

# Kunchangtai Liang

University of Edinburgh

✉ K.Liang-4@sms.ed.ac.uk • 🌐 lkct.github.io



## Education

### School of Informatics, University of Edinburgh

*MSc in Computer Science. Avg mark: 79.5% (A=70%)*

Edinburgh, UK

Sep 2021 - Aug 2022

- **Dissertation:** *Re-implementation and Optimization of a Scalable Spike Detection Algorithm for Large-Scale Extracellular Recordings.* Grade: Pending (Distinction expected)

### School of Electronics Engineering and Computer Science (EECS), Peking University

*BSc in Intelligence Science and Technology. Avg mark: 86.0% (A=85%)*

Beijing, China

Sep 2016 - Jul 2020

- **Thesis:** *Research on Local Feature Extraction and Video Coding for Machines Based on Neural Networks.* Grade: **A**

## Research Interests

Machine Learning · Computer Vision · Neural Computation · Neuro-symbolic AI · Probabilistic Models · AI Explainability

## Research & Work Experience

### School of Informatics, University of Edinburgh

*MSc Project. Spike detection for large-scale recordings*

Supervisor: Dr Matthias H Hennig ([link to homepage](#))

Edinburgh, UK

Feb 2022 - Aug 2022

- The first part of my MSc project aimed to re-implement a scalable spike detection algorithm, Herding Spikes, and integrate it into the modularized toolkit, SpikeInterface (SI). The detection part was split from the whole spike sorting pipeline, with the Python interface re-designed for SI integration. Cython was also used to optimize the Python code and provide an interface for the C++ extension.
- The rest of the project addressed optimizing the detection algorithm implementation in C++. Bottlenecks from profiling were eliminated to make full use of the CPU capabilities, and a parallel design was incorporated for multi-core machines, enabling real-time processing of neural recordings with the largest scale to date.

### R&D Group, iFLYTEK Co., Ltd.

*Core Researcher (Intern). Scene text detection and OCR*

Supervisor: Zhiguo Wang ([link to iFLYTEK](#))

Hefei, China

Aug 2020 - Aug 2021

- The research work targeted the detection of text boxes in scene photos, which might include different textures and get deformed due to projection. The focus was to improve an existing single-stage anchor-free method, CornerNet, to handle text boxes in the form of arbitrary quadrilaterals. The concept used in Deformable Convolution was employed to predict the direction of edges at corners, leading to text boxes.
- The internship also involved participation in the ICDAR 2021 Competition on Scientific Literature Parsing, and I was responsible for Document Layout Recognition. The task was treated with an ensemble of different state-of-the-art detection algorithms, followed by specific models for difficult cases. The final result reached the 2<sup>nd</sup> place.

### Wangxuan Institute of Computer Technology, Peking University

*Undergraduate Research. Video understanding*

Supervisor: Dr Jiaying Liu ([link to homepage](#))

Beijing, China

Sep 2017 - Jun 2020

- The first part of my undergraduate research was collaboration on a Video Coding for Machine (VCM) algorithm. The algorithm aimed to encode information for human action recognition into the compressed video stream, leading to a higher compression rate. My part was to extract key points from the video frames guided by human skeleton points to capture the motion with U-Nets, and to test the action recognition performance.
- The second part of my work focused on extracting local feature points. The aim was to provide a Neural Network (NN) version of SIFT that could run on accelerators while keeping the explainability of hand-crafted features. The design followed the structure of SIFT pyramids using convolutions to reproduce/approximate different operations. The NN could even be tuned with gradients to refine the performance.

## Robotics Research Center, Peng Cheng Laboratory

Research Intern. Remote Operated Vehicle control

Supervisor: Tao Mei ([link to PCL](#))

Shenzhen, China

Jul 2019 - Aug 2019

- This summer project aimed to develop an end-to-end Deep Learning framework for visual-servo in underwater ROV. The framework made use of eye-tracking data to hint at the focus of the human operator, providing clues for target detection. The predicted focus could also serve as an interpretation of the output control signal of the framework.
- The work also included the acquisition of eye-tracking data aligned to ROV video/movement. Detailed treatments contain eye-tracker calibration before experiments and coordinate projection from the raw result to the video plane.

## Teaching Experience

### School of Electronics Engineering and Computer Science, Peking University

Teaching Assistant. Introduction to Computation (A), 04830041

Supervisor: Prof Yafei Dai ([link to homepage](#))

Beijing, China

Sep 2017 - Jan 2018

- **Duties:** Q/A, assignment/project marking, exam supervision
- Appointed as undergraduate TA due to 100% mark in the same course (Jan 2017)

## Skills

**Programming:** C/C++, Python, Cython, PyTorch ([contribution](#))

**Tools:**  $\LaTeX$ , git/GitHub, Anaconda

**Language:** Chinese (native), English (MSc in UK, TOEFL 104)

## Publications

○ Sifeng Xia\*, Kunchangtai Liang\*, Wenhan Yang, Ling-Yu Duan and Jiaying Liu, "An Emerging Coding Paradigm VCM: A Scalable Coding Approach Beyond Feature And Signal," *2020 IEEE International Conference on Multimedia and Expo (ICME)*, 2020, pp. 1-6, doi: [10.1109/ICME46284.2020.9102843](https://doi.org/10.1109/ICME46284.2020.9102843).

*Conference Paper*  
*\*Equal contribution*

○ Kunchangtai Liang, Dezhao Wang, Yuzhang Hu, Sifeng Xia, Wenhan Yang and Jiaying Liu, "Local Feature Point Detector based on CNN," *10<sup>th</sup> Meeting of AI Standard Group, Artificial Intelligence Industry Technology Innovation Strategic Alliance*, Mar 2020, AI M1243.

*Standard Proposal*

## Awards and Honors

- Award for Scientific Research, Peking Univ.
- Award for Community or Public Service, Peking Univ.
- Third prize, Schlumberger Cup programming competition, Peking Univ.
- Mayor's Award for Adolescents Science & Technology Innovation, Hefei
- Third prize, 14<sup>th</sup> Awarding Program for Future Scientists, China

Dec 2018

Dec 2017

Jun 2017

Nov 2014

Oct 2014

## Hobbies

Animation · Reading · DIY · Baseball

## Extra-curricular Activities

- Volunteer at the Peking Univ. Admissions Group, Anhui Province
- Volunteer at the Youth Volunteers Association of the School of EECS, Peking Univ.
  - Deputy Secretary of the Association
- Member of the EECS Baseball Team, Peking Univ.

Y2017, Y2021

Sep 2016 - Nov 2019

Nov 2018 - Nov 2019

Sep 2016 - Aug 2018