Talk title: Revolutionizing Multimedia Applications in the Era of Advanced VLSI Technology

Abstract:
In today's era of advanced VLSI technology, the possibility of integrating a system-on-a-chip (SoC) for multimedia applications has become a reality. To meet the increasing demand for efficient image and video coding, a multitude of standards such as JPEG, MPEG-1, MPEG-2, MPEG-4, H.264, HEVC, and VVC have emerged. These standards rely on hybrid coding schemes that combine predictive coding and transform coding techniques. As a result, there are two distinct approaches to implementing video coding algorithms.

The first approach involves dedicated architectures, which offer exceptional processing capabilities, ensuring high performance. However, the fabrication and testing of such architectures require significant time and effort, limiting their flexibility. On the other hand, programmable architectures provide function flexibility and multiprocessing capability, but often fall short in terms of performance due to their complex nature.

During this keynote, we will delve into these two design methodologies for video signal processors. We will explore the benefits and challenges associated with dedicated architectures, emphasizing their high performance but limited flexibility. Additionally, we will examine programmable architectures, highlighting their advantages in terms of function flexibility and multiprocessing capability, while acknowledging their potential performance limitations due to complexity.

Furthermore, we will emphasize the crucial role that image and video codecs play in today's highly demanding multimedia appliances. These codecs are predominantly implemented as dedicated architectures to handle the computational complexity of real-time constraints. To create high-performance and cost-efficient architectures, designers must possess a deep understanding of the characteristics of video data and coding algorithms. By applying advanced architecture design techniques, designers can achieve highly parallel designs with smooth data flow and maximum hardware utilization.

Join us in this keynote session as we explore the groundbreaking advancements in multimedia applications, fueled by VLSI technology. Discover the optimal balance between performance and flexibility, enabling the creation of cutting-edge multimedia solutions that meet the ever-increasing demands of today's digital world.

Bio:

Yeong-Kang Lai received the Ph.D. degree from the Institute of Electrical Engineering, National Taiwan University, Taiwan, in 1997.

In 2001, he joined the faculty of the Department of Electrical Engineering, National Chung Hsing University, Taichung, Taiwan, where he is currently a full Professor. He served as the Director of Meng Yao Chip Center from 2013 to 2015 and the Chairman of the Electrical Engineering Department from 2019 to 2022. He has published more than 100 technical journal and conference papers. His research interests include 3D display, 3D video, video compression, DSP architecture design, video signal processor design, artificial intelligence, and VLSI signal processing.

Dr. Lai was a recipient of the Distinguished Teaching Award from National Chung Hsing University in 2011, 2013, and 2016. In 2010, he also received the Best Paper Award of the International SoC Design Conference. He is a Fellow of IET and a member of Phi Tau Phi. He served as an Associate Editor for IEEE Transactions on Consumer Electronics from 2012 to 2021, and a Technical Program Committee Member for several conferences.