

## ASTRI's R&D Groups

# IC Designs

It is generally recognized that Integrated Circuits (ICs) are the essential building blocks of today's electronic equipment and devices. Hence, the impact of a successful IC design team on the manufacturing industry and economy cannot be anything but positive.

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# IC Designs



## Introduction

The global IC market exploded to US\$250 billion last year from US\$215 billion in 2004. In recent years, strategic and modern facilities have been built to manufacture ICs on the Mainland, and a great amount of work on the core technology has been done to sustain the continuous growth of the electronics and manufacturing industries.

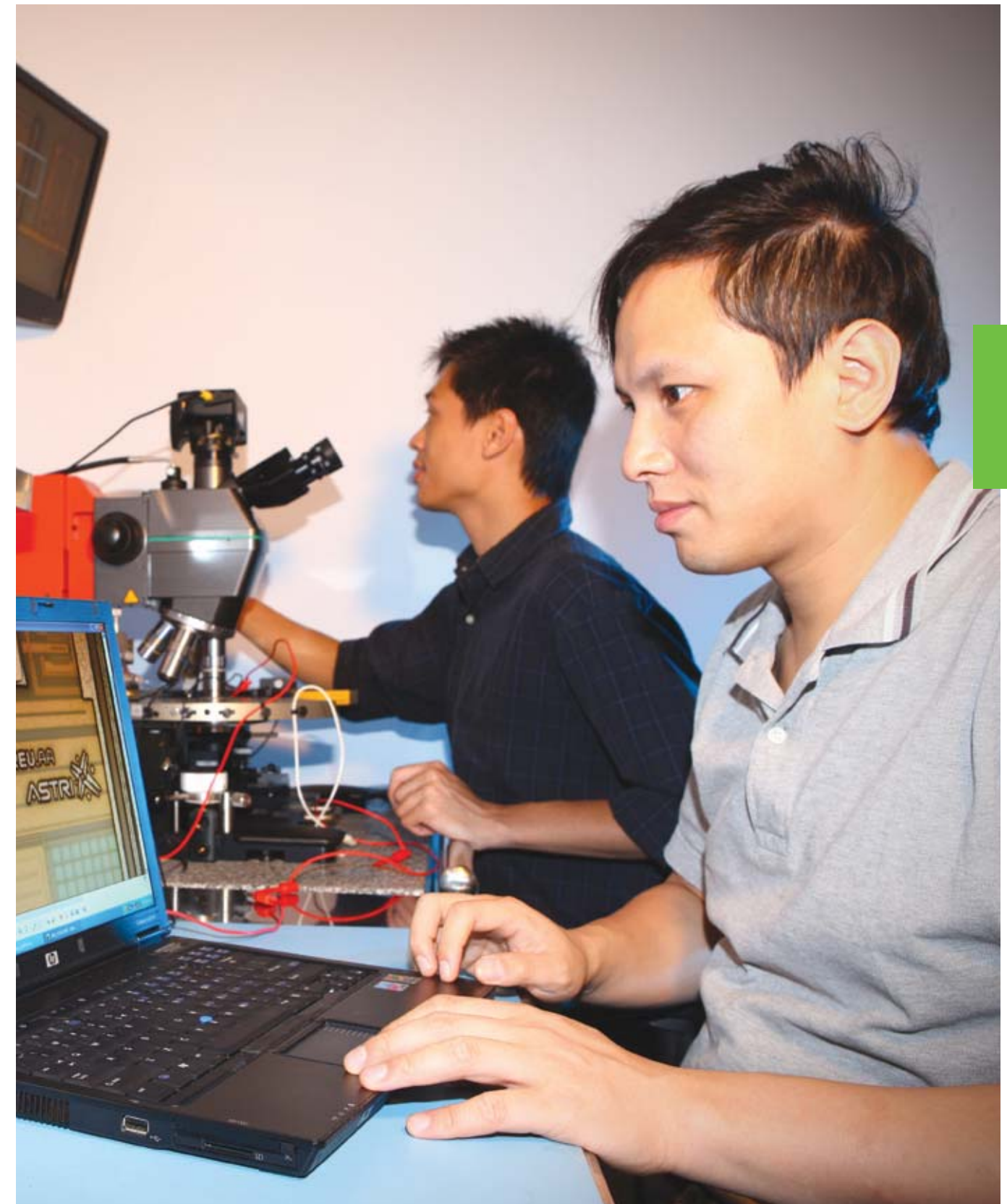
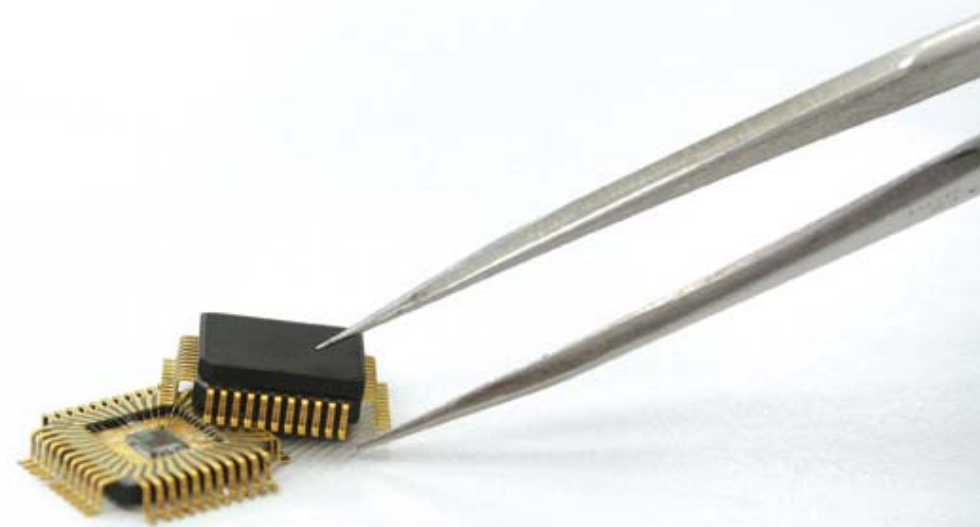
The Mainland has already been transformed from a manufacturing base into a design and development base. It is foreseeable that the industry will gradually acquire the capability to serve as IC-design bases in the next decade. By then, the country may further grow into an innovation base.

