KE DONG

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HIGHTLIGHTS OF QUALIFICATIONS

- Two years research and work experience at the intersection of machine learning, deep reinforcement learning and robotics, with an emphasis on decision-making strategies and dynamics system modeling.
- Hands-on developing experience with C++ and Python in Linux environments.

EDUCATION

University of Toronto, Institute of Aerospace Engineering, Toronto, ON
Master of Applied Science on Robotics, **GPA 4.00** Sep. 2018 – Expected Sep.2020
Supervised by Prof Angela P. Schoellig (Vector Institute Faculty Member) and Prof Florian Shkurti
Related coursework: Computer Vision • Probabilistic Graph Model • Convex Optimization • State Estimation
Honors: **Vector Institute Scholarships in Artificial Intelligence**

Beihang University, School of Aerospace Engineering**,** Beijing, China
Bachelor of Engineering (with honor), **GPA 3.98**, ranking # 1/222 Sep. 2014 - June 2018
Major: Aerospace Engineering, Minor: Applied Mathematics
Honors: National Scholarship of China (top 1%), Outstanding Graduates of Beijing (top 0.1%)

RESEARCH EXPERIENCE

Accurate High-Speed Motions for Mobile Manipulators via Inverse Dynamics Learning Sep.2019 – Mar.2020
University of Toronto, Institute for Aerospace Study, Toronto, ON

- Designed and implemented a mobile manipulator ball catching system from scratch in ROS with more than 70,000 lines of C++ code. This system can achieve a success rate of 85.33% for ball catching, setting a new state of the art.
- Proposed a bi-level real-time motion planning scheme using Sequential Quadratic Programming (SQP) algorithm. This motion planner can generate smooth trajectories with nonlinear trajectory constraints within 5 milliseconds.
- Utilized deep neural networks to learn the inverse dynamics model of the system and deployed learned models into safety-critical low-level control systems. This technique can reduce at most 80% of tracking errors.

Visuomotor Policy Learning for Mobile Manipulator Ball Catching via Sim2Real Transfer Sep.2019 - Present
University of Toronto, Institute for Aerospace Study, Toronto, ON

- Developed a MuJoCo simulation environment in python for a mobile manipulator, which has similar kinematic and dynamic behaviors to real robot experiments with errors less than 20 millimeters.
- Tested popular deep reinforcement learning and imitation learning algorithms in the simulation environment for catching policy training, which includes Proximal Policy Optimization (PPO), Twin Delayed DDPG (TD3) and Hindsight Experience Replay (HER)

PROJECT EXPERIENCE

Lane Detection Development for aUToronto Self-driving Car Sep.2019 – Mar.2020
University of Toronto, Institute for Aerospace Study, Toronto, ON

- Utilized Gated Recurrent Unit (GRU) and optical flow wrapping to fuse lane segmentation information over time, which can improve Intersection over Union (IoU) by 2% on the BDD 100K dataset.
- Collected and organized a small-scale lane detection dataset for algorithm validation.

Failsafe Mechanism Design for Aerial Refueling Based on State Tree Structure Summer.2017
University of Toronto, Department of Electrical and Computer Engineering, Toronto, ON

- Analyzed critical safety issues and user requirements of multi-agent autonomous aerial refueling and modeled the system with Finite State Machine.
- Generated a supervisory logic controller consisting of 15 binary decision diagrams for this refueling system with 10^{12} states to control the system away from pre-defined unsafe states.

INTERESTS/ACTIVITIES

Photography, Mountain Biking, Volunteer work (more than 450 hours during undergraduate study)