Linfeng Cao

Phone: 18821218087
Email: linfengcao1996@gmail.com
Address: Shanghai Jiao Tong University, Minhang

EDUCATION

Sep. 2018-Present **Shanghai Jiao Tong University**
Candidate for Master of Mechatronic Engineering
Robotics Institute, School of Mechanical Engineering

- Research area: Non-invasive brain computer interface, Robot control
- GPA: 3.42/4.00
- Honor & Awards: First-class Scholarship/ Second-class Scholarship
- IELTS: 6.5

Sep. 2014-Jun. 2018 **Southwest Jiaotong University**
Bachelor of Vehicle Engineering
School of Mechanical Engineering

- GPA: 3.63/4.00 (top 2%)
- Honor & Awards: Tongmao Scholarship, Merit Student, Innovation Award

PROJECT & ACADEMIC EXPERIENCE

(John Hopcroft Center for Computer Science, SJTU, Research Intern)

Optimization for Fault Tolerant Neural Network Architecture (Project Member) Mar. 2021 - Present

- Systematically explored the weight drifting tolerance of different neural network components, such as dropout, normalization, number of layers, and activation functions
- Used Bayesian optimization to search for the optimal neural architecture robust to weight drifting. The search space included dropout rate, Gauss or Laplace noises distributions. The experiments demonstrated that our algorithmic framework had outperformed the state-of-the-art methods on various tasks, such as image classification and object detection
- This work will be submitted to *Nature Electronics* in the future

Deep High-Dynamic Range (HDR) Image Compression (Project Leader) Dec. 2020 - Apr. 2021

- Proposed a novel end-to-end learning-based HDR compression method by combining a white-box module to model the luminance masking and tone-mapping (or their inverse) for HDR pre/post possessing respectively, and with a black-box neural network to implement the content compression
- Experimental results demonstrated that our proposed method outperformed other methods on multiple metrics and generates more visually pleasant results with a more stable bitrate control performance
- This work has been submitted to *ACM Multimedia (MM) 2021*

(*Robotics Institute, School of Mechanical Engineering, SJTU, Master*)

A Brain-Actuated Robotic Arm System Using Non-invasive Hybrid Brain-Computer Interface and Shared Control Strategy (Project Leader) Sep. 2019 - Nov. 2020

- Designed a hybrid brain computer interface (BCI) scheme (i.e., integrated motor imagery and steady-state visual evoked potentials) and the corresponding parallel decoding algorithm to provide multi-dimensional BCI control and optimize resources allocation.
- Proposed a shared control strategy which inferred the user's intention, constructed the machine

autonomy and human intention models dynamically based on the inference confidence and user's characteristic, and fused them using Bayesian fusion theory to provide machine automatic assistance during online control, thus enhanced the BCI control performance

- This work has been published in *Journal of Neural Engineering*

Object Recognition and Pose Estimation of Task Scene (Project Leader) Jan. 2019 - Sep. 2019

- Implemented an Fully Convolutional Network (FCN) for the target object recognition and point cloud segmentation in the picking task scene of robotic arm, and employed the Iterative Closest Point (ICP) algorithm to obtain the poses of the segmented objects, which were used as the knowledge base of the online BCI experiment (This work served for the machine vision perception function in the brain-actuated robotic arm system)

A Shared Control Strategy for Reach and Grasp of Multiple Objects Using Robot Vision and Non-invasive Brain-Computer Interface (Project Member) Nov. 2018 - Apr. 2019

- Utilized a simple left- vs right- hand motor imagery as non-invasive brain computer interface (BCI) paradigm to control the movement of the robotic arm and proposed a parallel shared control strategy based on machine vision guidance to integrate the user's BCI command and the machine instruction for providing the machine independent auxiliary control (mainly involved in the design of EEG interface paradigm, the design of shared control principle and experiments)
- This work has been published in *IEEE Transactions on Automation Science and Engineering*

Visual Intelligence Analysis | Mathematical contest in modeling (Project Member) Sep. 2019

- Aiming at the problem of camera parameter calibration and image content analysis without camera parameters, combined with the invariant information in perspective projection, the calculation of camera matrix and daily prior information to reverse information in the single image, and combined two or more frames of video information to perform camera parameter calibration and 3D reconstruction of objects in videos (mainly responsible for the construction of UAV video information inverse model and the writing of related content)
- This work won the second prize of the "Huawei Cup" 16th China Post-Graduate Mathematical Contest in Modeling

PATENT/PUBLICATION

1. **L. Cao,** W. Li, H. Wu, A. Jiang and N. Ye, "DeepHDR-codec: Learning to Compress High Dynamic Range Image", *29th ACM International Conference on Multimedia (MM),* 2021. (EI, under review)
2. **L. Cao,** G. Li, Y. Xu, H. Zhang and D. Zhang, "A Brain-Actuated Robotic Arm System Using Non-invasive Hybrid Brain-Computer Interface and Shared Control Strategy", *Journal of Neural Engineering*, vol. 18, no. 4, 2021. (SCI, published)
3. **L. Cao,** D. Zhang, "A Bayesian Fusion Based Shared Control Strategy for Brain-Actuated Robotic Arm System", *IEEE International Conference on Real-time Computing and Robotics (RCAR)*, 2021. (EI, conference abstract)
4. Y. Xu, H. Zhang, **L. Cao**, X. Shu and D. Zhang, "A Shared Control Strategy for Reach and Grasp of Multiple Objects Using Robot Vision and Noninvasive Brain-Computer Interface", *IEEE Transactions on Automation Science and Engineering*, pp. 1-13, 2020. (SCI, early online)
5. Utility model patent, "一种压感能源装置", No: 201720477072.4
6. Utility model patent, "一种具有能量采集功能的高压电力线防震锤系统", No：201720688201.4