**YUANJUN CHAI**
The University of Hong Kong
yuanjunchai89@gmail.com; yjchai@hku.hk
+86 15029679576
Professorial block
Pok Fu Lam, Hong Kong
Personal Website: http://yuanjunchai.github.io
Lab Website: http://xpixel.group/; https://www.aimed.hku.hk/

**RESEARCH INTERESTS**

Computer Vision (image&video super-resolution, inpainting, detection), Multimodal (VQA, fusion, event detection), video processing (compression, interpolation), and AI in Medicine (Medical Imaging, Federated Learning)

**PROFESSIONAL APPOINTMENTS**

2022-present **Research Assistant, The University of Hong Kong**
*Department of Orthopaedics and Traumatology, Li Ka Shing Faculty of Medicine*
*Advisor: Dr. Jason Pui Yin Cheung (**Dean**)*

2021-2022 **Algorithm Engineer, Samsung Xi'an Research Lab**
*Department of AI Technology, team of vision and imaging*
*Advisor: Dr. Jianbo Zhao*

2020-2021 **Research Assistant, Tsinghua University**
*Intelligent Media and Cognition Laboratory, School of Software*
*Advisor: Dr. Yue Gao*

2019-2020 **Research Assistant, Shenzhen Institute of Advanced Technology, Chinese Academy of Science**
*Multimedia Laboratory at SIAT-CAS & CUHK, Institute of Advanced Computing and Digital Engineering*
*Advisor: Dr. Chao Dong, Dr. Yu Qiao*

2019-2020 **Teaching Assistant, Shenzhen Institute of Advanced Technology, Chinese Academy of Science**
*Institute of Advanced Computing and Digital Engineering*

2015-2019 **Research Assistant, Xidian University, China**
*Key Laboratory of Intelligent Perception and Image Understanding, Ministry of Education, China*
*Advisor: Dr. Fei Qi*

2021 **Co-Founder and CTO, INGREM Ltd** (http://www.ingrem.com)
***Standing at the crossroads of technology and humanities**: Design facial fine control keyboard and mouse algorithm, based on flexible gaming chairs, to help the disabled with high paraplegia to better perform daily work and entertainment. Here is a video link to warm-up.*

**EDUCATION**

2022-now **MPhil,** Li Ka Shing Faculty of Medicine, The University of Hong Kong

2020-2021 **Visiting Scholar**, School of Software, Tsinghua University

2019-2020 **Visiting Scholar**, Shenzhen Institute of Advanced Technology, Chinese Academy of Science

2019 **B.E.** Xidian University, China
*Major in Electronic and Information Engineering (Photoelectric Imaging)*

2018 **Cambridge Summer Academic Programme**, Catharine's College, University of Cambridge, UK
*Artificial Intelligence – Advisor: Dr. Pietro Lio' (**Full scholarship**)*

**SKILLS & LANGUAGE PROFICIENCY**

**Coding:** Python, C/C++, Java, MATLAB
**Deep Learning Frameworks:** PyTorch, TensorFlow

**Web Development:** HTML, CSS, JavaScript, Bootstrap, Flask, Jekyll
**Other Skills:** OmniGraffle, Visio, Latex, QUARTUS, VHDL, Multisim
**Language Proficiency:** Chinese (*Native*), English (*Fluent, TOEFL 107, L25, R30, S25, R27*)

**HONORS & AWARDS**

2019 **Undergraduate Evaluation**
*Outstanding Undergraduate Student Award*
2019 **Undergraduate Dissertation**
*Outstanding Undergraduate Thesis Award (13/5000)*
*Topic: Image Inpainting Based on Deep Learning*
2018 **National University Computer Design Contest**
*Second Prize* - Artificial Intelligence
2017 **National Student Innovation Training Program**
*Outstanding Award* - Placed 5th/100
2017 **Mathematical Contest in Modeling (MCM) & Interdisciplinary Contest in Modeling (ICM)**
*Merit*
2016 **National Mathematical Contest in Modeling**
*First Prize*
2016 **Academic & Technology Contest: XingHuo Cup**
*Second Prize*
2016 **Speech Contest: Xidian University**
*Second Prize*
2016 **Silk Road Cloud Classroom Analog Electronic Technology Circuit**
*Comprehensive Design Special Award*

**RESEARCH PROJECTS**

2021.12-2022.07 **Spine Angle and Key Point Detection Program**
*Research Asistant, AI in medicine Lab, Li Ka Shing Faculty of Medicine, HKU*
*Advisor: Dr. Jason Pui Yin Cheung*

- Be responsible for identifying the spine region and further determining the construction of the spine key point framework. Actively contact doctors for cooperation, use ImageJ for medical image datasets for data annotation, mark spine key points, bounding boxes and segmentation training sets;
- Focus on designing algorithms and use Python to implement MPF-net algorithm and complete the final test; use C++ to build the win system can run the program exe framework and put it into practical assistance in the diagnosis of doctors, improving the surgeon's 10% accuracy and 59% efficiency in clinical diagnosis.

