KAIYUAN HOU

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EDUCATION

My research focuses on embedded AI and machine learning in healthcare, designing intelligent systems for home assistance and health monitoring that aim to ease human workload in various contexts. I'm also exploring the use of AR/VR/XR to enhance human-machine interaction and data interpretation.

EDUCATION

Columbia University — New York, NY, USA
Ph.D. Electrial Engineering **4.07/4.00** — **09/2021 - Present**
Research Advisor: Dr. Xiaofan (Fred) Jiang

University of Colorado Boulder — Boulder, CO, USA
B.S. Electrical Engineering **3.98/4.00** — **09/2017 - 05/2021**
Summa Cum Laude; Member of Tau Beta Pi; Dean's list from 2017 fall to 2021 fall; Merit Scholarship;

WORK EXPERIENCE

Columbia University — **09/2021 - 05/2023**
Teaching Assistant
Teaching assistant for the graduate-level *Internet-of-Things*, *Reinforcement Learning* and *Blockchain*(two semesters) courses offered by Columbia University.

University of Colorado Boulder — **09/2019 - 05/2021**
Course Assistant
Teaching assistant for *Analog Circuits* (two semesters) and *Computer Architecture* (two semesters) courses offered by University of Colorado Boulder.

RESEARCH EXPERIENCE

Intelligent and Connected Systems Lab, Columbia University — **09/2021 - Present**
Graduate Research Assistant

Continuous multi-person fever screening system: Led the development of SIFTER, a low-cost RGB-thermal camera system for continuous multi-person fever screening. Implemented real-time algorithms for head detection, tracking and reconstructing personalized 3D head model for each head detected. The system achieved a measurement error rate of within 0.4°F at 2 meters and 0.6°F at 3.5 meters without introducing bias on different skin colors. Deployed multiple systems at the entrance of clinics and medical center. (IPSN 2022)

Modular sensing platform: Developed LegoSense, a plug-and-play platform based on Raspberry Pi, designed for no-code data acquisition, which enabling users to custom mix-and-match various sensors. Contributed to the system architecture design and conducted evaluations focusing on ease-of-use, flexibility, and scalability (Mobisys 2022 demo, IoTDI 2023).

AR assisted intelligent stethoscope platform: Developed ARSteth, an Augmented Reality (AR)-assisted intelligent stethoscope platform that accurate self-auscultation for everyone at home. Implemented an integrated system that leverages pose estimation, computer graphics, acoustic intelligence, human-computer interaction, and signal processing algorithms. Conducted comprehensive evaluations that demonstrate the effectiveness and accuracy of the AR guidance in the system. (Sensys 2022 demo, IPSN 2023)

Airflow measurement with UAV: Collaborated on a low-cost drone system for 3D airflow mapping in indoor environments. Engineered various flight control loops to explore the impact of different PID configurations on airflow estimation accuracy. (MobiCom 2023)

LASP, University of Colorado Boulder — **09/2020 - 05/2021**
Undergraduate Research Assistant

Medium Energy Electron Telescope in the Van Allen radiation belt: Designed a 1U CubeSat-compatible PCB from scratch for a ground detector simulator and implemented its FPGA logic and firmware using Verilog and C. Also contributed to the design of the charge-sensitive amplifier (CSA) for the detector.

SKILLS

Programming	Python, C, C++, RISC-V, MATLAB, Verilog, Ruby, R
Software & Tools	Linux, EAGLE, 3D Printing, SD webui(AIGC), Git
Machine Learning	Scikit-learn, Deep learning(TensorFlow, PyTorch), NCNN framework, TVM

PROFESSIONAL SERVICE

Volunteer, SIGCOMM 2023, New York, NY, USA

Poster Proxy Presenter, ACM/IEEE IPSN 2023

Web Chair, ACM Mobisys 2022 Workshop IASA

PUBLICATIONS

S. Xia, M. Zhao, C. Adhivarahan, **K. Hou**, Y. Chen, J. Nie, E. Wu, K. Dantu, X. Jiang, (2023).**Anemoi: A Low-cost Sensorless Indoor Drone System for Automatic Mapping of 3D Airflow Fields**, *The 29th Annual International Conference On Mobile Computing And Networking (MobiCom) 2023* (to appear).

K. Hou, S. Xia, E. Bejerano, J. Wu & X. Jiang, (2023). **ARSteth: Enabling Home Self-Screening with AR-Assisted Intelligent Stethoscopes**, *The 22nd ACM/IEEE Conference on Information Processing in Sensor Networks (IPSN) 2023* pp. 205-218.

M. Zhao, S. Xia, J. Nie, **K. Hou**, A. Dhupar & X. Jiang, (2023). **LegoSENSE: An Open and Modular Sensing Platform for Rapidly-Deployable IoT Applications**, *8th ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI) 2023* pp. 367-380.

K. Hou, S. Xia, J. Wu, M. Zhao, E. Bejerano, X. Jiang, (2022). **AI Stethoscope for Home Self-Diagnosis with AR Guidance**, *The 20th ACM Conference on Embedded Networked Sensor Systems (Sensys) 2022*

K. Hou, S. Xia, & X. Jiang, (2022). **BuMA: Non-Intrusive Breathing Detection using Microphone Array**, *ACM International Workshop on Intelligent Acoustic Systems and Applications (IASA) 2022* pp. 1–6.

M. Zhao, Y. Liu, A. Dhupar, **K. Hou**, S. Xia, X. Jiang, (2022). **A modular and reconfigurable sensing and actuation platform for smarter environments and drones: demo abstract**, *20th Annual International Conference on Mobile Systems, Applications and Services (Mobisys) 2022.*

K. Hou, Y. Liu, P. Wei, C. Yang, H. Kang, S. Xia, T. Spada, A. Rundle, & X. Jiang, (2022).**A Low-Cost In- situ System for Continuous Multi-Person Fever Screening**, *Information Processing in Sensor Networks (IPSN) 2022* pp. 15-27.