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

Medtronic Research — **07/2020 - 06/2021**
Research Intern
Designed an ultrasonic dissector with enhanced connectivity and intelligence. The system streams real time operating data of ultrasonic dissector to a remote server and detect damage to the jaw and jaw liner.

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.

Designed and graded assignments, labs, and exams. Hosted office hours and assisted students on course material.

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.

Designed and graded assignments, labs, and exams. Hosted office hours and assisted students on course material.

RESEARCH EXPERIENCE

· **Intelligent and Connected Systems Lab, Columbia University** — **09/2021 - Present**
Graduate Research Assistant
· *SIFTER*: Lead the development of SIFTER, a low-cost RGB-thermal camera system for continuous multi-person fever screening. Implement real-time algorithms for head detection, tracking and reconstructing personalized 3D head model for each head detected, achieving 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. Deploy multiple systems at the entrance of clinicsyes and medical center.

· *LegoSENSE*: Develop a plug-and-play platform based on Raspberry Pi, designed for no-code data acquisition, enabling users to custom mix-and-match a variety of sensors. Contribute to the system architecture design and conducted evaluations focusing on ease-of-use, flexibility, and scalability.

· *ARSteth*: Develop an Augmented Reality (AR)-assisted intelligent stethoscope designed to enable self-auscultation for everyone at home. Implement an integrated system that leverages computer vision, acoustic intelligence, human-computer interaction, and signal processing algorithms. Conduct comprehensive evaluations that demonstrate the effectiveness and accuracy of the AR guidance in the system.

- *Anemoi*: An low-cost drone system designed to autonomously map 3D airflow fields in indoor environments. Engineer various flight control loops to explore the impact of different PID configurations on airflow estimation accuracy.

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

- *The Medium Energy Electron Telescope (MEET)*: A 1U CubeSat-compatible instrument to study the source, loss, intensity, and dynamic variation of 30-400 keV electrons in Earth's inner belt. Implement a detector simulator circuit that met stringent performance metrics, including an energy resolution of less than 500 eV, a charge collection time of 200 ns, and a maximum count rate exceeding 500 kHz. Design the simulator's PCB board, and also contribute to the design of the charge-sensitive amplifier (CSA). The project's performance was validated through ground-based simulations using FPGA on CmodA7.

SKILLS

Programming	Python, C, C++, RISC-V, MATLAB, Verilog, Ruby, R
Machine Learning	Scikit-learn, PyTorch
System & Tools	Linux, EAGLE, Android Studio, 3D Printing

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.