

Motivation and Research Interest. Human interaction with intelligent systems has evolved for decades, and it is expected to continue in the foreseeable future. A key factor involves endowing machines with the capability to perceive humans across various dimensions, such as activity, identity, and emotions, and through various channels, including radio, audio, and vision. I am deeply intrigued by this vision of future technological advancements, which formed my enthusiasm for orchestrating the comprehensive pipeline of signal collection with sensors, pattern analysis, and enabling machine-mediated user interaction. Specifically, my research interest lies in the convergence of mobile computing, machine learning, and human-computer interaction. Through my involvement in various research projects, I have developed my skills as a researcher and fortified my ambition to pursue a PhD.

Speech Processing Project. Before my transfer to UMich, I engaged in undergraduate research at HKUST, supervised by Professor Kevin Chau on a project of speech intelligibility enhancement. We devised an algorithm that significantly improved speech intelligibility through wavelet reconstruction, a purely analytical approach that facilitated real-time processing. The project was recognized by the Mr. Armin and Mrs. Lillian Kitchell Undergraduate Research Award at HKUST.

This initial research experience acquainted me with the methodologies and attractiveness of research. Corrupted audio turned into intelligible audio cemented my passion for research.

Wireless Localization Project. Since my transfer to UMich, I have become a part of the Interactive Sensing & Computing Lab, under the guidance of Professor Alanson Sample. I ran experiments for a project that constructs a switched antenna array using cost-effective, readily available components to enable 2D localization via Angle of Arrival. The work is published in IMWUT.

My efforts were valued in the lab and I was given the precious chance to be the first undergraduate student who led a project, which eventually turned into a first-author paper of mine. I explored the prior work's hardware system's potential in object depth estimation in addition to more accurate 2D localization. I conceptualized and implemented a custom two-dimensional Angle of Arrival measurement algorithm, delivering performance improvements over the methods detailed in the previous paper. Additionally, I proposed and implemented a depth estimation pipeline based on machine learning, expanding the dimensionality from 2D to 3D with decent accuracy. The culmination of this effort led to the development of a first-author paper, which is currently under review at the IEEE Wireless Communications and Networking Conference (WCNC).

This project, pivotal for me, witnessed my inaugural involvement in every stage of the research process and my deep immersion into the realm of research. I struggled with unexpected experiment results, accidents caused by static electricity intricate problems with no guidance. Research often felt like navigating an infinite ocean of challenges and uncertainties. Nevertheless, I would enjoy such adventures, as I find worthiness and self-actualization in them.

Other Projects: Audio & Image. During my junior year, I undertook my undergraduate capstone project advised by Professor Emily Mower Provost's popularity prediction of music based on emotion recognition in audio. I developed a deep learning pipeline to predict timely valence and arousal trends in music. I employed an LSTM model for music genre classification and an RNN model for emotion prediction. In my senior year, I further refined this project by engaging physiological features, which proved to be effective in continuous emotion prediction. This work has been submitted to IEEE PerCom 2024.

Alongside working on the Wireless Localization Project, I also developed a research idea: the generation of 3D Lego block construction plans from a pile of blocks and a language command. After extensive reading in the field and consulting some graduate students, I successfully developed a system for 2D Tetris block construction of hand-writings continuing to 3D, I encountered a formidable obstacle in formulating a gradient-available loss function. As the wireless localization project demonstrated more promising results, I had to balance resources, time, and

ambition, and postpone this idea. I remain eager to revisit similar topics in the future.

Internship and Academics. In my sophomore year, I worked as a summer intern at the Hong Kong Applied Science and Technology Institute. I collaborated closely with a senior engineer on a project related to camera calibration for autonomous vehicles. We adapted open-source code to our specific LiDAR + Camera hardware, and the final prototype was highly valued by the group leader and was included in the demonstration session to the Hong Kong Government. This internship offered insights into industry-leading software development practices, covering aspects like version control, documentation, and code structure maintenance. Moreover, this collaboration provided a 'Managing Up' mindset, enabling me to effectively resolve intergroup asynchronization and articulate needs for support.

Furthermore, I have consistently set high standards in my coursework. I pursue double majors in Computer Science and Statistics, having chosen rigorous courses throughout my undergraduate studies. I consistently earn a place on the dean's list or receive university honors in every academic year. Though some unexpected situations triggered by HK Pandemic policies significantly impacted my HKUST grade in the "Principles of Cybersecurity" course, I retook the course at UMich with an A-.

Future Career Plans. Based on my interests and experiences, my foremost ambition is to attain a research position in EE&CS in academia. My commitment to academics has provided me with insight and resilience, as well as the ability to effectively collaborate, which is necessary for a research career.

Faculty of Interest. Specifically, I am very interested in collaborating with Professor **Hari Balakrishnan**, Professor **Gregory W. Wornell**, and Professor **Fadel Adib**.

I am intrigued by the topic of drone sensing and intelligence in Professor Balakishnan's lab, as I have developed an understanding of Robotics by earning decent grades in related courses. Moreover, I am interested in the research topic of "artificial intelligence techniques for RF spectrum analysis and interference suppression, and applications" in Professor Wornell's lab, as it matches my interest and background in Machine Learning and RF signal processing. Additionally, I am intrigued by the topic of "RF Perception/Localization for Robots and Drones" in Professor Adib's group.