

... { Achieving  
Applied R&D Excellence  
with Industrial Impact



## The Hong Kong Applied Science and Technology Research Institute (ASTRI) : An Introduction

The Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI) was founded by the Government of the Hong Kong Special Administrative Region, and began operation in 2001 to enhance technological advances for Hong Kong through applied research.

In April 2006, when the Innovation and Technology Commission (ITC) launched the Hong Kong R&D Centre Initiative with the objective to promote applied R&D and facilitate technology transfer and commercialization under a new strategic framework for innovation and technology development, ASTRI was designated the Hong Kong R&D Centre for Information and Communications Technologies (HK R&D Centre for ICT) with special goals to market leading-edge R&D for technology transfer to industry, to develop the much needed technical human resources, and to act as a focal point bringing together industry and university R&D assets to increase Hong Kong's technological competitiveness on a continuous basis.

In the past few years, ASTRI has already built teams of excellent world-class researchers and created real economic impact by transferring their intellectual properties (IPs) in customer-focused ways to our industry customers, continuously and in volume. Our ultimate objectives will be nothing short of establishing ASTRI as one of the best and most influential R&D centres in the region, and a truly strategic asset that enables Hong Kong to enhance values from competitive technologies for years to come.



### Chairman's Foreword

Dr. Patrick Wang Shui-chung, JP  
Chairman of the Board

It is my pleasure to present to you the first Annual Report of The Hong Kong Applied Science and Technology Research Institute (ASTRI), covering the period 1 April 2007 to 31 March 2008. It is indeed our intention to use the different sections of this report to inform readers of our achievements and developments during the past year.

Having chaired this dynamic institution since October 2007, I am very impressed by its achievements and progress. Although ASTRI is a relatively young institution, it is beyond doubt we have made great progress in pursuing our public mission to becoming an outstanding research institute that brings together industry, universities and the research capabilities of ASTRI to enhance the competitiveness of Hong Kong's technology-based industries.

While we are creating innovative and customer-focused technology, we have never lost sight on the well-being and personal development of our talented staff. We strongly believe the success of any organization, including ASTRI, cannot be separated from the individual growth of its team members. Similarly, the success of any applied research institute depends heavily on focusing its efforts to meet the needs of customers and industry.

Furthermore, we are mindful of the need to constantly review our operations to achieve a high level of transparency and accountability.

With the full support of the Hong Kong SAR Government, industry in the region and the local community at large, I am confident when ASTRI continues to excel in its R&D endeavours, this fine institution will also continue to build its reputation as a first-class and influential applied research institute in the region.

On behalf of the Board, I extend my sincere thanks and congratulations to the Chief Executive Officer and his entire staff for their dedication and tremendous efforts during the past year. All Board members and I are looking forward to another successful year ahead.

April 2008



## CEO's Overview

Prof. Edward S. Yang  
Chief Executive Officer

I am pleased to report the past year has been both rewarding and challenging for ASTRI. The Management went through a period of major reorganization to ensure continued excellence in R&D activities.

During the year under review, we exceeded all our main targets. Innovation Technology Funding went up 12 per cent (\$135 million to \$153 million); and total funding, including recurrent subvention, rose six per cent (\$241 million to \$255 million). These increases enabled us to step up outputs, namely, technology transfers (platform projects) rose 34 per cent (33 to 50); and industry income went up 35 per cent (\$11.3 million to \$17.6 million). I am very proud of our colleagues' combined efforts in achieving these milestones.

Other prominent achievements include the "Innovation Award" Communications Technologies Group received in December last year from Wireless Personal Area Networking (WPAN) Working Group of China National Information Technology Standardization Technical Committee; and the "2007 Hong Kong Awards for Industries: Technological Achievement Grand Award" awarded to ASTRI and its spun-off company, ALTAI, in January 2008.

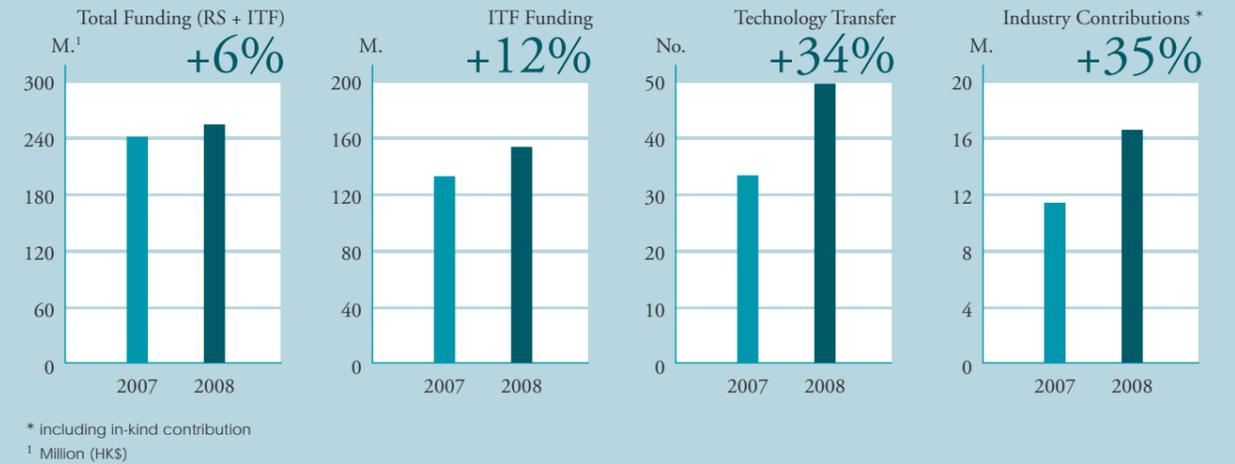
ASTRI in October last year also signed a significant Memorandum of Understanding with TVB, ATV, Hong Kong Science and Technology Parks Corporation, and Rohde & Schwarz Hong Kong Limited, to establish the Hong Kong Digital Terrestrial Television Local Testing Group. It is the first organization in Hong Kong to support both the roll out and testing of digital TV (DTV) broadcasting technology, particularly for testing set-top boxes and DTV sets.

On 31 December last year, in conjunction with the Launching of Hong Kong's Digital Terrestrial TV Broadcasting, ASTRI signed an agreement with Tsinghua University to establish a Multimedia Broadcasting and Communications Joint Research Laboratory — the first-of-its-kind between Hong Kong and Beijing on DTV broadcasting.

ASTRI held two very successful Industry and University Consultation Forums in September 2007, one in Hong Kong and the other in Shenzhen, introducing to industry and the academia our various technology programmes and R&D endeavours. The forum also aimed to solicit the audiences' ideas for future projects, and to seek collaborations from industry and universities on the development of innovative technologies for the sustainable growth of Hong Kong.

