Chao Ni

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EDUCATION

ETH Zürich, Zürich, Switzerland
Master of Science In Robotics, System and Control — Grade: 5.8/6.0
2019.9 -

Peking University, Beijing, China
Bachelor of Science
College of Engineering, 2015-2019
Bachelor thesis:
Exploiting Effective Representation via Cooperative Learning of Multi-Sensory Robotics Data
Bachelor of Economics
National School of Development, 2016-2019

Johns Hopkins University, Baltimore, American
Visiting Student, Advised by Gregory Chirikjian, 2018.6-2018.9
The Laboratory for Computational Sensing and Robotics

Tsinghua University, Beijing, China
Research Assistant, Advised by Chongjie Zhang, 2019.1-2019.9
The Machine Intelligence Group

SELECTED COURSES

Convex Optimization
Advanced Machine Learning
Computer Vision
Probabilistic Artificial Intelligence
Robot Dynamics
Computational Animation for Robots
Advanced Model Predictive Control
Linear System Theory

RESEARCH INTERESTS

- Learning for Control
- (My motivation letter: https://about.2cni.com/blog/Learning-Control/)

RESEARCH EXPERIENCE

Learning to Walk Over Challenging Terrain by Imitating MPC
Advisor: Jan Carius, Takahiro Miki, Marco Hutter — 2021.2 - 2021.8

- Aimed at developing a variant of MPC-Net by incorporating terrain information and learn the behavior of MPC expert walking over difficult non-flat terrains.

Learning Sampling-Based Exploration Planning
Advisor: Lukas Schmid, Olov Andersson — 2021.3 - 2021.6

- Aimed at effectively planning an informative path within an unknown environment. To ease the computational pressure from the traiditonal "next-best-view" sampling-based method, we leverage the idea of learning a distribution conditioned on the local map.

MPC-feedback Trajectory Optimization for Wheeled-legged Robots
Advisor: Marko Bjelonic, Ruben Grandia, Marco Hutter — 2020.3 - 2020.9

- Utilized a parameterized method to optimize for the trajectories on tough terrains; automatically switched between rolling and walking mode;
- Using Model Predictive Control(MPC) to track the optimized trajectory, verify the approach on the real robot ANYmal.

Hexapod Robot Control
Course Project — 2020.5 - 2020.6

- Developed an inverse kinematic solver for the hexapod robot
- Designed multiple gaits and the transition between for the robot;
- Implemented obstacle avoidance features on tough terrain for the hexapod;
- The project and video can be found at https://github.com/chaofiber/hexapod

Exploiting Effective Representation via Cooperative Learning of Multi-Sensory Robotics Data
Advisor: Chongjie Zhang **Collaborator:** Guangxiang Zhu 2019.1 - 2019.9

- Proposed Self-supervised Cooperative Network (SCN) utilizing synchronization between images and vectors using contrastive loss;
- Combined our model with PPO and showed that our model outperformed raw images in reinforcement learning problems.

Globally Optimal Reparameterization Algorithm-Based Frame Selection for Video Action Recognition
Advisor: Gregory Chirikjian **Collaborator:** Sipu Ruan 2018.6 - 2019.3

- Simulated the temporal fluctuation effect, illustrated the difference between a uniformly distributed video and a video with temporal fluctuation;
- Utilized the global optimal reparameterization algorithm (GORA) as a preprocess for frame selection in deep learning architecture;
- Compared the training performance between the GORA based frame selection method, uniform selection and random selection, and verified the advantage of the GORA based frame selection preprocess;
- Verified the outperformance of GORA in various deep learning neural network architectures.

WORKING EXPERIENCE

Core Engineer
Formula Student, AMZ Driverless Racing 2020.10 - 2021.2

- Researched on the SLAM related topics for driverless car. Compared different behavior among Graph-SLAM, EKF-SLAM and Fast-SLAM. Decided to switch the Graph-SLAM to EKF-SLAM to get real-time update for longer range cone detection while the overall performance won't be compromised.

Teaching Assistant
Course: Introduction to Robotics and Mechatronics 2021.2 - 2021.6
Course: Information System for Engineers 2020.10 - 2021.1

SKILLS

Robotics: C++, ROS, Cmake, MATLAB;
Learning: Python, PyTorch, TensorFlow
Language: English (Fluent), German (A2)

AWARDS

- Chen Overseas Exchange Scholarship (1%)(Peking University)
- 2017 & 2018 Academic Excellence Awards (5%) (Peking University)
- First Prize for the Mathematical Modeling Contest(Peking University)