HONG KANG

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EDUCATION

The Chinese University of Hong Kong, Shenzhen (CUHK-Shenzhen)   **Sep. 2021- Oct. 2023**
Master of Philosophy
- **Major:** Computer and Information Engineering
- **Overall GPA:** 3.75/4.00

University of Electronic Science and Technology of China (UESTC)   **Sep. 2017-Jul. 2021**
Bachelor of Engineering
- **Major:** Electronic Information Engineering, Department: Glasgow College
- **Overall GPA:** 3.53/4.00， **Junior-Senior GPA:** 3.76/4.00
- **Honors:** Outstanding Student Leader Scholarship, 2020
                      Model Student Scholarship, UESTC, 2019, 2020

University of Glasgow   **Sep. 2017-Jul. 2021**
*Bachelor of Engineering **with Honors of the First Class***
- **Major:** Electronics and Electrical Engineering

AECADEMIC PAPER

- Lin, Lehao, **Kang, Hong**, Chen, Hongzhou, and Cai, Wei, Plutus: A Simulation and Visualization platform for Smart Contract Development. (Working paer)
- Zhao, Rong, **Kang, Hong**, Liu Yunshu, and Cai, Wei, A Transaction Fee Mechanism for Resource Allocation in Resource-constrained Blockchain-based IoT Systems. (Working paer)
- **Kang, Hong**, Li, Minghao, Lin, Lehao, Fan, Sizheng, and Cai, Wei, "Bridging Incentives and Dependencies: An Iterative Combinatorial Auction Approach to Dependency-Aware Offloading in Mobile Edge Computing", *IEEE Transactions on Mobile Computing*. (Submitted)
- Lin, Lehao*, **Kang, Hong***, Sun, Xinyao, and Cai, Wei, "NeuroNFT: An Autoencoder Enhanced Decentralized Framework for Digital Asset Immortality", Submitted to a CCF-A Conference.
- Zhao, Rong, **Kang, Hong**, Zhang, Qiyue, Fan, Sizheng, and Cai, Wei, "LocPoS: A Location-based Proof-of-Stake Mechanism for Industrial Digital Twins", Submitted to a CCF-A Conference.
- **Kang, Hong,** Li, Minghao, Fan, Sizheng, and Cai, Wei, "Combinatorial Auction-enabled Dependency-Aware Offloading Strategy in Mobile Edge Computing", *IEEE Wireless Communications and Networking Conference (WCNC 2023).*
- **Kang, Hong,** Zhang, Zaixin, Dong, Junyi, Xu, Hao, Valente Klaine, Paulo, and Zhang, Lei "Blockchain-enabled COVID-19 Contact Tracing Solutions", *Wireless Blockchain: Principles, Technologies and Applications*, *Wiley-IEEE Press*.
- **Kang, Hong*,** Zhang, Zaixin*, Dong, Junyi, Ji, Yinghao, Xu, Hao, and Zhang, Lei. "BeepTrace for COVID-19 Pandemic: a Demo.", *3rd Conference on Blockchain Research & Applications for Innovative Networks and Services (BRAINS 2021)*

RESEARCH EXPERIENCE

Building a decentralized framework addressing NFT storage and verification challenges, CUHK-Shenzhen   **May. 2023 – Sep. 2023**
Instructor: Prof. Wei Cai, The Chinese University of Hong Kong, Shenzhen
- Investigated the NFT market and identified storage inefficiencies, with only 9% of NFTs stored on-chain and the rest risk asset linkage losses on private servers or IPFS.
- Proposed a decentralized NFT storage and verification framework leveraging deep learning (autoencoders) and blockchain, aiming for efficient storage and reduced dependency on

IPFS/private servers.
- Designed and implemented the framework to be compatible with existing NFT standards like ERC721, ensuring seamless integration into the current ecosystem.
- Validated the proposed framework through performance evaluations, showcasing its superiority in terms of reconstruction, storage costs, and integration capabilities.

Mechanism Design for Computation Partitioning and Offloading in Mobile Edge Computing (MEC) (Supported by National Natural Science Foundation of China)   Feb. 2022 – Jun. 2023
Instructor: Prof. Wei Cai, The Chinese University of Hong Kong, Shenzhen
- Recognized the absence of an incentive mechanism in current offloading methods for dependent tasks in MEC and highlighted the potential of integrating auction theory as a solution.
- Proposed a novel multi-stage iterative combinatorial double auction (MICDA) mechanism. This integrates dependency-aware task offloading with combinatorial auction dynamics under the Cloud-Edge-End cooperative computing paradigm.
- The MICDA mechanism, underpinned by a concurrent provider and consumer (CPC) model, employs a two-stage approach:
  - **Stage 1:** Utilizes a winner determination algorithm, informed by market clearing bid densities, to determine auction winners and compute payments/revenues for mobile devices and service providers, respectively.
  - **Stage 2:** Applies linear relaxation with the ellipsoid method, employing a hypergraph-based proxy cost model for efficient demand oracle queries. This ensures polynomial time complexity for the winner determination problem. Post-processing utilizes the Lavi-Swamy decomposition technique and adopt the Vickrey–Clarke–Groves (VCG) payment rule to achieve a truthful-in-expectation mechanism.
- Demonstrated through theoretical analysis that the MICDA mechanism satisfies essential economic properties like truthfulness, individual rationality, weak budget balance, and polynomial time complexity
- Experimental evaluations indicate MICDA's superiority against non-dependency-aware offloading strategies and its competitive edge over other dependency-aware algorithms in performance metrics

