My current research focuses on developing ICs and systems with edge AI for advancing **human health**, **5G telecommunication**, and **environmental studies**. I conducted interdisciplinary research in (1) biomedical IC designs for treating intractable neurological conditions [J1-15], [B1], [C1-11]; (2) ultra-wideband data converter designs for 5G telecommunication (at Qualcomm 2017-2021) [P1-4], [1], [2]; and (3) multi-functional CMOS (complementary metal-oxide-semiconductor) sensor designs for environment monitoring [J16], [J17], [C12]. Currently, I conduct research at the University of Toronto (U of T) in collaboration with multiple faculty members in the Faculty of Applied Science & Engineering and the University Health Network (UHN), international researchers (e.g., the University of Pennsylvania in the United States, Tsinghua University in China), and industrial partners.

Up to 1 billion people around the world are suffering from neurological disorders, such as epilepsy, Parkinson’s disease, Alzheimer’s disease, spinal cord injury, and traumatic brain injury. Neurological disorders cost 25% of the global burden of diseases. There is a great need for improved treatments with low-cost and high efficacy, consuming mini-mum healthcare resources. My research develops neural implants, a type of medical device that can treat neurological conditions by providing therapeutic stimulation (similar to a heart pacemaker) to a patient in response to the real-time detection of irregular biomarkers in the neural signals (e.g., seizures). ICs have been developed for integrating neural implants into miniature chips for improving performance and reducing invasiveness. However, conventional ICs for neural implants have limited interfacing modalities and oversimplified neuromodulation algorithms. My research aims to overcome these limitations by advanced IC design techniques with edge AI.