



## Hwa Chung “HC” Torng

September 19, 1932 – March 31, 2023

Dr. Hwa Chung “HC” Torng, professor emeritus in the School of Electrical & Computer Engineering at Cornell University, passed away on March 31, 2023, at the age of 90. Professor Torng was born on September 19, 1932, in Yangzhou, Jiangsu Province, China. In 1949, he moved to Taiwan with his parents, and a few years later, he enrolled in the electrical engineering program at National Taiwan University, earning a bachelor’s degree in 1955. Subsequently, he pursued graduate studies in electrical engineering at Cornell University, obtaining M.S. and Ph.D. degrees in 1958 and 1960, respectively. That same year, he married Bung-Fung Lee, with whom he would eventually have two sons, Cliff and Eric.

Upon completing his Ph.D. studies, Professor Torng joined the faculty of the School of Electrical Engineering at Cornell University, where he would conduct research and teach until his retirement in 1998. Professor Torng’s research encompassed several subjects, including digital systems and telecommunications; however, he was arguably best known for his contributions to processor architectures. He was also an award-winning teacher, receiving the Ruth and Joel Spira Outstanding Teacher Award twice and the Best Professor Award from the Cornell student chapter of the Institute of Electrical & Electronics Engineers three times, among other accolades.

One of his most famous research contributions is described in the article “An Instruction Issuing Approach to Enhancing Performance in Multiple Functional Unit Processors,” co-authored with Ramón Acosta and Jacob Kjelstrup, which appeared in *IEEE Transactions on Computers* in September 1986. In this paper, Professor Torng and his co-authors describe the *dispatch stack*, which, with the help of a *precedence count memory* to keep track of register dependencies across instructions fetched from a single stream, allows the dynamic issuing of multiple instructions per processor cycle in a nonsequential way. Professor Torng had already filed a U.S. patent application covering the concepts in October 1983; the patent was granted in 1988. Later, in the 2000s, this invention was the subject of a nine-year legal dispute between Cornell University and the Cornell Research Foundation v. Hewlett-Packard Corp, which the parties ultimately settled out of court.

Professor Torng and his wife used the proceeds from that patent to establish a charitable fund and multiple scholarship programs. The School of Electrical and Computer Engineering, too, used its share to endow multiple graduate fellowships that bear HC Torng’s name.

Although I joined the school after HC (as he liked to be called) had already retired, I had the privilege and pleasure to meet with him multiple times during his visits to our Ithaca campus. HC was always very supportive of our Computer Systems Laboratory (CSL), which we proudly regard as heir to his pioneering contributions to computer architecture. In 2019, during one of his visits, CSL faculty and graduate students enjoyed an hour-long sit-down with him, where, to everyone's delight, he reminisced about the origins of his invention and the subsequent legal tussle. HC and Bung-Fung were generous enough to donate some funds to the lab, which we use to this day to host external speakers under our HC Torng Computer Engineering Lecture Series and, more recently, to provide professional development support for female Ph.D. students.

May he rest in peace.

Written by José F. Martínez