During the year, ASTRI successfully launched the Industry Collaborative Projects (ICP) Scheme, involving multimedia and home entertainment, high-definition IP receiver and TV system, low-cost MRI systems and components for mass markets, and the tyre pressure gauge systems. These projects are undertaken

## Year to Year Performance

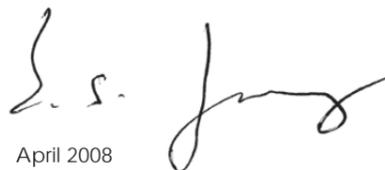


in collaboration with local industry partners who contributed 50 to 100 per cent of the budget. This Scheme is a new funding model which effectively alleviates the chronic shortage of industry support ASTRI faced in the past.

Fully aware ASTRI is supported by public funds, the Management, guided by its Board, continued to achieve further cost-effectiveness during the year. It is worth noting ASTRI contained administrative staffing cost to a relatively low level. Last year's ratio of management and administrative manpower cost (\$29.03 million) over total manpower cost (\$185.79 million) was about 15.6 per cent, and only about 29 per cent of recurrent expenditure was spent on staffing at headquarters. Of the total 406 employees, only 15 per cent are non R&D staff (61).

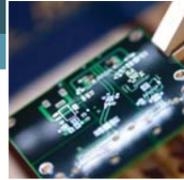
The latest administrative staffing situation compares very favourably with other educational and research institutions in the region. The Management is monitoring closely the headquarters staffing situation and will continue to employ measures, such as outsourcing, to achieve a higher level of cost effectiveness and value for money, without adversely affecting the efficiency of ASTRI's overall operation.

Looking ahead, I am optimistic that with the generous support from both Government and industry, and total commitment of all members of ASTRI, we will achieve further excellence in our R&D endeavours in a customer-focused manner that will contribute significantly to the sustainable growth of Hong Kong as a knowledge-based economy and a centre of technological development in the region.

  
April 2008



# ASTRI's R&D Groups and Subsidiary



ASTRI's research work focuses on four main technology domains of information and communications technologies:

- Communications Technologies
- Enterprise and Consumer Electronics
- IC Designs
- Material and Packaging Technologies

These four technology domains form the cornerstones of the Information and Communications Technologies R&D Centre (ICT RDC) initiated by the Innovation and Technology Commission (ITC), and hosted by ASTRI to coordinate technological assets from research institutions, industry and academia in Hong Kong to jointly pursue worthy research topics for substantive industrial impact. In the coming years, the bulk of ASTRI's research work will be conducted under the ICT RDC.

In addition to giving substance to the operations of the ICT R&D Centre, ASTRI's ICT R&D programmes are formulated with the intention to bring not only strategic "applications" that are transferable to the industry to enhance their competitiveness, but also to build and continuously strengthen the "technical competencies" or "platform technologies" that would continuously spawn a multitude of future applications.

The impressive progresses and developments achieved by the four domains during the year under review are reported in the following pages.

Also included in this section is a progress report of ASTRI's subsidiary — The Hong Kong Jockey Club Institute of Chinese Medicine (HKJCICM).



## ASTRI's R&D Groups Communications Technologies

The Communications Technologies Group (CTG), themed WM7F (Wireless/Mobile Miniaturized Multi-Mode Multi-Media Multi-Function), aims at addressing key issues in wireless communications, such as ubiquitous radio access, high data rate transmission and reception, and small form-factor for sustaining and disruptive innovations. The Group provides world-class and competitive wireless technologies and IPs (intellectual property) for direct industrial impacts in the Pearl River Delta and Greater China.

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# Communications Technologies



## Introduction

CTG has initiated four Key Technology Initiative Groups (KTIGs) — Multimode Multifunction Systems (KTIG1), Low Power High Spectral Efficiency Radio Access (KTIG2), Miniaturization (KTIG3), and Service and Application Enabling Technology Platform (KTIG4). Under this structure, CTG has delivered a wide variety of technology solutions to many local industry players.

During the year, CTG added multiple wireless IC/chip design programmes to support different initiatives. These include the topics of DTMB BB, Multimode Mobile TV, UWB MAC and RF, and CWPAN/Zigbee RF. Responding to market needs, KTIG1 added three new tracks including DTMB Core, ASTRI-Tsinghua Multimedia Broadcast and Communications (MBC) Joint Lab, and Multimode Mobile TV. In KTIG3, RFIC and Antenna Subassemblies were added to expand the scope of wireless system solutions. In KTIG4, Advanced MRI was added to support high value-added medical and healthcare applications.

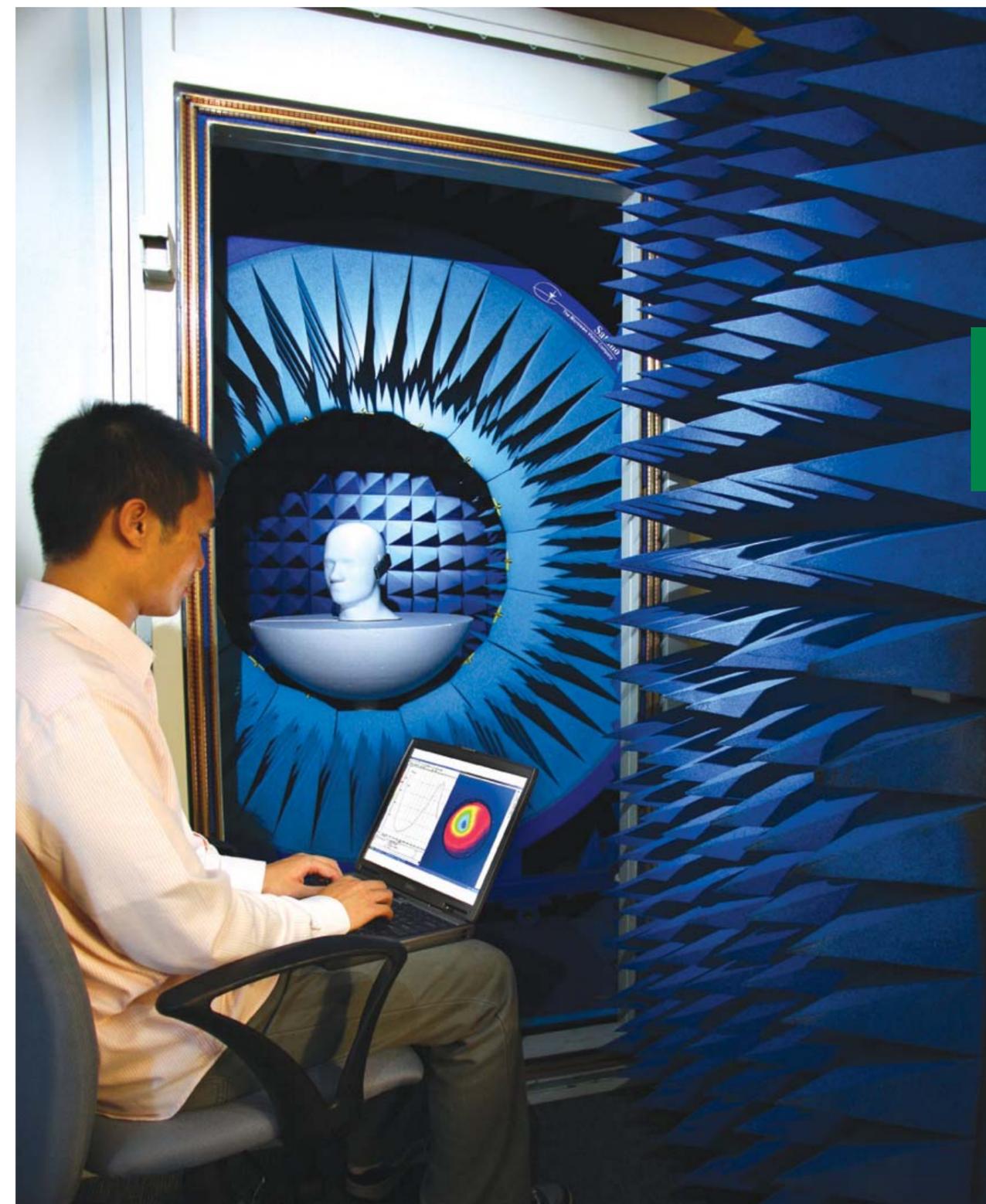
In this year, CTG filed 24 patents, compared with 28 for the previous two years. Also, six patents were approved, including one which was restricted by the United States Department of Defence for military and national security purpose due to its importance and technology significance. These technical breakthroughs enabled ASTRI and its licensees to receive two important awards during the year: the Best Innovation Award in China National Information Technology Standardization Award 2007; and the Grand Technology Innovation Award of Hong Kong Industry Award 2007. These awards are in addition to the four awards received previously: Gold Awards in Asia Pacific ICT Award 2006 and three Gold Awards in Hong Kong ICT Awards 2006.