ASTRI's IC Designs (ICD) Group has been tasked to assist in the development of local competence, consolidate the technology foundation, and sustain the IC design ecosystems in Hong Kong and the Pearl River Delta. R&D teams are combining their efforts to help the industry capture the best opportunities in the fast growing semiconductor and electronics markets worldwide, especially in Greater China.

The focus of ICD programmes is to establish the technology foundation for the IC design industry in Hong Kong and the Delta region, in order to capture the future growth opportunities brought by the worldwide semiconductor markets in general, and the Mainland market in particular.

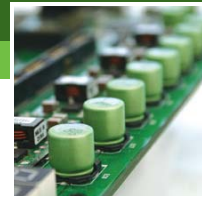
Making full use of its design skills and domain-specific expertise, ICD is currently focusing on developing IC design technology foundation by implementing designated projects that create direct commercial benefits for Hong Kong and the Delta region.

During the past year, ICD applied research programmes were able to deliver services, consultation, IC prototypes, IC cores, IC design libraries and ecosystems. All of these are extremely vital to fuel the development of the IC design industry in Hong Kong and the Delta region, thereby increasing Hong Kong's overall competitiveness in global markets.



Silicon Analysis Laboratory

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## Developments

### Technology Transfers

During the past 12 months, ICD successfully achieved seven industrial transfers to local and Mainland industry for commercialization. They include:

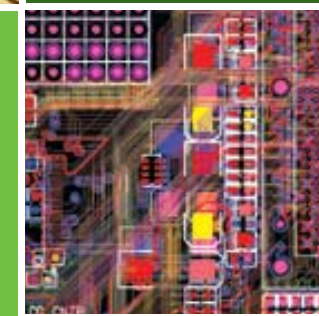
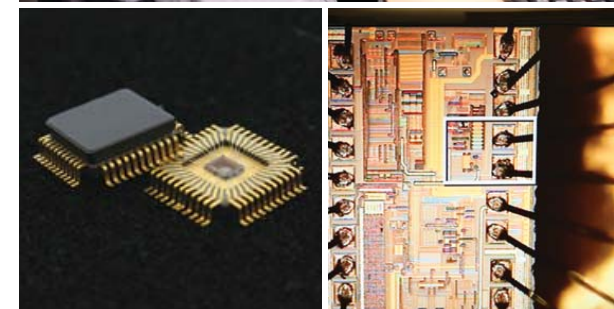
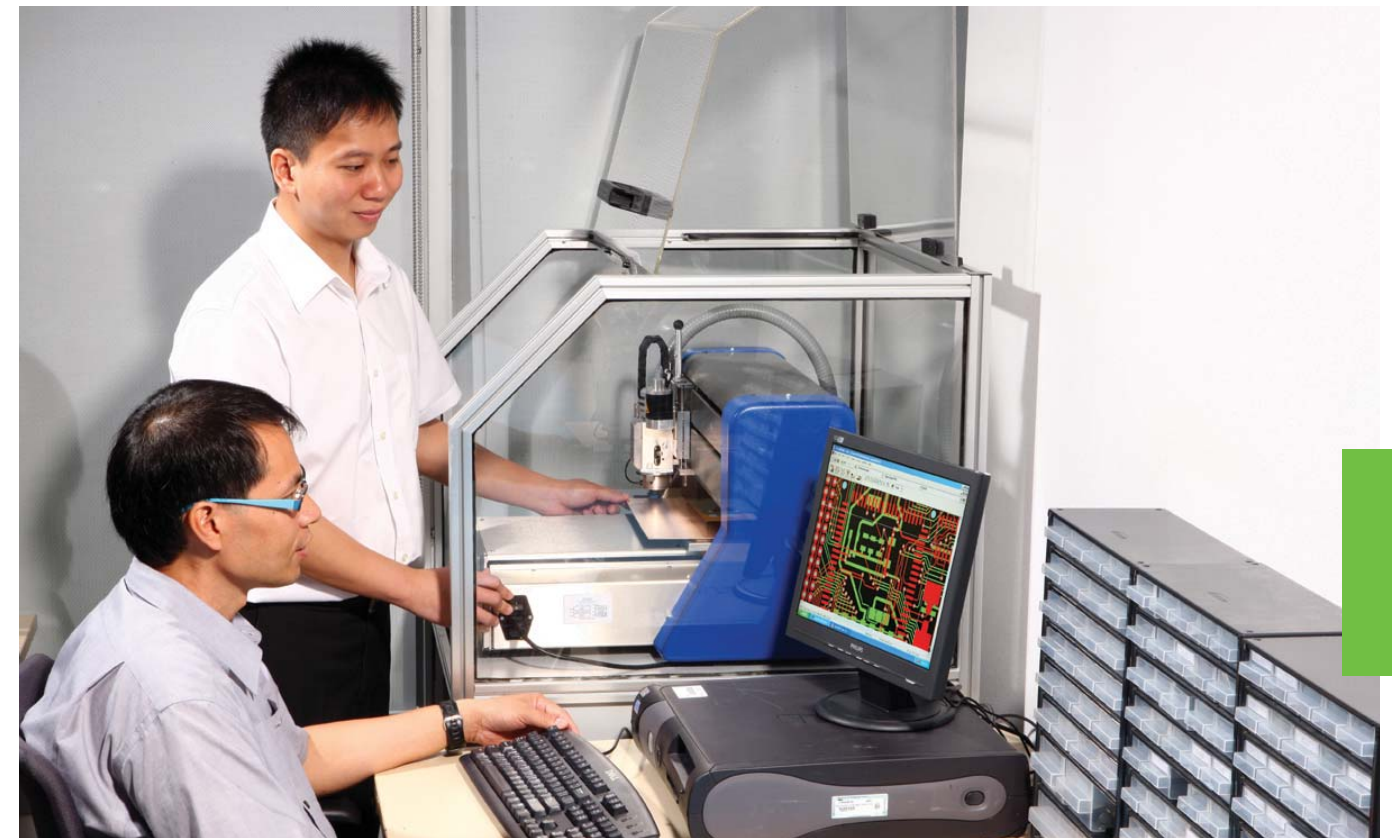
- Two power management silicon IPs to a local semiconductor company for mass production. These IPs are used in consumer electronics products, such as Portable Digital (PDA), MP3 players and cell phones.
- An image processor for security camera IP was transferred to a Hong Kong based semiconductor company for production. The mixed signal design significantly lowers the cost of a security camera by reducing a normal three IC solution to a single IC.
- ICD transferred System on Chip (SoC) Design Methodology to a major TV manufacturer on the Mainland to facilitate the design of a video processing system for mass production in HDTV.
- An eight-bit MCU Platform was licensed to a Hong Kong-based IC design company. The platform enables this purely analog design house to successfully create mixed-signal SoC ICs.
- ICD transferred two digital signal processing silicon IPs to a local IC design company for mass production. These IPs are used in audio products, such as noise cancellation headset and wireless transmitter.

### Industrial Sponsorships

ICD secured sponsorship from a group of local and Mainland partners for new projects in mixed signal SoC, LED lighting, audio/video processing and LED backlight projects. These projects provide local electronic product manufacturers with Hong Kong designed and produced IC solutions with significant cost savings over imported products. The industrial sponsorships, which amounted to more than HK\$5 million, reaffirmed ICD's significant contribution to the industry in Hong Kong and the Mainland.

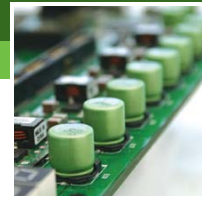
### Patents and Technical Papers

The ICD is proud to announce that during the year, it filed five technical patents with the U.S. Patents Office and two IEEE technical papers were submitted.



