Keynote in honor of Prof. McCluskey

Symbiotic-System Approach for IOT Devices

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Abstract
The global semiconductor business over the past thirty years shows an encouraging trend of growth in general, with only a few glitches that did not hinder the long-term trend. The growing trend, however, slows down in recent years, along with the global economy. Meanwhile, the Internet-of-Things (IOT) has long been identified, or expected, as the main driving force of growth for many industries in the future, if not now. Unfortunately, so far there is not so much evidence that IOT will likely give a great boost to the semiconductor industry (that we are all concerned here) in the near future. People are realizing that IOT is NOT a tangible industry, but instead just a phenomenon or notion of industry migration toward smart and connected everyth`ing. If IOT is going to be the savior of the struggling semiconductor industry, what will be the key factors of its success? In my speech, in addition to paying my respects to Prof. Ed McCluskey, I will address this issue and propose the Symbiotic System Model (SSM) for developing IOT devices and systems. Especially for device and system test, the Symbiosis-Based Test (SBT) will also be proposed. A Symbiotic Relationship (SR) is a relationship of mutual dependence between two different (biological or electronic) systems, where (part of) one system's input is from the other's output, and vice versa. A Symbiotic System (SS) (see Fig. 1) is a twin system comprising the primary (functional) system and secondary (test) system, with SR. A couple of cases of SSMs for existing and/or future applications will be demonstrated, e.g., an IOT-based sensor network that is connected to cloud with big data analytics for natural disaster prevention, a data center storage system with at least tens of thousands of nodes that should be optimized for energy efficiency and lifetime, a heterogeneous network of computing nodes in a data center or a distributed environment that should be optimized for cost, performance and lifetime, an enhanced cellular automata where cells are equipped with sensors, etc. This speech is meant for triggering more research activities regarding establishing a sound IOT platform that allows heterogeneous integration of technologies and partners to migrate certain industries based on the notion of IOT.

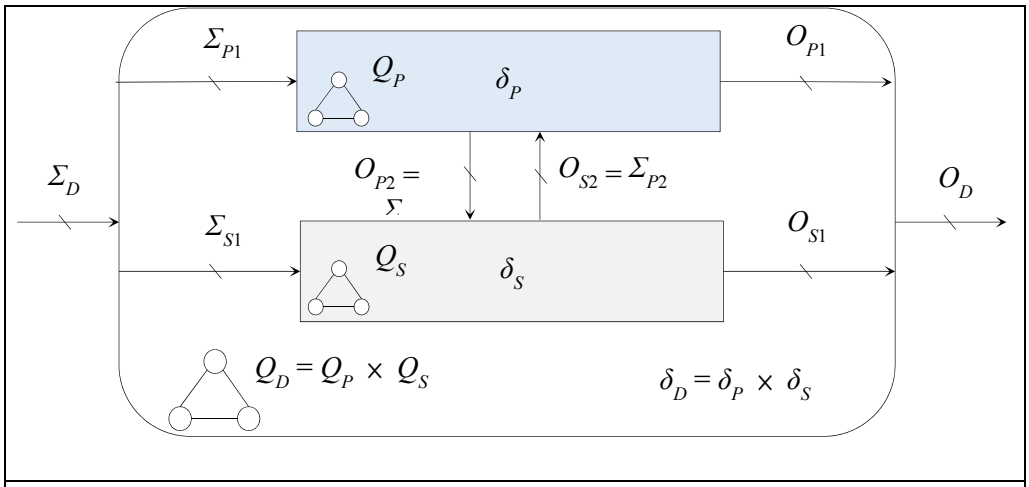

Fig. 1. The FSM model of a symbiotic device.

Speaker's Bio

Cheng-Wen Wu received the BSEE degree from National Taiwan University in 1981, and the MS and PhD degrees in ECE from UCSB in 1985 and 1987, respectively. Since 1988, he has been with the Department of EE, National Tsing Hua University (NTHU), Hsinchu, Taiwan, where he is currently a Tsing Hua Distinguished Chair Professor. He has served in the past at NTHU as the Director of Computer Center, Chair of EE Department, Director of IC Design Technology Center, Dean of the College of EECS, and Senior Vice President for Research. When he was on leave from NTHU from 2007 to 2014, he served at ITRI as the General Director of the SOC Technology Center, and the Vice President and General Director of the Information and Communications Labs. Dr. Wu received the Academic Award from the Ministry of Education (MOE) in 2005. He became a Golden Core Member of the IEEE Computer Society in 2006. In 2013, he received the National Endowed Chair Professorship from MOE, and in 2015, he received the EE Medal (highest honor) from the Chinese Institute of Electrical Engineers (CIEE). His research interests include design and test of high performance VLSI circuits and systems, and test and repair of semiconductor memory. He is a life member of the CIEE, a life member of Taiwan IC Design Society, and a Fellow of the IEEE.