Chao Ni

Buchwiesen 2
8052 Zürich
Switzerland

chaoni@ethz.ch
https://about.2cni.com/
+41 788605204

EDUCATION

ETH Zürich, Zürich, Switzerland
Master of Science In Robotics, System and Control, 2019.9 - Grade: 5.84/6.0
Master thesis:
Learning to Walk over Complex Structured Terrains by Imitating MPC

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
Recursive Estimation
Computer Vision
Probabilistic Artificial Intelligence
Perception and Learning for Robotics
Robot Dynamics
Model Predictive Control
Linear System Theory

RESEARCH INTERESTS

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

RESEARCH EXPERIENCE

Learning to Walk Over Complex Structured Terrain by Imitating MPC
Advisor: Jan Carius, Takahiro Miki, Alexander Reske, Marco Hutter 2021.3 - 2021.9
In progress

- Aimed at developing the Perceptive 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 - 2021.9
In progress

- We propose to learn the optimal sampling distribution from the Next-Best-View (NBV) uniform planner and sample from the learned distribution for faster exploration.
- We evaluate our learning sampling-based exploration approach on a 2D simulator and show that it explores faster than the NBV planner with same amout of samples and requires less computational resource to fully explore the map.
- We extend the application of CVAE to the exploration planning tasks.

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)