Decentralized Application Development for COVID-19 contact tracing   Sep. 2020-Jun. 2021
Instructor: Prof. Lei Zhang, University of Glasgow
- Develop a mobile APP for Covid-19 cases tracing while ensuring the users' privacy;
- Set up the Ethereum environment on several AWS distributed nodes and connect them to establish the private chain;
- Applied solidity to assist the users to upload and load Hash encrypted data information;
- Applied JAVA language and Ethereum Web3J API to realize the interaction process between users and blockchain remotely through Http port;
- Emerged block chain with the APP to complete the function of BeepTrace and verified the performance and handling capacity of the blockchain;
- Interviewed and broadcast by BBC.

Deep Density-based clustering for images, UESTC   September 2020-May 2021
Instructor: Prof. Yazhou Ren, UESTC
- A two-stage deep density clustering model is proposed to solve three problems: feature drift problem in feature extraction of large image, high computational complexity of density calculation, and robustness of clustering performance.
- Two deep feature extraction methods are proposed for images with different sizes: generative model (autoencoder) for small image and contrastive model (MoCo v2) for large image.
- Reproducing and improving density-based clustering algorithm (DenMune) by a cluster merge process, enhancing the robustness and accuracy of the algorithm.
- Without supervision and the number of classes in advance, the accuracy of the model in MNIST-test exceeds 99.6%, 98.4%，86.1% for USPS and STL-10 respectively.

Development of a Smart Contract for Route Recommendation Service on Ethereum by Solidity
Summer Research of University of Glasgow   Jun. 2020-Aug. 2020
Instructor: Prof. Lei Zhang, University of Glasgow
- Applied blockchains to write a smart contract for route recommendation Ethereum by Solidity;

- Established a private Ethereum chain locally (Ganache+Remix IDE) to verify the feasibility of the smart contract;
- Verified the smart contract could recommend the most time-efficient route for users to travel, meanwhile, it solves the problems of privacy leakage and data reliability of traditional third-party mapping application.

Water Segmentation of Remote Sensing Image Based on Machine Learning, RADI (Chinese Academy of Sciences)   **Aug. 2019-Sep. 2019**

Instructor: Dr. Weijia Cao, Assistant Research Fellow from Chinese Academy of Sciences
- This project is about the segmentation of the water body extraction from remote sensing image, one of China's 13th Five-Year Plan Civil Space Pre-Research Projects;
- Studied the knowledge of image processing, including color models, image formats, image morphology, remote sensing image with shapefile, projection, etc.;
- Conducted experiments on image processing, such as image denoising (smoothing filter), image enhancement (gamma transformation, Laplace transformation), and image segmentation (threshold segmentation) by Matlab;
- Designed two feasible schemes by respectively using supervised learning (SVM) and unsupervised learning (K-Means) methods to implement the water body extraction from remote sensing image based on Matlab, and completed the project report.

Smart Contract Development for Toshiba Europe   **Sep. 2020**
- Developed a smart contract in Solidity to interact data from sensors and scanners with the blockchain platform;
- Designed the structure of data storage within the contract to make the data in the block chain be accessed more clearly and efficiently;
- Realized the conversion between the timestamp and the regular time of Ethereum to make recorded time could be read directly.

Aacademic Services

- **Reviewer:** IEEE Transactions on Cloud Computing (TCC).
- **Reviewer:** IEEE Transactions on Mobile Computing (TMC).
- **Reviewer:** IEEE International Conference on Communications (ICC 2022, 2023)
- **Reviewer** ACM International Symposium on Blockchain and Secure Critical Infrastructure (BSCI 2022)

EXTRACURRICULAR ACTIVITIES

Trainee, **University of California-Los Angeles, Extension**   **Feb. 2019-Mar. 2019**
- Participated in the intensive English Communication Program of UCLA extension for ESL courses training.

Monitor, **Class Committee, UESTC**   **Sep. 2018-Present**
- Assisted counselors to coordinate the communication between students and the college and implement all tasks, leading the class committee to carry out class activities, regularly organizing class meetings and class buildings;
- Won the honors of 2017-2018 Characteristic Class and 2018-2019 Excellent Class.

Member, **Outreach Department, Student Union, Glasgow College, UESTC Aug. 2017-Aug. 2018**
- Participated in planning and organizing the Chinese and Foreign Leaders Forum of the UESTC, receiving attendants and arranging the venue of the forum.

ADDITIONAL INFORMATION

- **Language Skills:** Chinese Mandarin (Native), English (IELTS: 7.0)
- **Computer Skills:** Python, MATLAB, Solidity, Latex, Java, etc.