Chao NI

No.5 Yiheyuan Road
Haidian District
P.R.China 100871

2cni09@gmail.com
https://about.2cni.com
+86-15701575281

EDUCATION

ETH Zurich, Zurich, Switzerland
Master of Science In Robotics
from 2019.9 on

Peking University, Beijing, China
Bachelor of Science
In Theoretical and Applied Mechanics   Major GPA: 89 (3.84/4)
College of Engineering, 2015-2019   2/34
Bachelor of Economics
Double degree, 2016-2019

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

SELECTED COURSES

Course	Score	Course	Score
Calculus (I)	91/100	Probability and Mathematical Statistics	93/100
Calculus (II)	88/100	Fluid Mechanics	90/100
Data Structure and Algorithm (H)	86.5/100	Engineering information retrieval & Scientific	
Theoretical Mechanics	89/100	Writing	95/100
Ordinary Differential Equations	94/100	Computational Fluid Dynamics	86/100
Electromagnetism	92/100	Finite Element Methods	94/100
Mechanics of Materials	87/100	Entrepreneurship: New Venture Creation	91/100
Advanced Dynamics	92/100	Modern Physics	88.5/100
Numerical Analysis	85/100	Thermal Physics	89/100
Methods of Mathematical Physics	92/100		

RESEARCH INTERESTS

- Machine learning; Reinforcement learning; Computer vision
- Robotics and Control

RESEARCH EXPERIENCE

Cooperative Representation Learning with Self-Supervised Synchronization
Advisor: Chongjie Zhang **Collaborator:** Guangxiang Zhu, Hao Cheng   2019.3

- 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 (the video can be found at https://about.2cni.com/robo.html);
- 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.

Gradient Descent Method: an Alternative to GORA in Frame Selection
Advisor: Gregory Chirikjian   2018.6 - 2018.8
- Utilized the gradient descent method and its variant RMSprop to compute the temporal reparameterization mapping function;
- Used the bisection method to deduce the approximate value of the mapping function in the sampled points, reducing computation cost;
- Proved that the gradient descent method could be an alternative approach to GORA in videos which were uniformly distributed, and proved that this method could be used as a refinement after the GORA operation.

Model Predictive Learning Control in Rehabilitation
Advisor: Qining Wang   2018.3 - 2018.9
- Proposed a self-adaptation feature of the assistive exoskeleton in long distance walking because of the uncertainties in the real human walking process;
- Combined the model predictive control and iterative learning control into the same framework, after several walking gaits the uncertainty disappearing;
- Developed the model predictive learning control framework, operated on YALMIP with the MATLAB platform, and verified the control rule by simulation, serving to show the assistive performance would become better and steady.

Assistive Control of Lower Exoskeleton
Advisor: Qining Wang **Collaborator:** Geng Chen   2017.12 - 2018.8
- Used the loop shaping method to raise the natural walking frequency of human lower limb, thus helping with walking performance;
- Put forward a double-pendulum-based model to simulate the dynamics of the lower-limb and deduced the transfer function considering the impedance control;
- Introduced a DC gain feedback controller and a lead controller to shift the frequency curve upwards and rightwards.

COMPETITION   **Kaggle**
PUBG Finish Placement Prediction: 30%

SKILLS   **Programming:** C/C++, Python, MATLAB, Fortran, LaTeX;
Deep Learning: TensorFlow, Pytorch, Keras;
Statistics: R, STATA, SPSS;
Operating System: Linux.

AWARDS
- Chen Overseas Exchange Scholarship (1%)
- National Talent Scholarship (1%)
- Xia & Huan Undergraduate Internship Scholarship (UPOS) (10%)
- 2017 & 2018 Academic Excellence Awards (5%)
- First Prize for the Mathematical Modeling Contest held in PKU
- Second Prize for the National Physics Olympic Competition (10%)