Centre for Integrated Circuits and Systems

Centre for Integrated Circuits and Systems (CICS) was established with the mission to excel in research and design of Integrated Circuits and Systems to provide cutting edge technologies and specialized manpower training for the electronic industry. Its activities are focused mainly on the design, analysis and integration of low power electronic circuits and systems. CICS has 3 well established research groups, namely, RF Integrated Circuits & Systems; Mixed-Signal IC & Applications, and VLSI Design & Embedded Systems. Currently, CICS has 18 active academic staff and more than 80 research students.

- The RF Integrated Circuits & Systems Group's activities cover the following topics: RF IC design for wireless applications, RF modeling for deep sub-micrometer devices, interconnects, Integrated Circuit Package Antenna (ICPA), and electromagnetic interference and compatibility. The group has 10 ongoing research projects with an aggregate funding of over $4 million. The research funding mainly comes from external establishments and the industry. The group published 25 papers in top journals and 14 conference papers in 2005 and the first quarter of 2006, and has had one patent filed/granted per year since 2000. In March 2006, the Group was awarded a grant of $1.2 million for the Body sensor Wireless Network project. An integrated voltage-controlled oscillator and a 10Gbps clock and data recovery chip fabricated in 180-nm RF CMOS technology are shown in Figures 1 and 2 respectively.

- The Mixed-Signal IC & Applications Group's activities cover analog and digital class-D amplifiers, low-power asynchronous digital circuits, biomedical circuits and systems, sensor interfaces, data converters, precision analog circuits, low-voltage low-power analog cells, analog design automation and circuit synthesis. Followed by the Panasonic funding of $1 million for research of digital class-D amplifier in 2005, it secures another $661K funding from NTU-Linköping University for research of low-power asynchronous DSP chips. The group published 11 journal and 13 conference papers in 2005 and the first quarter of 2006. One patent is granted in 2006. An asynchronous DSP chip has been recently featured in the France CMP annual report. A biomedical IC for EEG/ECG monitoring systems is as shown in Figure 3.

- VLSI Design & Embedded Systems Group's activities cover topics pertaining to the development of novel algorithms, efficient hardware architecture, embedded systems, energy recovery CMOS circuits, reconfigurable computing, high-level synthesis, and reliability study of VLSI interconnect. The group has a research funding of $478,800 for two ongoing externally funded projects. For 2005 and the first quarter of 2006, 43 journal papers, and 37 conference papers were published and one patent was filed. A 1.1V ultra low-power digital multiplier with low spurious switching is illustrated in Figure 4.