Low Power and Flexible Solutions: Application Specific Instruction-set Processors

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Abstract
Application Specific Instruction-set Processor (ASIP) which can give both relatively high performance low power of ASIC and flexibility of processor has emerged as a promising solution. This talk introduces three implemented ASIPs for communication and multimedia applications. First, a Motion Estimation Specific Instruction-set Processor (MESIP) for video applications has been developed having 2-D parallel configurable processing elements and a special instruction set, which can efficiently implement various ME algorithms. Moreover, MESIP can significantly reduce the redundant data loading by using the proposed novel data reuse search scan order. Next, a Signal Processor for OFDM Communication Systems (SPOCS) is implemented to efficiently handle FFT, scrambling/descrambling, etc. SPOCS can dramatically reduce the number of cycles and memory accesses and meet various standards that use OFDM. Last, a Digital Audio Specific Instruction-set Processor (DASIP) employs for the optimized instruction set and architecture for high-quality audio. ASIP solutions can significantly reduce the number of cycles, and memory accesses and they can dramatically save power consumption. In summary, ASIP can be a promising solution for implementation of rapidly changing various communication and multimedia applications, and hence ASIP can save huge NRE costs in nano technology era.

Thursday, 12.07.2012
Start: 16:40 (60 min)
Barkhausen-Bau, lecture room 205
Helmholtzstr. 10, 01069 Dresden
Myung H. Sunwoo received the M.S. degree in Electrical and Electronics from Korea Advanced Institute of Science and Technology (KAIST) in 1982, and the Ph.D. degree in Electrical and Computer Engineering from the University of Texas at Austin in 1990. He worked for Electronics and Telecommunications Research Institute (ETRI) in Korea from 1982 to 1985, and Digital Signal Processor Operations, Motorola, Austin, TX from 1990 to 1992. Since 1992, he has been a Professor with the School of ECE, Ajou University in Korea. He has authored over 380 papers and also holds 50 patents. He received 28 research awards and his research interests include low power SOC architectures, design for multimedia and communications, and application-specific design.

He served as General Chair of International Symposium on Circuits and Systems (ISCAS) 2012, Seoul Korea. He served as Technical Program Chairs of the IEEE Workshop on SiPS in 2003, General Co-Chair of ISOCC and General Chair of the IEEK SOC Conference in 2008. He has been a Technical Committee member for numerous conferences and he was an Associate Editor for the IEEE Transactions on Very Large Scale Integration (VLSI) Systems (2002–2003), Guest Editors for the international journals. He is the IEEE Circuits and Systems Society (CASS) Board of Governor (BoG) since 2011 and was a Distinguished Lecturer of the IEEE CASS until 2010. He was a Director of the National Research Laboratory sponsored by the Ministry of Science and Technology and a Director of the New Growth Engine Semiconductor Center,. He is a President of the IEEK Semiconductor Society. He was an honorary ambassador of Korean Tourism Organization. He is a Chair of the IEEE CASS, Seoul Chapter and a Fellow of IEEE.