champaign, Urbana, IL

- Calibrated **control spacing policies** for Connected and Autonomous Vehicles (CAVs) using a **genetic algorithm**, enabling real-time adaptation to dynamic traffic conditions and improving flow stability and safety across dynamic traffic conditions.
- Simulated large-scale traffic environments involving both **heterogeneous (mixed-autonomy)** and **homogeneous** vehicle fleets to conduct comprehensive **string stability and hysteresis analyses**; demonstrated how CAV penetration significantly dampens shockwave propagation in stop-and-go traffic.
- Integrated custom **trajectory planning algorithms** on a **full-scale autonomous vehicle platform** using **ROS (Robot Operating System)**; conducted closed-loop experiments at the **Illinois Center for Transportation (ICT)** to evaluate real-time path tracking, control smoothness, and latency.
- Contributed a **data-driven behavioral analysis** using the **Phoenix Robotaxi Open Dataset**, comparing lane-change frequency, car-following gaps, and reaction latency between human-driven and autonomous agents; visualized trajectory patterns and extracted empirical metrics to quantify trajectory behavior.

Undergraduate Research Assistant May 2023 – May 2024
University of Illinois Urbana–Champaign, Urbana, IL

- Designed and implemented a **trajectory re-identification framework** using **LSTM-based Convolutional Social Pooling**, enhancing vehicle tracking performance in occluded and low-visibility environments.

– Conducted hyperparameter tuning, temporal feature engineering, and training deep neural networks to improve model robustness under varying observation windows.

– Completed a year-long independent study culminating in a technical report analyzing trajectory matching fidelity across network architectures and scene complexities.

– Investigated the use of **GPT-style Transformer models** for sequential vehicle state prediction and explored its integration with **Deep Reinforcement Learning (DRL)** for policy learning in mixed-autonomy traffic simulations.

Undergraduate Researcher May 2022 – August 2022
University of Illinois Urbana–Champaign, Urbana, IL

– Co-developed **AutoVerse-AI**, a simulation platform for **control verification** of autonomous vehicles, controller safety and performance under various scenarios (github.com/AutoVerse-ai/Verse-library).

– Assisted with parsing and cleaning Open Roads ASAM files and road geometry data needed to be integrated for the controller agents.

PUBLICATIONS & MANUSCRIPTS

– **Cho, L. S, Talebpour, A.** (2025). *Evaluating Longitudinal Control Strategies for Autonomous Vehicles*. **Under review** in the ASCE Journal of Transportation Engineering, Part A: Systems.

– **Cho, L. S.** (2025). *Evaluating and Comparing Longitudinal Control Strategies for Autonomous Vehicles*. Master's Thesis, University of Illinois Urbana-Champaign.

– **Cho, L. S.** (2024). *Trajectory Reconstruction Based on Probabilistic Time-Space Diagram*. CEE 497 Senior Independent Study Thesis advised by **Talebpour, A**.

AWARDS & RECOGNITIONS

Charles E. DeLeuw Scholarship Mar 2025
Awarded to outstanding civil engineering students to study urban transit systems abroad. Conducted a field study in South Korea, analyzing the public transit network and producing a report on lessons applicable to U.S. transit planning.

UIUC Engineering Open House Outstanding Exhibit Award, 3rd Place Apr 2024
Recognition for a mobility exhibit covering **High-speed Rail**, **Maglev**, **eVTOL**, **BRT**, and **AI-driven** time-series forecasting for transit planning.

Grant W. Shaw Memorial Scholarship Mar 2023
Faculty-selected award recognizing **Leadership in Traffic Engineering** awarded by Schaumburg Chapter, and Illinois Association of Highway Engineers.

LICENSES & CERTIFICATIONS

Engineer in Training (E.I.T), Civil Engineering Oct 2025
Issued by National Council of Examiners for Engineering and Surveying (NCEES)

LEADERSHIP & SERVICE

Institute of Transportation Engineers (ITE), UIUC Chapter

President Aug 2022 – May 2024

- Revived a dormant transportation organization by leading professional development and organizing seminars and panels with industry leaders and professors in **CAVs** and **ITS**; increased student participation by **60%** and built partnerships with national ITE chapters, and volunteered at major transportation conferences.
- Directed the Champaign-Urbana bus ridership trend and transit planning research and analytics project to analyze and forecast routes with high demand using time-series forecasting, and presented results at the **2024 UIUC Engineering Open House** which earned **Top 3 Outstanding Exhibit Award** out of 200+ projects.

Graduate Student Representative May 2024 – May 2025

- Facilitated collaboration between undergraduate and graduate members, strengthening mentorship and project integration.
- Contributed to a chapter-wide case study and feasibility analysis on **High-Speed Rail (HSR)** development from Chicago to St. Louis.

Representative to the Engineering Council Sept 2023 – Apr 2024

- Advocated for the importance of **diversity in transportation** in the school community by building cross-disciplinary connections with representatives from other student organizations.
- Participated in **university community volunteering activities**.
- Coordinated K–12 robotics outreach and networking events with UIUC engineering leadership.

SELECTED PROJECTS

GRAIC Autonomous Driving Competition Mar 2025 – May 2025

Collaborated in a team to design and test autonomous driving algorithms; implemented and compared **RRT**, **Potential Field Steering**, and **End-to-End ML models** for obstacle avoidance and performance evaluation in simulation USING CARLA, ROS, and GAZEBO.

Bus Rapid Transit (BRT) Feasibility Study Jan 2023 – Mar 2023

Conducted a feasibility analysis of a proposed Bus Rapid Transit (BRT) system in Champaign–Urbana, applying **mathematical optimization models** and **Python programming** to determine optimal stop placement, estimate boarding and alignment passengers, and assess potential improvements in travel efficiency.

SKILLS

Programming: Python, Java, C++, HTML/CSS/JavaScript, ReactJS
Simulation: ROS, CARLA, Gazebo, HCS
Design/Tools: Git, Cloud, Docker, LaTeX, Bentley Openroads, AutoCAD, Revit
Languages: English, Korean