On industrial support, it has been a very successful year, with CTG securing industry contribution of HK\$8.49 million — HK\$6.47 million in cash through 23 technology licensing and contract services, and HK\$2.02 million worth of in-kind contribution from nine projects. The total industry contribution to CTG this year accounted for 14 per cent of the total ITF fund expenditure and 12 per cent of the total project expenditure. CTG made great strides in leveraging local and external resources to expedite its R&D pace. In addition to active and close partnership with universities in Hong Kong (HKU, CUHK, HKUST, CityU, PolyU), it established ASTRI-Tsinghua (MBC) Joint Lab in December 2007 to serve local and the Mainland's digital TV market, and to deliver direct industrial impact in terrestrial applications and in mobile TV and Broadband Wireless Multimedia applications.

Together with TVB, ATV, Hong Kong Science and Technology Parks Corporation (HKSTP), and Rohde & Schwarz, CTG founded the Hong Kong Digital Television Test Group (DTTG) in October 2007. With strong support from the BMC Joint Lab, DTTG provided critical and urgently needed DTMB STB voluntary testing in compliance with the Office of the Telecommunications Authority's Basic-tier and Higher-tier DTT receiver requirements. It also intends to support specific features/functions and Greater China's future specifications. Partnering with FHKI, HKEIA, WTIA, and HKPC, it co-founded the Hong Kong WIMAX/DTV Industry Consortium early this year to develop technology, service and products for these two important areas.

Meanwhile, CTG has been actively contributing to and playing significant roles in many important committees under the Hong Kong Government, universities, industry associations in Hong Kong, the Mainland, and worldwide to facilitate information and communication technology industry growth in Hong Kong.

In March 2007, CTG successfully organized the IEEE Wireless Communications and Networking Conference (WCNC), the flagship IEEE Communications Society annual wireless event, to be held in Hong Kong, the first time the event was held outside the U.S.



Measuring the 3D radiation pattern of a phone next to a phantom head

# Communications Technologies



## Developments

To meet industry needs, broadband access and digital broadcast technologies were selected as current major application vehicles for core technology developments. They included Reconfigurable OFDM Core, Practical MIMO Core, RF & Antenna and Material & Miniaturization.

To serve the fast growing broadband wireless market, CTG started with a fixed WiMAX BTS-based technology platform to create valuable core IPs. Currently, CTG is developing a mobile WiMAX BTS design with compact and customizable system partition which can be easily adapted to various application and capacity configurations (macro, micro, pico, femto).

CTG's CWMS is an Element Management System for managing WiFi and WiMAX wireless networks. The System can be flexibly customized to support and manage more than 20 models of WiFi and WiMAX BTS from 10 different vendors. Based on the technology established in-house, CTG is developing a WiMAX ASN-GW platform to handle the mobility requirement in an IP-based mobile WiMAX network.

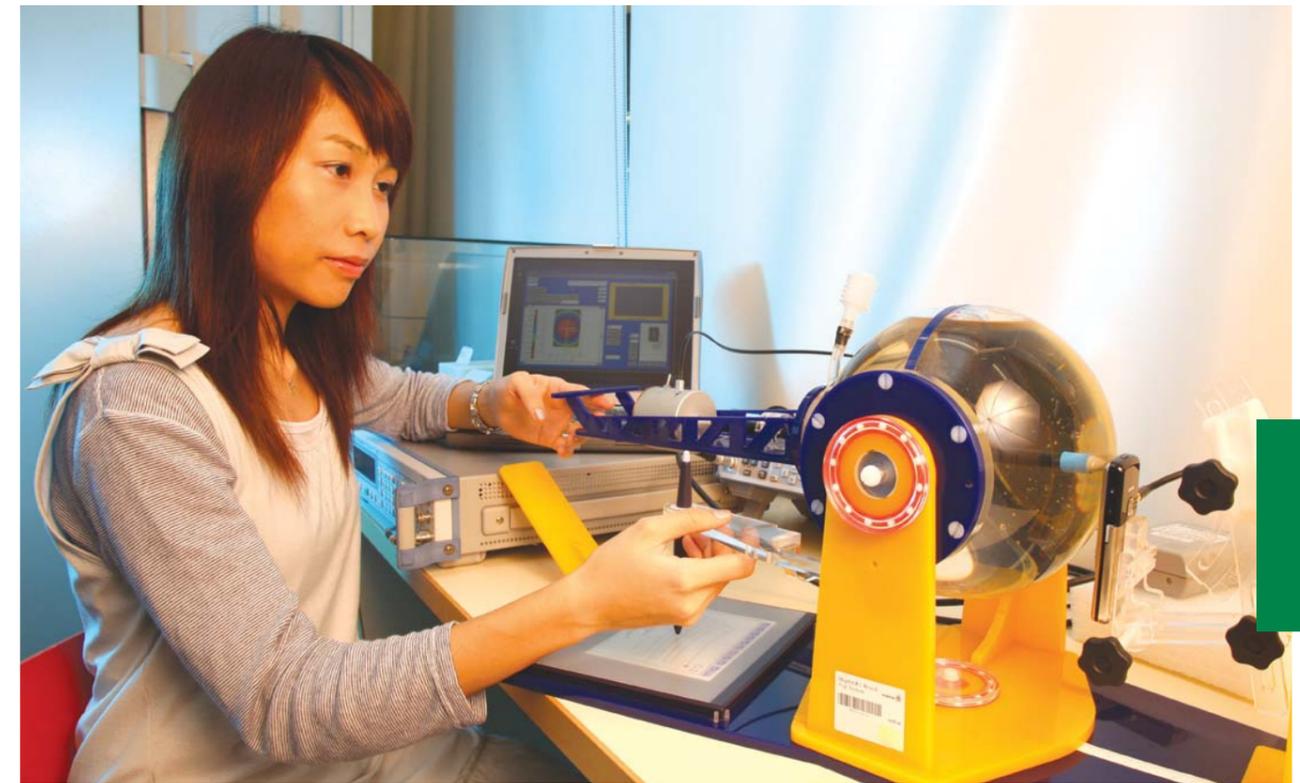
Since the early 1990s, many Multiple-Input-Multiple-Output (MIMO) "innovations" can be found in patents and dissertations. However, these have not been practical on portable devices. CTG's Practical MIMO programme focuses on approaching this new area in a holistic manner. For example, our MIMO WiFi USB dongle design licensed to a world leading WiFi chipset company in Silicon Valley performs 50 per cent better than the company's own design. On top of the competitive MIMO technology for WiFi, we are now focusing on developing the Practical MIMO design for mobile WiMAX and LTE devices. We will be among the first in the world to deliver TD-LTE devices and chips.

