Nan Wang

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EDUCATION

University of California, Santa Cruz, *Santa Cruz CA* *September 2018—Now*
Ph.D. candidate in Computer Science and Engineering, GPA: 3.85/4.0

Tongji University, *Shanghai China* *September 2015—June 2018*
Master of Science in Control Theory and Engineering, GPA: 89/100

RESEARCH FOCUSES

- Motion planning for hybrid systems
- Motion planning and control for autonomous vehicles
- Hybrid system modeling, computation and analysis
- MPC-based tracking control for hybrid systems

SELECTED PUBLICATIONS

[1] **N. Wang**, and R. Sanfelice, Rapidly-exploring Random Tree Algorithm for Hybrid Dynamical Systems, in 61st IEEE Conference on Decision and Control, 2022.(accepted)

[2] **N. Wang**, M. Song, J. Wang, and T. Gordon, A flow-field guided method of path planning for unmanned ground vehicles, in 56th IEEE Conference on Decision and Control, 2017, pp. 2762-2767.

[3] A. Ames, **N. Wang**, and R. Sanfelice, A set-based motion planning algorithm for aerial vehicles in the presence of obstacles exhibiting hybrid dynamics, in 6th conference on control technology and applications, 2022.(accepted)

[4] M. Song, **N. Wang**, T. Gordon, and J. Wang, Flow-field guided steering control for rigid autonomous ground vehicles in low-speed manoeuvring, Vehicle system dynamics, vol. 57, no. 8, pp. 1090-1107, 2019.

[5] M. Song, **N. Wang**, J. Wang, and T. Gordon, A fluid dynamics approach to motion control for rigid autonomous ground vehicles, in Dynamics of vehicles on roads and tracks: Proceedings of the 25th international symposium on dynamics of vehicles on roads and tracks (IAVSD 2017), 2021, p. 347.

SELECTED PROJECTS

Research Assistant in Hybrid System Lab advised by Professor Ricardo Sanfelice

- **Motion Planning for Hybrid Systems:** Developed **BFS/RRT**-based motion planning software tools for hybrid systems based on **Matlab/Simulink**. The software tools are capable of generating **motion plans for hybrid systems**. Proved the **exactness** and **probabilistic completeness** properties of those tools. (two conference papers submitted, one journal paper in progress)
- **MPC-based Tracking Control for Hybrid Systems:** Designed a **model predictive tracking controller** for hybrid systems. Proved its **convergence** property. Verified the control strategy on **Matlab/Simulink**. (one paper in progress)
- **Set-based Motion Planning for Drones in the Presence of Hybrid Obstacles:** Implemented a set-based motion planner for drones that considers the obstacles exhibiting both continuous and discrete behaviors using **C++**. (one conference paper accepted by CCTA)

Research Assistant in Lab of Vehicle Control & Networking advised by Professor Jun Wang

- **Decision Making, Trajectory Planning and Control Modules Development:** Developed a **finite state machine**-based decision making module using **Stateflow**, a **Bezier curve**-based trajectory planning module, and a **preview tracking controller** using **C++**. The three modules are tested on **CarMaker** simulation software and a **full-size autonomous vehicle platform** configured by **ROS**.
- **Flow Field-guided Trajectory Planning for Ground Vehicles:** Developed a flow field-guided trajectory planning software tool for ground vehicles using **ANSYS ICEM CFD** and **Matlab/Simulink**. (two conference papers and one journal paper published)
- **Path Planning for Autonomous Parking Systems:** Developed a **geometry-based** path planning module for autonomous parking systems using **C++**. The proposed path planning method **decreases** the **minimal length** of the **feasible parking lot by** 7%**.**
- **Differential GPS Data Processing:** Developed a GUI software to navigate autonomous vehicles using differential GPS data on **Matlab**. The GUI software incorporates the functionalities of **path planning**, **path smoothing**, and **manual concatenation** and **truncation** operations on the path. (**8th place** of 20 teams in Intelligent Vehicles Future Challenge 2018)

SKILLS

- **Environments:** Matlab/Simulink, ROS, C++, Java
- **Applications:** CarMaker, CarSim, Git