2021.08-2021.12 **Video Sensitive Content Review via Multimodal Fusion**
*Algorithm Engineer, Samsung Xi'an Research Lab*
*Advisor: Dr. Jianbo Zhao*

- Collect and check sensitive dataset (such as sex, terror, ad, etc). Build baseline vision&text algorithm to detect content. Compare our baseline with other big companies methods, and find the gap between pure vision and multimodal detection. Use multimodal technology to fuse both text&vision to improve the performance (recall, precision, mAP and time delay) of the content review. The method could be used in text, image, video and lives.
- The maximum response time of the intelligent video filtering API is 1s, the timeout rate is less than

0.01%, and the real-time rate of intelligent video processing can reach 30%. The intelligent video filtering API supports a maximum of 100 concurrent processing tasks, and can be horizontally expanded according to needs. The rate is higher than 90%, and supports video formats MPEG, AVI, MOV, WMV, etc.

2020.07-2021.02 **Spiking Neural Network Based Super-Resolution for Event-Stream Vision**
*Research Assistant, Tsinghua University, Software School*
*Advisor: Dr. Yue Gao*

- Be responsible for the investigation of the super-resolution project of the event camera and the entire algorithm design, development and testing process of the event stream spiking neural network, and designed a new end-to-end framework based on the special spiking neural network to enhance the spatial resolution of the event data. The performance of the previous scheme has been improved by 10%.
- Using Python and Pytorch framework to implement a special spiking neural network, it solves the problem of insufficient spatial resolution of discrete event stream data, and realizes the super-resolution task of this kind of data. At the same time, Matlab is used to visualize the training results, sort out and analyze the effect of the algorithm to obtain an optimization scheme, which has achieved the best results on four large-scale data sets.

2019.07-2020.06 **Blind Video Super Resolution with Iterative Correction**
*Research Assistant, Shenzhen Institute of Advanced Technology, Chinese Academy of Science*
*Advisor: Dr. Chao Dong*

- In charge of proposing and leading the team to implement an iteratively corrected video super-resolution algorithm for estimation of unknown degradation in blind video super-resolution problem. On eight 2080Ti GPUs, an industrial-grade code framework is built with Python and Pytorch to realize multi-card distributed training and testing of the algorithm. This method achieves the best results on the two largest datasets, and outputs visually. Higher-definition video frames (4K, 8K); responsible for the release and maintenance of the single-image version of the method on Github, the project has won a total of **190+ stars** (https://github.com/yuanjunchai/IKC);
- Fully responsible for the construction and maintenance of the laboratory website, proficient in web front-end technologies (HTML, CSS, JavaScript, BootStrap) and back-end frameworks (Flask, Django), and built from scratch image processing with over **100,000 page views** within two years Group website (http://xpixel.group);

2018.11-2019.06 **Image Inpainting Based on Deep Learning (*Outstanding Undergraduate Thesis Award*)**
*Research Assistant, Key Laboratory of Intelligent Perception and Image* Understanding
*Advisor: Dr. Fei Qi*

- Be fully responsible for the progress of the entire process, including preliminary method and literature research, mid-term algorithm design and implementation, and later thesis writing and defense. Use the linux command line to collect and process image datasets, and flexibly use Python & Pytorch to implement Generative Adversarial Networks (GAN) and Variational Autoencoders (VAE) for image restoration.
- For the square defects and irregular defects generated by the image transmission process, the GAN inpainting achieves the highest comprehensive score, which is a visually pleasing image. The output of the paper is nearly 30,000 words and a total of 100 pages. This project is one of the ICME 2019 Grand Challenge, and was selected as the Excellent Graduation Design of Xidian University-School (13/5000).

2017-2018 **Birdsongs Recognition (http://sweety-birdsong-recg.cc), National University Computer Design Contest**

*Advisor: Dr. Yinfeng Li*

- Self-developed and designed website based on the combination of speech signal processing, machine learning and website design to identify birdsong sounds online. Users only need to upload a recording to know what kind of bird they hear the beautiful bird song, so that more people can better understand, appreciate and protect birds.
- Using format conversion (FFmpeg) and speech enhancement (MMSE-LSA) algorithms, the speech signal is preprocessed; the processed signal is subjected to feature extraction (MFCC), and the training and learning are based on the hidden Markov model. Collection bird audio website: www.xeno-canto.org, using the Viterbi algorithm to search for the best state sequence, match the corresponding bird calls, and the recognition accuracy rate reaches 88%.
- On the website deployment, the backend is developed by the Python-Flask framework, and Nginx is selected as the reverse proxy server. The project went through layers of selection and finally won the National College Student Computer Design Competition - National Award.