On digital broadcast, the ASTRI-Tsinghua Joint Lab was established to support the Digital Terrestrial Multimedia Broadcast (DTMB), the designated terrestrial digital TV standard in Hong Kong and the Mainland. R&D efforts in the Joint Lab cover technologies in transmission, Single Frequency Network (SFN) Adaptor, field testing instrumentation, testing and verification, receiver chipset and STB reference design. Most of these technologies and products for the DTMB chain were not mature when Hong Kong launched the service at the end of 2007. The Joint Lab has significantly contributed to the deployment of DTMB in Hong Kong by providing receiver testing methodology and software to a leading test equipment provider and HKSTP, broadcast transmission technology to a major local equipment vendor, as well as consultations to broadcasters and the Government.

Multimode wireless terminals have become a major market trend in providing more flexible and cost effective mobile TV handsets. CTG's Multimode Mobile TV baseband demodulator supports multiple standards for different regions: DVB-T/H (Europe), T-DMB (Korea, Europe), and CMMB (China). Compared with a single mode chip, the 3-in-1 chip can be fabricated with only a small increase in size, power consumption and cost. The team is also developing a multimode tuner RFIC and a single chip SoC (system-on-a-chip).

CTG is developing the world's first dual mode CWPAN/ZigBee RFIC Transceiver to support both the Mainland and international standards. With its extremely low power consumption and low cost, CWPAN/ZigBee can find important applications in wireless sensor network, home network, commercial and industry control, building automation and automatic metering.

RF & Antenna is an indispensable ingredient in all wireless devices and is critical to system performance. While an internal antenna has advantages over traditional external antenna due to its multiband design



- 01 Using advanced SAR equipment to measure the radiation absorbed in a brain from a Nokia mobile phone
- 02 UWB MAC Chips
- 03 A demonstration on the design of mobile phone antenna for RTHK

and better performance in practical environment (multi-path), it requires an in-depth design know-how and sophisticated techniques in order to come up with a high performance implementation. Internal antennas can be further categorized as one of the three types/applications: passive, active/reconfigurable, or multiple. We have developed new technologies such as utilizing novel elements of the wireless device as part of the passive antenna; ultra low-power, low-profile switch to re-configure an active antenna with high efficiency and bandwidth without an increase in antenna size; and advanced element isolation methods in MIMO system on small form factor devices across different physical locations.

Material science also plays a key role in miniaturizing communication systems. Thermal management, data storage, and energy storage technologies are crucial to wireless equipment and devices. The efficiency of the innovations in thermal dissipation can reach more than 50 times of traditional methods. The multiple level data storage technology developed will provide a memory device with potentially more than 200GB memory capacity in USB dongle size with a comparable cost of current 1GB flash. Our energy storage technology will reach 2X energy capacity compared to conventional products with high C-rate and low cost.

Currently, CTG is also leveraging the core technologies established in-house to develop high value-added parts in medical and health equipment and devices, including MRI/MRE, and portable non-invasive diagnosis apparatus. CTG will further extend the scope to cover wireless home-health-care applications.

# Communications Technologies



## Achievements

This year, the Group has conducted many industry transfers. The following is a partial list of such transfers: On broadband wireless, the WiMAX base station platform technology was licensed to a locally based multi-national telecom equipment company to establish its technical foundation in broadband wireless edge equipment.

- The CWMS team provides support to a local operator to address the WiFi network performance management issues for the widely publicized Government WiFi programme.
- CWMS technology was licensed to a local telecom company to establish WiFi networks in more than 100 local secondary schools to improve students' information and education environment.
- CWMS technology managing more than 20 models of WiFi and WiMAX BTS was licensed to telecom edge equipment vendors on the Mainland and other parts of Asia.
- CTG established close partnership among two leading companies and ASTRI utilizing CTG's Practical MIMO technology.
- On digital broadcast, the Joint Lab, through collaboration with Hong Kong DTTG and WiMAX/DTV Consortium, effectively supported the Mainland's DTMB commercial service deployment in Hong Kong. The Joint Lab also transferred its DTMB transmission technology to a local telecom equipment vendor to expand its business scope; transferred DTMB receiver test methodology and software solutions to a top test instrument vendor and provided the technology to the HKSTP's Wireless Communication Test Laboratory to facilitate DTMB STB testing service in Hong Kong and Greater China.
- In the area of material and miniaturization, ASTRI's enhanced thermal management technology was licensed to two LED developers and manufacturers for high-power general lighting applications. ASTRI's high-density data storage technology has attracted two customers and initiated close collaborations with industry through the Industry Collaboration Project established in the current fiscal year.



