

Dongyoon Kim

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1994-12 | Male



Education

Tsinghua University	Vehicle Engineering	Master of Science 2021. 09 – 2024. 06 GPA: 3.76/4.0
UNIST	Mechanical Engineering	Bachelor of Science 2013. 03 – 2020. 09 GPA: 3.75/4.3
Technical Languages:	Python, C++, Java, SQL, MATLAB, Latex	
Technical Skills:	Ubuntu, Docker, Casadi, Reinforcement Learning, Neural Network, MPC, PID, LQR, Nonlinear Control, Vehicle Dynamics Model, Git	
Research Areas	High Efficient Real-time Vehicle Control, Online Optimization, Path Selection, Autonomous Driving Decision and Control Platform, Autonomous Driving Simulation Platform	
Awards & Positions	Second-class Scholarship (2023), Chinese Government Scholarship (2021-2023), Excellent Academic Performance Award (2020), Semester Honors (2017, 2019), Full Scholarship for Engineering Students (2013-2020), Violinist in University Orchestra (2018-2019), Mechanical Engineering Student Council (2014), Manager in Non-profit Educational Company (2013-2014, 2017), Air Force Military Service (2015-2017)	

Experience

01. Intergrated Decision and Control (IDC) Platform Design and Development for Advanced Autonomous Driving

- **Project Description:** This project is a collaborative project with Toyota and GAC, aims at addressing the inefficiency of existing hierarchical decision and control methods. This project involves designing an integrated decision and control approach to optimize efficiency. The approach involves static path planning, path optimization, and dynamic trajectory tracking. It utilizes static information for path planning, selects an optimal reference trajectory based on five metrics, and employs neural networks, MPC for obstacle avoidance and tracking control in dynamic environments.
- **Main Contributions:** Implemented the path selection module considering safety, compliance, traffic flow, economy, and comfort metrics. Developed the neural network deployment module and the static trajectory adjustment module based on front obstacles. tested IDC with the autonomous driving simulation platform and conducted troubleshooting. Participated in vehicle experiments.
- **Main Technologies:** C++, Python, Ubuntu, Evaluation Metrics, Docker, Autonomous Driving Simulation, Apollo

02. Large-scale Autonomous Driving Vehicle Simulation Software (LasVSim) Design and Development

- **Project Description:** This software focuses on simulating complex traffic scenarios for autonomous driving. It provides diverse simulation testing scenarios and various sensor models, supporting simulation and training of autonomous driving decision and control algorithms, along with result analysis and evaluation.
- **Main Contributions:** Implemented the V2V communication module and incorporated parallel programming.
- **Main Technologies:** SUMO, Simulation Scenario Construction, Python, Autonomous Driving Simulation

03. High Efficient Real-Time Control Research Based on Control Barrier and Lyapunov Functions

- **Project Description:** This project aims to address the real-time performance issues of commonly used iterative controllers. It transforms constrained optimal control problems into a scalar function and employs control laws based on gradients and dynamic models to achieve high real-time capabilities, obstacle avoidance, and trajectory tracking in vehicle control.
- **Main Contributions:** Designed, researched and developed a real-time control algorithm. Implemented MPC and PID controllers for comparison purposes. Deployed the algorithm within the IDC and LasVSim unified simulation platform. Conducted simulation tests and theoretical analysis. Drafted a research paper and a patent (papers and patents pending submission).
- **Main Technologies:** C++, Python, Casadi, MPC, PID, Optimal Control, Dynamic Models, Nonlinear Control

Research Achievement

01. Patents

- Co-inventor of two patents related to IDC, serving as the third author on one patent and the seventh author on another.

02. Software Copyrights:

- Co-holder of copyrights for two autonomous driving software applications related to IDC and LasVSim, contributing as the sixth author on one and the seventh author on another.