

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
Labs: Smart City Laboratory
Thesis: *Evaluating 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
Labs: Smart City Laboratory; Reliable Autonomy Group
Advisors: Prof. Alireza Talebpour; Prof. Sayan Mitra

EXPERIENCE

Graduate Research Assistant, Smart City Laboratory, UIUC Jul 2024 – May 2025

- Calibrated **control spacing models** for autonomous vehicles using a **genetic algorithm** to optimize performance across varied traffic scenarios; demonstrated that parameters must **adapt dynamically** to ensure stability.
- Conducted traffic flow stability analysis by simulating **heterogeneous (mixed autonomy)** and **homogeneous** traffic scenarios, demonstrating how the presence of autonomous vehicles mitigates stop-and-go shockwaves compared to fully human-driven flows.
- Deployed planning and control algorithms on a **physical autonomous vehicle** using **ROS**; analyzed real-time vehicle dynamics at the **Illinois Center for Transportation** to validate trajectory-tracking responsiveness.
- Performed **comparative behavioral analysis** using the Phoenix Robotaxi Open Dataset, examining lane-changing and car-following patterns of human versus autonomous drivers; conducted exploratory data analysis and trajectory visualizations to show behavioral differences.

Undergraduate Research Assistant, Smart City Laboratory, UIUC May 2023 – May 2024

- Developed a **trajectory re-identification** pipeline incorporating **LSTM-based Convolutional Social Pooling**, improving vehicle detection accuracy in low-visibility scenarios, and completed a year long independent study report.
- Explored integration of **GPT-based sequence modeling** with **Deep Reinforcement Learning** for vehicle state prediction, evaluating feasibility for mixed autonomy traffic simulations.

Undergraduate Researcher, Reliable Autonomy Group, UIUC

May 2022 – Aug 2022

- 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).

PUBLICATIONS & MANUSCRIPTS

- **Cho, L. S. & Talebpour, A.** (2025). *Evaluating Control Spacing Strategies for Autonomous Vehicles*. **Under review** in the ASCE Journal of Transportation Engineering, Part A: Systems.
- **Cho, L. S.** (2024). *Trajectory Reconstruction Based on Probabilistic Time-Space Diagram*. CEE 497 Independent Study Senior Thesis advised by **Talebpour, A.**

LEADERSHIP & SERVICE

Institute of Transportation Engineers (ITE), UIUC Chapter

President

Aug 2022 – May 2024

- Led professional development by organizing seminars and panels with industry leaders in **CAVs** and **ITS**; increased student participation by **60%** and built partnerships with national ITE chapters, and volunteered at major transportation conferences.
- Directed a **transit analytics** project (ML-based bus ridership trends), identified capacity gaps, and presented at the *UIUC Engineering Open House*; earned **Top 3 Award** out of 200+ projects.
- Coordinated K–12 robotics outreach and networking events with UIUC engineering leadership.

Graduate Student Representative

May 2024 – May 2025

- Organized graduate-level panels on transportation research and career development.
- 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**.

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.

Sustainable Road Network Design

Oct 2024 – Dec 2024

Designed an optimization-based framework for sustainable roadway improvements, balancing traffic efficiency, reducing travel time, and environmental impact reduction by Python-based modeling.

IL 9 Road Design Project

Jan 2024 – May 2024

Performed horizontal and vertical geometric alignments for roadway design in accordance with AASHTO standards, calculating vertical grade parameters to ensure safety, visibility, and smooth driving conditions, while integrating **Bentley OpenRoads** with Python-based calculations to streamline alignment evaluation.

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.

University of Illinois Traffic Impact Analysis Study

Oct 2022 – Dec 2022

Led a traffic impact study for five UIUC intersections, projecting 2024 volumes and estimating site-generated trips using ITE guidelines. Modeled LOS with HCS under various scenarios, including Route 150 rerouting and Springfield Ave restrictions. Proposed low-cost signal and geometric improvements that reduced delays and improved intersection performance.

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** (UIUC Transportation area; Schaumburg Chapter, Illinois Association of Highway Engineers).

SKILLS

Programming: Python, Java, C++, HTML/CSS/JavaScript, ReactJS

Transportation/Simulation: ROS, CARLA, Gazebo, HCS

Design/Tools: Git, Cloud, Docker, LaTeX, Bentley Openroads, AutoCAD, Revit

Languages: English, Korean