FPGA testing for the development of DTMB Demodulator Chip

## Project Highlights

	Project Name	Description	Date
1	Advanced Broadband Wireless Technologies Platform (Full)	This project aims at establishing an OFDM/OFDMA based broadband wireless access technology platform through developing WiMAX base station platform technologies including basic physical layer and medium access control layer.	Jul 06 ~ Dec 07
2	Customizable Element Management System (EMS) for Wireless Networks (Full)	The project targets an Element Management System, which can be rapidly and cost-effectively customized to manage WiFi (802.11 series) and WiMAX (802.16 series) network BTSs.	Jul 06 ~ Dec 07
3	Access Service Network Gateway (ASN-GW) Platform (Seed)	This project explores the most cost-effective design approach of ASN-GW Platform compliant with WiMAX Forum (NWG) standard specifications.	Feb 08 ~ Jul 08
4	T-DMB Digital TV/ Audio Baseband Demodulator (Seed)	As the starting point of establishing a reconfigurable OFDM core for multimode mobile TV device, the project explores the architecture, reusable building blocks, and realization methods for the design.	Nov 07 ~ Apr 08
5	DVB-H Core for Multimode Mobile TV (Seed)	Working with the TDMB project, this project explores the cost-effective methods to facilitate reusability and re-configurability through innovations in architecture, module and interface design.	Nov 07 ~ Apr 08
6	ASTRI-Tsinghua BMC Joint Lab-Foundation Platform Technologies (Full)	The Joint Lab facilitates development of DTMB industry, including service and equipment sectors, in Hong Kong and the Mainland.	Jan 08 ~ Dec 10
7	DTMB Set-Top-Box Reference Design (Seed)	The project aims at implementing the Set-Top-Box (STB) reference design, compliant with the Basic-tier receiver specification in Hong Kong OFTA's Digital Terrestrial Television Specification (HKTA 1108 ISSUE 01).	Sep 07 ~ Mar 08
8	ASTRI-Tsinghua BMC Joint Lab-DTMB SFN Technology Adaptors and Systems (Full)	The project targets developing key technologies in synchronization signal generation, transmitter synchronization, and deployment strategies & methodologies of DTMB single frequency network.	Jan 08 ~ Jan 09
9	OFDM Core for Digital TV Applications (Full)	The project focuses on developing technology in system algorithms and circuit design IPs for the Mainland terrestrial DTV standard DTMB.	Oct 07 ~ Apr 09
10	Advanced Indoor MIMO Platform (Full)	The project develops core technologies of Practical MIMO design, with a holistic approach and integrated with IEEE 802.11g/n WiFi devices.	Dec 06 ~ May 08
11	Wireless PAM and Streaming Media Access Control (Full)	The project aims at developing IPs and technologies of a MAC (Medium Access Control) design solution that is compatible with UWB related standards (WiMedia, IGRS, and DLNA) and interfaces.	Nov 06 ~ Apr 08

## Project Highlights

	Project Name	Description	Date
12	RF Design for WPAN Core Technology Platform (Full)	The project develops WiMedia MB-OFDM based UWB RFIC design, IP, and solutions.	Nov 07 ~ May 09
13	Surface Mount RF Switches for Reconfigurable Antennas (Seed)	This project investigates the feasibility of a new type of RF switch, explicitly designed for reconfigurable antenna applications.	May 07 ~ Nov 07
14	Next Generation Antenna Sub-Assemblies (Full)	This project focuses on developing a new intelligent antenna sub-assemblies platform technology which can be applied across: (1) Multi-band/mode & Miniature antenna sub-assemblies for future wireless devices; (2) Beam-forming antenna sub-assemblies at low-cost, while increasing range of the system; (3) MIMO antenna sub-assemblies for high data rate applications.	Feb 08 ~ Jul 09
15	Advanced & Affordable MRI Systems (Seed)	Making use of our RF, antenna, array and signal processing know-how, the project constructs a prototype 0.3T affordable low field MRI system. We are working on the industrial design and specific antenna coil arrays for different parts of the body: wrist, hip, shoulder, head, ankle, knee, foot and hand for greater resolution.	Dec 07 ~ Jun 08
16	Feasibility of Piezoelectric MRE Driver Array (Seed)	This project explores the feasibility of developing a new piezoelectric driver array featuring light weight, small size and user-friendly interface to facilitate early detection of diseases in brain, liver and other portions of the body.	Feb 08 ~ Aug 08
17	Dual-mode CWPAN/ZigBee RFIC Transceiver (Full)	The project aims at developing the world's first dual-mode RFIC transceiver supporting CWPAN (low-rate China wireless personal area network) at 780MHz and ZigBee at 868/915MHz bands.	Jan 08 ~ May 09
18	Recordable Electrical Memory (REME)/Single Address with Multiple Data Storage(SAM) (Seed)	The project investigates methods to develop novel low-cost and ultra-high density recordable memory devices through building multiple storage stages in a single cell.	Apr 07 ~ Jan 08
19	Cost Effective Fabrication for Antenna-and-RF Module (Seed)	The project explores the feasibility of developing a mass producible plating technology to produce conductive metal layer onto the affordable substrates followed by the thin film photo-patterning technique to fabricate Antenna-and-RF components / modules cost-effectively.	May 07 ~ Oct 07
20	Thermal Energy Management with Advanced Materials and Structures (Full)	This project develops a method dealing with the heat dissipation hurdle, a problem that current and future wireless communication equipment and devices are facing.	Dec 07 ~ Aug 09

# ASTRI's R&D Groups Enterprise & Consumer Electronics

With the maturity of the wireless and broadband network infrastructures, the trends to use and share digital contents over networks, and the convergence of computer, communication and consumer electronics are growing at a fast pace. This has also brought about considerable business opportunities for developing new generations of wireless and multimedia consumer electronic devices, applications and services.

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# Enterprise & Consumer Electronics



## Introduction

ASTRI is developing key technologies and building the necessary partnerships and strategic alliances with local, Mainland and overseas high-tech companies with a goal to obtain significant intellectual property and technology assets to position Hong Kong and the Pearl River Delta as a leading innovation and design centre for the next generation of digital consumer electronics and applications.

The mission of the Enterprise & Consumer Electronics (ECE) Group is to create and expand Hong Kong's core intellectual property for multimedia over IP technology, and to establish networked consumer electronics and applications. These dedicated efforts will no doubt enhance the competitiveness of local industries, help them move up the value chain, and capture future jobs and business growth opportunities presented by the newly emerging worldwide wireless and multimedia consumer market.

ECE has three major on-going technology programmes: Digital Home Technology, Mobile Multimedia Communications Technology, and Multimedia Technology IP. Each technology programme offers a suite of licensable products and platforms. ECE has also established a Digital Living Platform, which hosts the Digital Living Lab and supports the Digital Living Consortium with active participation from industry.

