Yansong Huang

873994556@bupt.edu.cn · (+86) 180-175-85587 · https://iso497.github.io/

Education

Beijing University of Posts and Telecommunications (BUPT), Beijing, China *Sept. 2022 – Jun. 2025*

M.E. *in Information and Communication Engineering | GPA (present): 91.65/100*

Interests: *Federated Learning, Over-the-Air Computation, Communication Emulation, and Computer Vision.*

Courses: *Machine Learning (95), Graph Theory and Applications (91), Communication Network Theory (90).*

Beijing University of Posts and Telecommunications (BUPT), Beijing, China *Sept. 2018 – Jun. 2022*

B.E. *in Telecommunications Engineering with Management | GPA: 86.94/100*

Courses: *Principles of Communications (93), Internet Protocols (92), Electric and Magnetic Fields (93).*

Queen Mary University of London (QMUL), Beijing, China *Sept. 2018 – Jun. 2022*

Joint Programme with BUPT

BSc *in Telecommunications Engineering with Management | GPA: 381/510 (Honors, First Class)*

Courses: *Advanced Transform Methods (93), Interactive Media Design (96), Computer Vision (94).*

Publications

PAPERS

Y. Huang, X. Li, M. Zhao, M. Peng, "Asynchronous Federated Learning via Over-the-Air Computation in LEO Satellite Networks," *IEEE Transactions on Wireless Communications*, Accepted.

- This paper proposed an asynchronous federated learning (FL) framework in low-earth orbit (LEO) satellite networks by exploiting multiple high-altitude platforms (HAPs) for model aggregation
- Over-the-air computation (AirComp) is utilized in the FL framework for reducing energy consumption.
- To find the optimal aggregation scheme and beamforming vector, this paper proposed a linkage search algorithm combining depth-first search (DFS) and breadth-first search (BFS) algorithm with subtree pruning.

Y. Huang, X. Li, M. Zhao, M. Peng, "A Self-Adaptive Aggregation Scheme for Tackling the Model Staleness Problem in AirComp-Assisted AFL in UAV Swarms," *IEEE Transactions on Wireless Communications*, Submitted.

- This paper proposed an asynchronous federated learning (AFL) framework in unmanned aerial vehicle (UAV) swarm networks with AirComp to improve communication efficiency.
- An alternating optimization algorithm is proposed to get the optimal solution of beamforming vectors.
- Cosine-similarity-based model aggregation scheme is proosed to relieve model staleness in AFL.

Y. Huang, H. Wei, J. Yang, M. Wu, "Damaged Road Extraction Based on Simulated Post-Disaster Remote Sensing Images," *2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS*, Brussels, Belgium, 2021, pp. 4684-4687.

- This paper applied CoCosNet on translating pre-disaster images to simulated post-disaster images of the same area, enlarging the dataset for related deep learning tasks.
- The work was varified effective by the high accuracy of applying D-LinkNet trained with real post-disaster images on detecting damaged roads in simulated post-disaster images.

PATENTS

X. Li, **Y. Huang**, M. Zhao, "A Method, Device, System, and Virtual Node for Constructing a Digital Twin Network," Beijing: CN116318397A, Jun. 23, 2023.

X. Li, **Y. Huang**, M. Zhao, "A User-Centric Federated Learning Method and Device Based on Visible Light Communication," Beijing: CN115942499B, Jun. 2, 2023.

X. Li, M. Zhao, **Y. Huang**, "A Multi-User Scheduling Method and Scheduling Device Based on Visible Light Communication," Beijing: CN117978667B, Aug. 6, 2024.

PROJECTS

Large-Scale Distributed Mobile Ad-hoc Network Emulation System *Mar. 2022 – Present*

This project constructed a communication **emulation** system deployed in a **distributed** framework and managed by Kubernetes. The system utilized Docker to create containers as independent nodes and emulated the effect of physical layer and data link layer through its highly flexible model plugin.

- Modified the system to emulate swarm communication with real data.
- Construct the distributed deployment pattern of the system through shell script and Kubernetes.
- Design the GUI of the system and connect it to the system.

Deep Learning Based Human State Assessment System *Oct. 2021 – Present*

This project construct a **non-contact human state assessment** system to monitor the realtime state of drivers and alert when abnormal state is predicted through videos captured by only one or two cameras. This system including target detection, keypoint detection, head pose estimation and time series prediction algorithms.

- Designed the framework of the human state assessment system.
- Surveyed and implemented related deep learning algorithms and the hardware of the system.
- Designed the tree-based ensemble learning algorithm to predict human state.

High-Resolution Road Disaster Monitoring and Assessment System *Aug. 2020 – Jun. 2021*

This project aimed to construct an **artificial intelligent** assisted system to monitor geological disasters and **assess road damage** through remote sensing images taken by satellites.

- Processed remote sensing images with ArcGIS API for Python.
- Implemented and validated the feasibility of damaged road detection algorithm D-LinkNet.
- Applied CoCosNet on generating simulated post-disaster remote sensing images.

SKILLS

- **Languages:** English (IELTS: 7, GRE: 149+170), Chinese (Native)
- **Programming Languages:** Python > Java > Matlab > C > C++ > HTML + CSS + JavaScript
- **Tools:** LXC, Docker, Kubernetes

HONORS AND AWARDS

First-Class Scholarship, Twice *Oct. 2022 - Oct. 2023*

Outstanding Graduate, Award on Undergraduate Graduation Ceremony *Jun. 2022*

QM Prize, Award on Undergraduate Graduation Ceremony *Jun. 2022*

Third-Class Scholarship, Twice *Oct. 2019 - Oct. 2021*

3rd Prize, Award on College Students Innovation and Entrepreneurship Forum *Jun. 2021*

Meritorious Winner, Award on 2021 Interdisciplinary Contest In Modeling *Apr. 2021*