Wenchao Ding

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Education

- **Hong Kong University of Science and Technology** — Hong Kong, China
  Ph.D. in Electronic and Computer Engineering, HKUST — *Sept. 2015 – July 2020 (Expected)*
  GPA: 4.18/4.3; Hong Kong PhD Fellowship — Supervisor: Prof. Shaojie Shen
  HKUST Aerial Robotics Group — Robotics Institute
- **Huazhong University of Science and Technology** — Hubei, China
  Bachelor of Electronics and Information Engineering, HUST — *Sept. 2011 – June. 2015*
  GPA: 92.81/100; Rank 1st — Supervisor: Prof. Wei Liu

Research

- **Decision-making for Autonomous Vehicles**
  - **Efficient Uncertainty-aware Decision-making**: Behavior and trajectory pediction can not be 100% accurate. Other human drivers may have unpredictable behaviors. To systematically consider these uncertainties, we propose an efficient uncertainty-aware decision making framework which can generate safe long-term behavior plans in real time (20 Hz). (ICRA 2020)
- **Prediction for Autonomous Vehicles**
  - **Learning-based behavior prediction**: Novel learning-based network to model and predict future behaviors of other agent vehicles. The key feature is modeling the interaction among vehicles to enhance prediction accuracy and extend prediction horizon. (Accepted by ICRA 2019)
  - **Two-level behavior & trajectory prediction framework**: Online hierarchical prediction framework for modeling multimodal behaviors and contextual factors in complex urban environments. Combining deep learning models with traditional optimization techniques. Using learning (LSTM/GRUs) to model the multimodal nature in behavior prediction, while using optimization techniques to conduct trajectory prediction in complex environments. (Also accepted by ICRA 2019)
- **Motion planning for Autonomous Vehicles**
  - **Safety and semantics**: A safe and unified motion planning framework for modeling numerous semantic elements in complex urban environments based on spatiotemporal information. The key feature is that it can work in different complex environments without special tuning efforts and has a safety guarantee. (IEEE RA-L)
- **Planning for Micro Aerial Vehicles**
  - **Trajectory planning for monocular vision-based quadrotors**: Efficient trajectory replanning framework for onboard autonomous flight in unknown indoor and outdoor environments with only one camera and one IMU. (ICRA 2018, IROS 2018, **IEEE Transactions on Robotics**)
  - **Trajectory planning for dual-fisheye vision-based quadrotors**: Trajectory planning framework for a quadrotor with dual-fisheye cameras to achieve omnidirectional vision, navigation and exploration. (**Journal of Field Robotics**)

Selected Publications

- **Journal papers**:

1. **Wenchao Ding**, Wenliang Gao, Kaixuan Wang, and Shaojie Shen, "An Efficient B-spline-Based Kinodynamic Replanning Framework for Quadrotors," in *IEEE Transactions on Robotics (T-RO)*, 2019. [Paper] [Video]

2. **Wenchao Ding***, Lu Zhang*, Jing Chen, and Shaojie Shen, "Safe Trajectory Generation For Complex Urban Environments Using Spatio-temporal Semantic Corridor," in *IEEE Robotics and Automation Letters (RA-L)*, 2019. [Paper] [Code] [Video] (* equal contribution)

3. Wenliang Gao, Kaixuan Wang, **Wenchao Ding***, Fei Gao, Tong Qin, and Shaojie Shen, "Autonomous Aerial Robot Using Dual-fisheye Cameras," in *Journal of Field Robotics*, 2019. ***Corresponding author**.

- **Conference papers**:

4. Haoran Song, **Wenchao Ding**, Yuxuan Chen, Shaojie Shen, Michael Yu Wang, and Qifeng Chen, "PiP: Planning-informed Trajectory Prediction for Autonomous Driving," in *European Conference on Computer Vision (ECCV)*, 2020.

5. Lu Zhang*, **Wenchao Ding***, Jing Chen, and Shaojie Shen, "Efficient Uncertainty-aware Decision-making for Autonomous Vehicles Using Guided Branching," in *IEEE International Conference on Robotics and Automation (ICRA)*, 2020. (* **equal contribution**) [Paper] [Code] [Video]

6. **Wenchao Ding**, Jing Chen, and Shaojie Shen, "Predicting Vehicle Behaviors Over an Extended Horizon Using Behavior Interaction Network," in *IEEE International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019. [Paper] [Video]

7. **Wenchao Ding**, and Shaojie Shen. "Online Vehicle Trajectory Prediction using Policy Anticipation Network and Optimization-based Context Reasoning." In *IEEE International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019. [Paper] [Video]

8. **Wenchao Ding**, Wenliang Gao, Kaixuan Wang, and Shaojie Shen, "Trajectory Replanning for Quadrotors Using Kinodynamic Search and Elastic Optimization," in *IEEE International Conference on Robotics and Automation (ICRA)*, Brisbane, Australia, 2018. [Paper] [Video]

9. Kaixuan Wang, **Wenchao Ding**, and Shaojie Shen, "Quadtree-accelerated Real-time Monocular Dense Mapping," in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, 2018. [Paper] [Video]

Honors and Awards

- **Graduate - Hong Kong University of Science and Technology (HKUST)**:

Hong Kong PhD Fellowship	*Sept. 2015 - Present*
Academic Award in School of Engineering, HKUST	*Sept. 2019*
Conference Travel Award: ICML 2018, Stockholm, Sweden	*July 2018*
Conference Travel Award: ICRA 2018, ICRA 2019	*2018, 2019*
Conference Travel Award: RSS 2017, Massachusetts, USA	*July 2017*

- **Undergraduate - Huazhong University of Science and Technology (HUST)**:

ChangJiang Student (20 awardees in all 2015 graduates in **Hubei province**, China)	*June 2015*
BaoGang Outstanding Scholarship (25 awardees from **Nationwide** election, China)	*Nov. 2014*
Outstanding Winner in Mathematical Contest in Modeling (MCM, 13/6755, USA)	*2014*
Frank Giordano Award, MCM, USA	*2014*
Outstanding Undergraduate Student in HUST	*2015*
National Scholarship (Top 2%) & School Merit Student (Top 3%), China	*2014*
National Scholarship (Top 2%) & School Merit Student (Top 3%), China	*2013*
National Scholarship (Top 2%) & School Merit Student (Top 3%), China	*2012*
Excellent Student of Qiming School, HUST (Top 5%)	*2012*

Teaching

Teaching Assistant: ELEC2600 Probability and Random Process, HKUST	*Spring 2016*
Teaching Assistant: ELEC4100 Digital Communications and Wireless Systems, HKUST	*Summer 2016*

Experience

Internship: DJI Ltd (Shenzhen, China)	*June 2018 - Oct 2018*
Summer Internship: Texas Instruments (TI, Shanghai, China)	*Aug. 2013*
Summer Camp: Microsoft Research Asia (MSRA, Beijing, China)	*Aug. 2014*