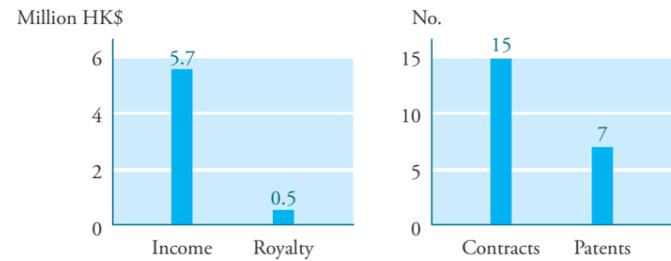


MMCT team members preparing the system environment for feature and performance testing of the WiFi enabled portable devices

# Enterprise & Consumer Electronics



## Developments



A number of ECE products have been licensed and are available in different markets. They include:

- Network Home Media Centre in Taiwan;
- Sina-mall real-time peer broadcasting installed at seven major shopping malls in Hong Kong;
- WiFi phone produced in Hong Kong;
- WiFi phone licensing to a major operator in Korea;
- ISIP phone produced for U.K. market; and
- iDNS technology in product deployment.

In addition, the following innovations were on trial during the year in different locations:

### DVB-T + IP Dual Mode STB/HMC

The licensee conducted successful integration with major studio certified DRM for VOD/content distribution field trials in Australia.

### Mobile TV (T-DMB) PMP

Successful field trials were conducted in Guangdong Province.

### DVB-T Mobile TV Receiver

Successful trials for receiving DVB-T broadcasts were conducted at the CeBit show in Germany

### UPnP AV SDK

In September 2007, UPnP AV SDK, developed by ECE, obtained UPnP™ Implementer Corporation's AV 1.0 and AV 2.0 certifications. ASTRI is the first among all UPnP members to achieve UPnP AV 2.0 certification.

### Emulation Boards for High Definition (HD) Video Decoder

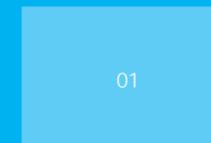
In the same year, ECE also delivered the Emulation boards for High Definition (HD) Video Decoder to a major Mainland customer.

### High Definition, High Profile H.264 Video Decoder

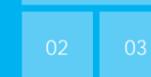
ECE's high definition, high profile H.264 Video Decoder FPGA was demonstrated with real time performance.

### Chinese AVS Compression Standards

ECE also made technical contributions to the Chinese AVS Compression Standards with one IP accepted into its IP pool.



01 DHT team members conducting product tests against High Definition STB and iShare P2P platform



02 Connection between the debugging board and main board of portable dual mode multimedia development platform

03 Portable T-DMB Receiver

# Enterprise & Consumer Electronics



## Achievements

In 2007, the Digital Living Consortium was launched with six founding members and three alliance partners to promote digital living in Hong Kong through a series of technology forums and publishing reports on technology trends. In the ensuing months, the Consortium organized a number of events.

In another strategic move, the Digital Living Lab was set up. It is Hong Kong's only DLNA interoperability testing facility where extensive DLNA and UIC certified AV products are available for interoperability testing.

During the past year, ECE has also established several partnerships with industry. Joint labs were set up with research institutes of Fudan and Tsinghua Universities. Active collaborations were also maintained with standard bodies and industrial alliances on the Mainland, including MII CVIA(信產部彩電聯盟) and IGRS(閃聯).

In 2007, ECE signed a marketing agreement with Boingo Wireless, which is the main provider of hotspot worldwide.

ASTRI has adopted the Boingo® Wi-Fi Embedded Toolkit for use in its Wi-Fi phone reference design. The Wi-Fi toolkit makes ASTRI's Wi-Fi phone capable of roaming at tens of thousands of commercial hot spots around the world.

ASTRI has developed the W-iSIP, a turnkey Wi-Fi phone reference design that leverages Linux for cost-effectiveness and ASTRI's own VoIP protocol software for high performance and robust SIP features. The W-iSIP comes with a complete software development kit (SDK) for customizing a wide range of voice quality and functionality features. Boingo and ASTRI are working together to develop and field test the Wi-Fi toolkit's integration into the W-iSIP phone in both Hong Kong and North America.

An ECE licensed customer, Mobilesoft was awarded the 2007 IBM/Microsoft Home Media Centre Product Consensus Award.

Mobilesoft is an innovative communications software engineering company located in Australia. It identifies, and rapidly brings to market, network appliances that deliver diverse digital data streams, such as video, voice over internet protocol (VoIP) and data.

## Project Highlights

	Project Name	Description	Date
1	Portable Dual Mode Wireless & Broadcast Multimedia Platform	This project aims at developing a multi-standard mobile digital TV platform enabling reception and viewing of mobile TV programmes on the wireless network. Mobile TV has been identified as the most appropriate and profitable means of delivering high bandwidth usage multimedia contents because of its broadcasting nature. Combined with mobile or Wi-Fi support, the platform provides a return path enabling interactive services.	Nov 06 ~ Aug 08
2	High Definition TV Technologies Applied Research Platform	ECE is collaborating with three local universities to develop IP/algorithms for the HD/digital TV applications for the multimedia SoC market.	Nov 06 ~ Nov 08
3	Digital Living Platform (DLPC)	This project aims at developing production-quality, standard compliant and certified embedded networking software components and platform technologies to enable ubiquitous enjoyment of multimedia content and services over IP inside or outside a digital home.	Apr 07 ~ Apr 08
4	Dual Mode Enabling Technology (DUET) for Convergent Networks	DUET enables transition of real-time communication between mobile and wireless LAN networks. The transition is imperceptible, so the user gets to enjoy the consistent mobile experience regardless of the type of wireless connectivity. The technology was implemented on an ASTRI dual mode (GSM+WiFi) communication hardware platform to demonstrate the viability of this technology on other dual mode mobile devices.	May 06 ~ Oct 07
5	Client-based Wireless Hotspot Access Technology (CHAT)	CHAT developed a pluggable WiFi access framework and a multi-layer power management mechanism, which enable handheld devices to access multiple WiFi hotspots with optimum power consumption. We also developed a robust WiFi enabled handheld hardware platform.	Aug 07 ~ Aug 08
6	AVS FPGA Video/Audio Decoder on Emulation Platform (MMP-AVS)	The AVS X-Profile Video/ Audio decoder aims at developing FPGA proven IPs supporting AVS decoder video applications.	Oct 07 ~ Dec 08

## Project Highlights

	Project Name	Description	Date
7	iShare Media Sharing Platform	This is a media sharing platform which enables and facilitates media content sharing, distribution, and management among various devices and across the network (e.g. private IP network or public Internet). It will leverage the one-to-one streaming function developed in the HMC project and expand it to many-to-many media distribution. The iShare Managed P2P Platform combines the power of P2P content distribution with the unique advantages of system coordination and distribution to provide an efficient viewing platform for the users. It can be embedded into any consumer electronic devices or use as software on PCs for distributing media content over IP network.	Dec 07 ~ Dec 08
8	Interactive TV Technologies Platform	This project aims at expanding the research conducted under an earlier seed project, which involves the development of scalable media delivery over Internet technology to support on-demand application with trick mode.	Jan 08 ~ Sep 09

