Role and Challenges of Embedded AI in the Era of Internet Intelligence-of-Things

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Abstract

Internet-of-Things (IoT) is the inter-networking of physical devices, vehicles, buildings, and objects with embedded sensors. It is estimated that by 2020 there will be more than 34 billion IoT devices connected to the Internet. Nearly $6 trillion will be spent on IoT solutions over the next five years. Artificial Intelligence (AI), on the other hand, is intelligence demonstrated by machines that work and react like humans. Some examples of AI powered applications are voice-powered personal assistants like Siri and Cortana, machine translation, email spam filter, etc. The combination of AI and IoT gives birth of Internet Intelligence-of-Things (I2oT). I2oT devices differ from IoT devices that not only they sense, store, transmit data but also analyze and act on data, i.e. the I2oT device makes a decision or perform a task similar to what a person could do. Most of existing “smart” IoT devices, which are controllable from an APP, are not I2oT devices. The true I2oT devices should be able to perform a task on your behalf, such as autonomous vehicle – it drives for you. The enabling technology for the I2oT device is embedded AI. This talk will cover low power techniques for embedded AI in I2oT applications. The focus is on the energy efficient system architecture that utilizes the brain-inspired event-driven signal representation. The event-driven signal representation enables data compression at the input source, which greatly reduces the power for data transmission and processing. We will show by examples that the event-driven system significantly improves energy efficiency and is well suited for I2oT applications.

About the Speaker

Prof. Yong Lian received the B.Sc degree from the College of Economics & Management of Shanghai Jiao Tong University in 1984 and the Ph.D degree from the Department of Electrical Engineering of National University of Singapore (NUS) in 1994. His research interest includes low power techniques, continuous-time signal processing, and biomedical circuits and systems. His work has been recognized with more than 20 awards including the 1996 IEEE Circuits and Systems Society’s Guiilemin-Cauer Award, the 2008 Multimedia Communications Best Paper Award from the IEEE Communications Society, 2011 IES Prestigious Engineering Achievement Award, 2012 Faculty Research Award, 2013 Outstanding Contribution Award from Hua Yuan Association and Tan Kah Kee International Society, 2014 Chen-Ning Yang Award in Science and Technology for New Immigrant, and the 2015 Design Contest Award in 20th International Symposium on Low Power Electronics and Design. He is also the recipient of the National University of Singapore Annual Teaching Excellence Awards in 2009 and 2010, respectively.

Prof. Lian is the President of the IEEE Circuits and Systems (CAS) Society, Chair of IEEE Periodicals Partnership Opportunities Committee, a member of IEEE Periodicals Committee, a member of IEEE Periodicals Review and Advisory Committee, a member of IEEE Biomedical Engineering Award Committee, a member of Steering Committee of the IEEE Transactions on Biomedical Circuits and Systems. He was the Editor-in-Chief of the IEEE Transactions on Circuits and Systems II for two terms from 2010 to 2013, a member of IEEE Fellow Committee from 2016 to 2018. He served many positions in the IEEE CAS Society including Vice President for Publications, Vice President for Asia Pacific Region, Chair of the Biomedical Circuits and Systems Technical Committee, Chair of DSP Technical Committee, Distinguished Lecturer, etc. He is the founder of several conferences including BioCAS, ICGCS, and PrimeAsia.