- 01 High-Speed PCB Design Station in IC Designs Lab
- 02 IC Manufacturing and Packaging
- 03 High-power Microscope in IC Designs Lab
- 04 SoC Layout Design

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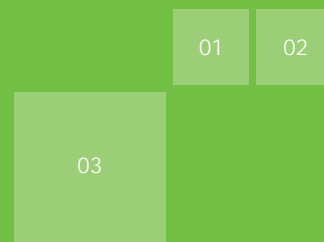
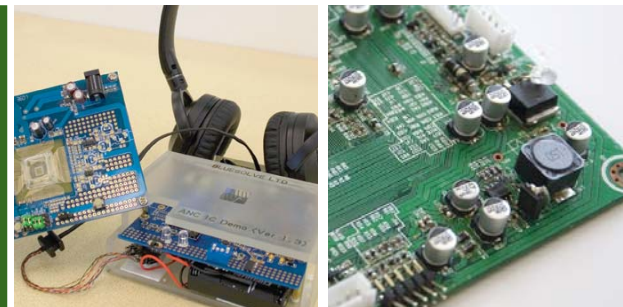


## Achievements

### ASTRI IC Design Technology Forum, Shenzhen

The group conducted a forum at Peking University (Shenzhen Graduate School) in September last year, primarily for sharing technical knowledge with their students and professors on the topics of Low Power IC Design, Design-for-Test and SoC Design Verification. Seminars and meetings were also held in Shanghai and Shenzhen on different related topics.

A joint development team has also been formed in Shenzhen by researchers from the Chinese University of Hong Kong, ASTRI and Peking University's Shenzhen Graduate School on the development of ASIC design.



01 Noise Cancellation SoC developed by IC Designs Group and industrial partner

02 HDTV Video Processing SoC developed by IC Designs Group and industrial partner

03 Wafer Probe Station in IC Designs Lab

## Project Highlights

	Project Name	Description	Date
1	Mixed Signal SoC Development Platform	This project delivers a design platform comprising a design methodology and a library of digital and analog IP. Using this platform, local design engineers, even without extensive analog design experience, can implement cost effective mixed signal applications specific system on a chip (SoC) products.	Mar 08 ~ Sep 09
2	Integrated LED Driver technology for general lighting	The low-cost LED lighting driver platform using locally produced IC drivers for general lighting applications developed by ICD presents a big boost to energy-saving lighting product manufacturers.	May 08 ~ May 09
3	Power Management IC: Low Drop Out (LDO) voltage regulator IP	This LDO has been in mass production since 2007. The R&D team designed the IP to specifically target at manufacturability using low-cost non-critical open CMOS processes adopted on the Mainland.	Feb 07 ~ Jan 08
4	Power Management IC: DC/DC Converter IC used in portable MP3 players and cell phones	This high efficiency DC/DC converter IP can boost a single cell battery to 3.3V output with close to 100 per cent efficiency. The IP was successfully transferred to local partners for production.	Febr 07 ~ Jan 08
5	CCD Camera Analog Front End (AFE) Single Chip IC for security camera	The CCD camera AFE IC designed with mixed signal and mixed BiCMOS process enables industrial partners to build single chip image processors that normally requires three separate chips. The AFE chip is being mass produced.	Jan 07 ~ Nov 08
6	Nanometer IC Design Technology	This technology is developed to lay down the foundation for improving SoC and Silicon-IP implementations in the nanometer dimension.	Aug 07 ~ Dec 07
7	Intellectual Property Qualification	This development focuses on the establishment of a quality indexing scheme for IP in various forms, through review checklist and implementation. This quality indexing scheme is based on IP qualification platform developed by Greater China Silicon IP Trading Centre (GCSIPTC) of the Hong Kong University of Science and Technology.	Mar 08 ~ Sep 08
8	Active Dynamic LED Backlight Control	This project aims at developing an Active Dynamic Backlight Control (ADBC) silicon IP to perform dynamic LED backlight dimming control and LCD image compensation for image quality improvement and power-saving on LED backlight LCD TV.	Sep 07 ~ Feb 08

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9	MCU Development Platform	The 8-bit MCU Platform is a high-performance and configurable MCU builder. It combines the award-winning Low Power Design Methodology from IC-ASD to provide a comprehensive and silicon proven development platform for building low-cost, high performance embedded-8051 MCU IC in short cycle time for a wide range of applications. With this success, IC-ASD will continue to look into expanding the platform with more popular IPs and enhance the horsepower into the 32-bit arena.	Dec 05 ~ Dec 07
10	Development of Structured ASIC Platform	Structured ASIC is an intermediate technology between ASIC and FPGA offering high performance, a characteristic of ASIC, and low NRE cost, a characteristic of FPGA. Using Structured ASIC allows products to be introduced quickly to market, to have lower cost and to be designed with ease. The objective is to open new opportunities in the Programmable Logic Device market based on Structured ASIC. The focus of this Shenzhen-Hong Kong Jointly Funded Project is to build a mechanism for Structured ASIC creation.	Mar 08 ~ Jul 09