## 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.

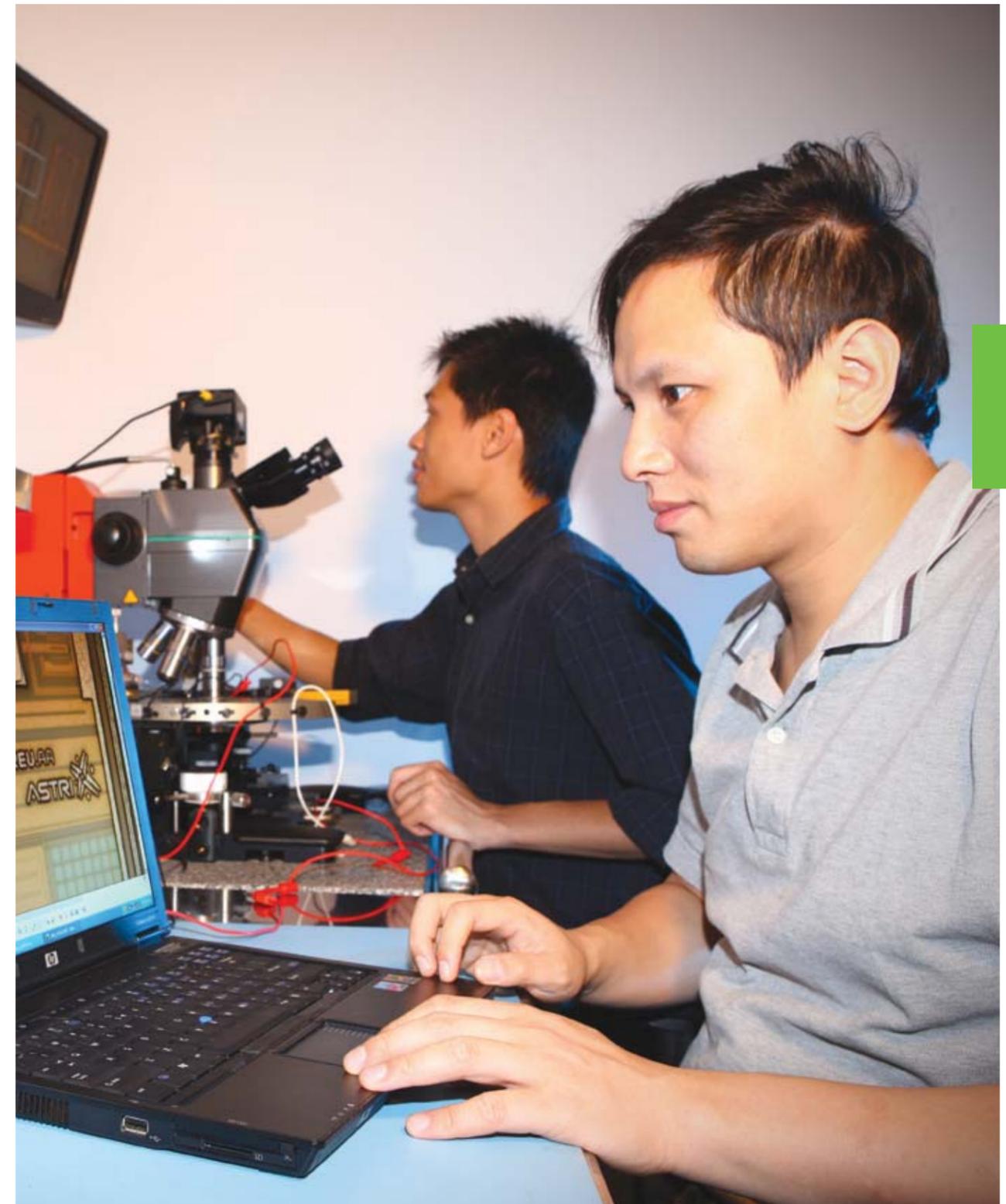
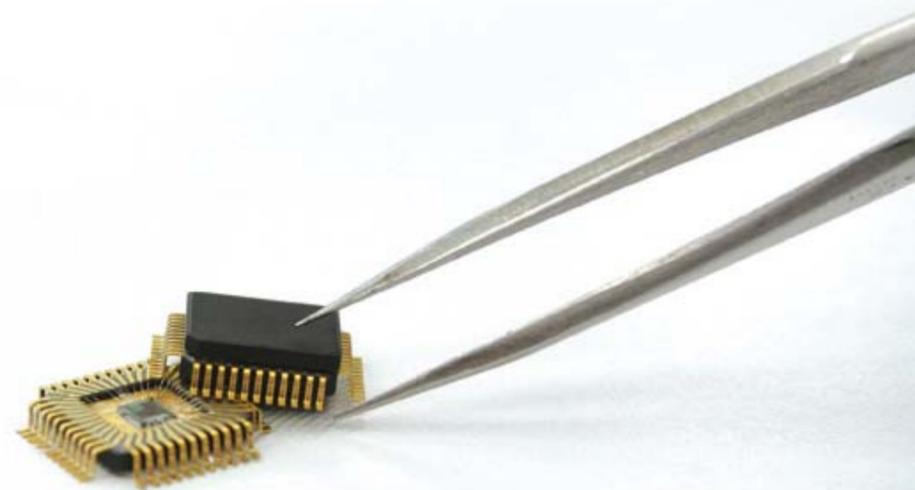
The Mainland has already been transformed from a manufacturing base into a design and development base. It is foreseeable that the industry will gradually acquire the capability to serve as IC-design bases in the next decade. By then, the country may further grow into an innovation base.

