Allen C. Cheng, Ph.D.

Department of Electrical and Computer Engineering
Department of Bioengineering
Department of Neurological Surgery
Department of Computer Science
Advanced Computing Technology Laboratory
University of Pittsburgh

Title: Designing Next-Generation Microelectronics for Emerging Bio-Implantable Applications.

Abstract: The idea of implanting microelectronic devices into a human body to perform *in vivo* diagnosis, therapeutic interventions, and functional augmentation holds the promise to significantly improve the state of healthcare and the overall societal wellbeing. Currently, bio-implantable devices can monitor and regulate a variety of electrical and biochemical processes in an individual, in many cases restoring a quality of life that has not been achievable in the past. Despite the large potential benefits and new range of capabilities they can potentially provide, the microelectronics used even in leading-edge bio-implantable research efforts lag the state-of-the-art in computing by several generations, severely limiting their capabilities. These shortfalls, rooted in the employed computing and communication technologies, pose a significant barrier to deploy more functionally sophisticated bio-implantable applications, extend their life span, and achieve profound breakthroughs in biological sciences and medicine.

In this talk, I will discuss some of the challenging issues and requirements in designing next-generation microelectronics for emerging bio-implantable applications. Then, I will propose a set of promising approaches and future research directions, which the system, architecture, and circuit communities can tackle and make significant contributions. I will also describe the current status of the bio-implantable computing platform initiative conducted at the University of Pittsburgh along with our strategic partners in other collaborative institutions.

Biography: Professor Allen C. Cheng is an Assistant Professor in the Departments of Electrical and Computer Engineering, Bioengineering, Neurological Surgery, and Computer Science at University of Pittsburgh. He received his Ph.D. and M.S. in Computer Science and Engineering from the University of Michigan at Ann Arbor, where he was also a faculty lecturer in its College of Engineering prior to joining the University of Pittsburgh. His research interest is ***Biomedical Computing*** with current focus on developing energy/power-efficient, resilient, and high-performance computer and system architecture, processor microarchitecture, performance characterization, and compiler optimizations for both *Bio-Implantable* and *Bio-Mobile* applications. The research efforts of his Advanced Computing Technology Laboratory target at developing fundamental science and implementing practical engineering solutions via algorithm/software/hardware co-design to pioneer assistive biomedical devices capable of performing *in vivo* diagnosis, therapeutic interventions, and functional replacement. He is a member of several international scholar and honor societies including Eta Kappa Nu, Phi Eta Sigma, and Golden Key. He is also a member of IEEE, ACM, and AAAS.