2016-2017 **Portable Printing Robot, National College Student Innovation Training Program**

*Advisor: Dr. Jun Deng*

- Created a portable printing robot controlled using LabVIEW with an HP print head and programmed an STM32 microcontroller.
- Wrote a visual APP interface & an Android program enabling Bluetooth control
- Currently seeking a national utility model invention patent.
- Taking the project to a national-level innovation cultivation project.

**PUBLICATIONS**

**Yuanjun Chai**. Siqi Li. & Yue Gao. "Spiking Neural Network Based Super-Resolution for Event-Stream Vision." CVPR (The IEEE / CVF Computer Vision and Pattern Recognition Conference). (pending)

**Yuanjun Chai**. Chao Dong. & Yu Qiao. "Blind Video Super Resolution with Iterative Correction." TIP (IEEE Transactions on Image Processing). (pending)

**Yuanjun Chai**. Yushen Zuo. &Zixiang Zhao. "Continuous Interventions Estimation via Attention Generative Adversarial Networks." NIPS (The Conference on Neural Information Processing Systems).

Shengli Zhang. Huayi Wang. **Yuanjun Chai** & Jiangcheng Ge. "Genotypic Difference Analysis in SNP Genome-wide Gene Interactions." *Advanced Mathematics Research*. ISSN1008-1399. 2018.

**CONFERENCE AND PRESENTATION**

Chao Dong. Yu Qiao. Wenlong Zhang. Ruicheng Feng & **Yuanjun Chai**. ICCV 2019. Invited Scholar and Poster. Seoul. Korea. 2019

Chao Dong. Yu Qiao. Xintao Wang. Jingwen He & **Yuanjun Chai**. Workshop NTIRE19. CVPR 2019. Invited Scholar and Team Assistant. Long Beach. US. 2019

Chao Dong. Yu Qiao & Yuanjun Chai. "Adjustable Image Stylization Software." China Hi-Tech Fair 2019. Invited Scholar and Software Assistant. Shenzhen. China. 2019

**EMPLOYMENT & MEMBERSHIP**

2019-2020 **Founder and Maintainer, Group Website** (http://xpixel.group/), **Multimedia Laboratory at SIAT-CAS & CUHK, Institute of Advanced Computing and Digital Engineering**

- Master the front-end skills (HTML, CSS, JavaScript, Bootstrap) and back-end framework (Flask, Jekyll) needed to build the website, understand the development path of image/video quality enhancement.
- Build and maintain the group website, collect and sort out the team information and related academic news, design the layout and content display of the site, deploy the site and update the relevant news in time.

2019-2020 **Teaching Assistant, Institute of Advanced Computing and Digital Engineering, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences**

- Assist teachers to complete PRML (pattern recognition and machine learning) teaching tasks for graduate students of Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences
- Be responsible for scoring students' significant assignments (linear regression, logistic regression, decision tree, SVM), scoring final defense of the course (PIRM2018).

2017-2019 **Associate Director, Innovation and Entrepreneurship Lab, National Electronic and Electrical Experiment Center**

- Be responsible for the daily management of the laboratory, reasonably allocated the laboratory resources.
- Led the laboratory members to cooperate with the company to operate the project and assist with the school to complete the selection and training of NI organization / National University Computer Design Contest.

2018-2019 **Server Management Member, Key Laboratory of Intelligent Perception and Image Understanding, Ministry of Education, China**

- Allocated server resources, maintained stable operation of the server, managed server permissions, cleared redundant memory in time, and scheduled GPU usage.

2017 **Member of Admission Committee, Xidian University, China**

- Assisted the professors of the admission committee in reviewing the scores to ensure that the applications were accurate and could be accepted.

**REFEREE**

| **Referee 1** | **Referee 2** | **Referee 3** |
|---|---|---|
| Dr. Chao Dong | Dr. Yue Gao | Dr. Fei qi |
| Associate Professor | Associate Professor | Associate Professor |
| SIAT, CAS | Tsinghua University | Xidian University |
| chao.dong@siat.ac.cn | gaoyue@tsinghua.edu.cn | fred.qi@ieee.org |