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

# IC Designs



## Developments

### Technology Transfers

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

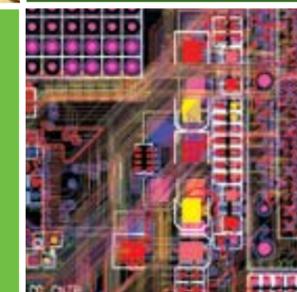
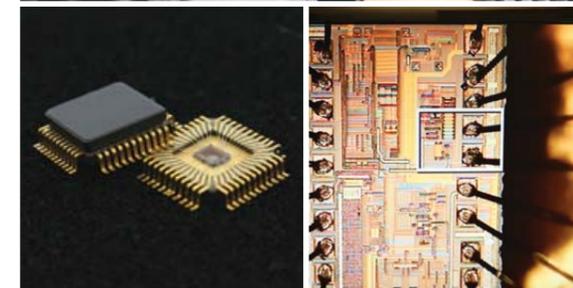
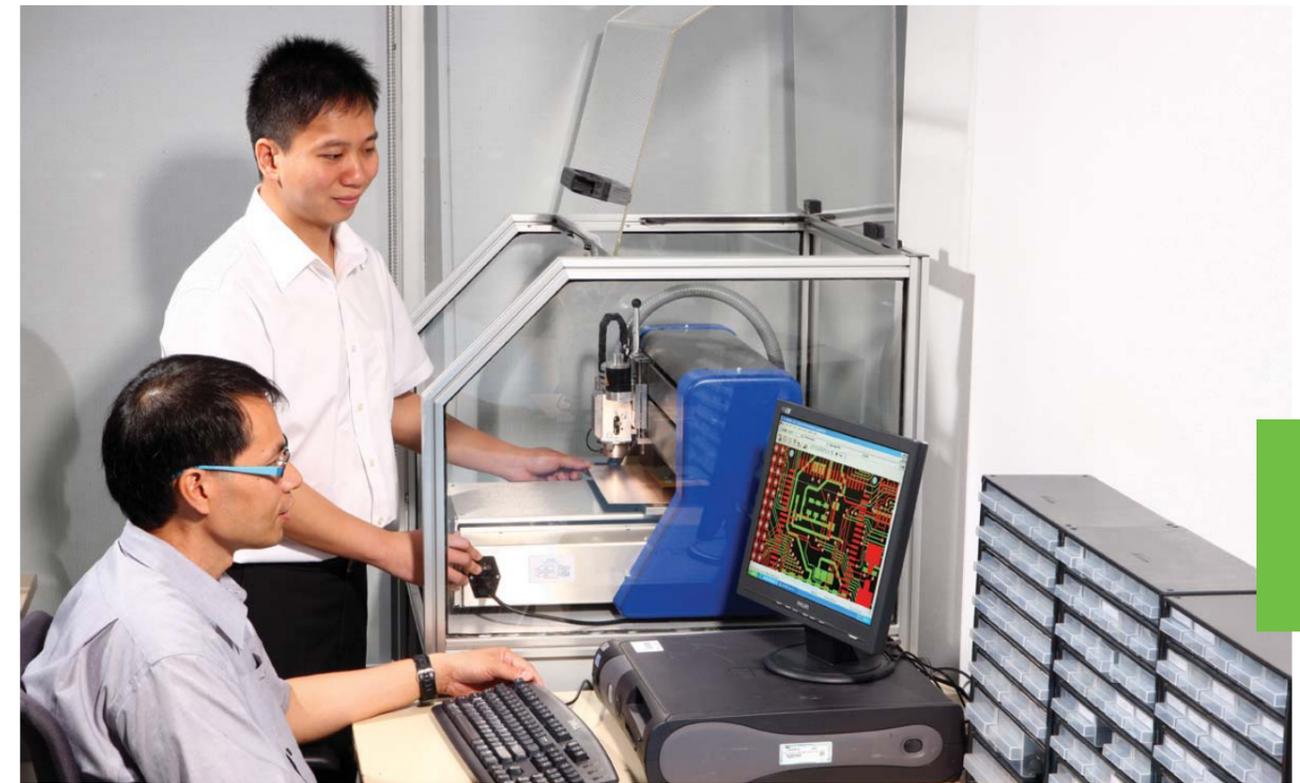
- Two power management silicon IPs to a local semiconductor company for mass production. These IPs are used in consumer electronics products, such as Portable Digital (PDA), MP3 players and cell phones.
- An image processor for security camera IP was transferred to a Hong Kong based semiconductor company 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

# IC Designs

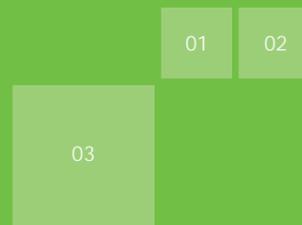
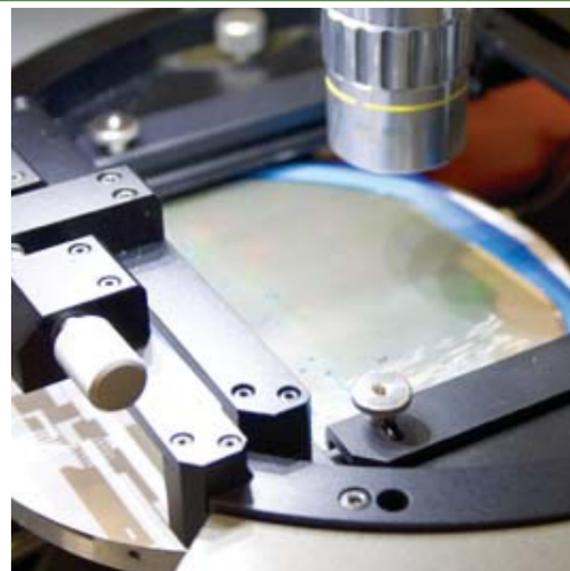


## Achievements

### 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

## Project Highlights

	Project Name	Description	Date
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

### ASTRI's R&D Groups

## Material & Packaging Technologies

High value-added manufacturing is crucial to Hong Kong because the Mainland's immediate technology ascent will largely concentrate in this area while the Pearl River Delta is a potential centre for information and communications technology (ICT) manufacturing. The Material and Packaging Technologies (MPT) Group focuses on developing high-value, next-generation products, devices and components that are differentiated by material and packaging technologies.

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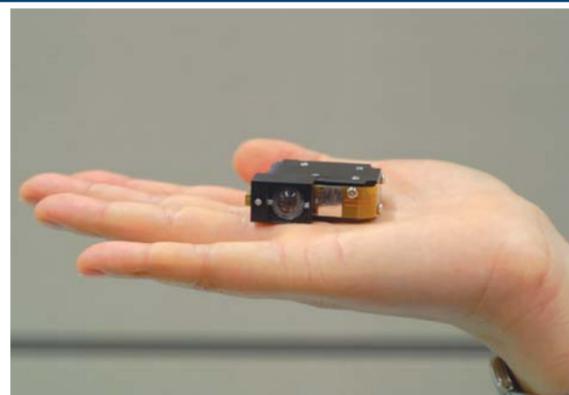
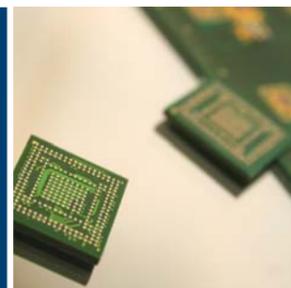
# Material & Packaging Technologies



## Introduction

MPT was established in 2005. Since then it has filed over 90 patents in its core technology and signed more than 35 industrial contracts for technology dissemination, which generated more than HK\$20 million of industry contributions. The licensees include key companies in the Greater China region, especially in Hong Kong and the Pearl River Delta.

The group builds upon ASTRI's existing base in photonics research and has expanded its scope to develop applications that are promising for Hong Kong and the Pearl River Delta (PRD) region in areas such as next-generation solid state lighting, electronic packaging, photonic components, advanced displays and components etc. Building up material and packaging technology platforms will continuously spawn new and competitive applications in the long term. The goal of MPT is to lay the foundation for Hong Kong or the PRD to become a major centre for designing and manufacturing next-generation devices and key components in the ICT industries of Greater China.



01

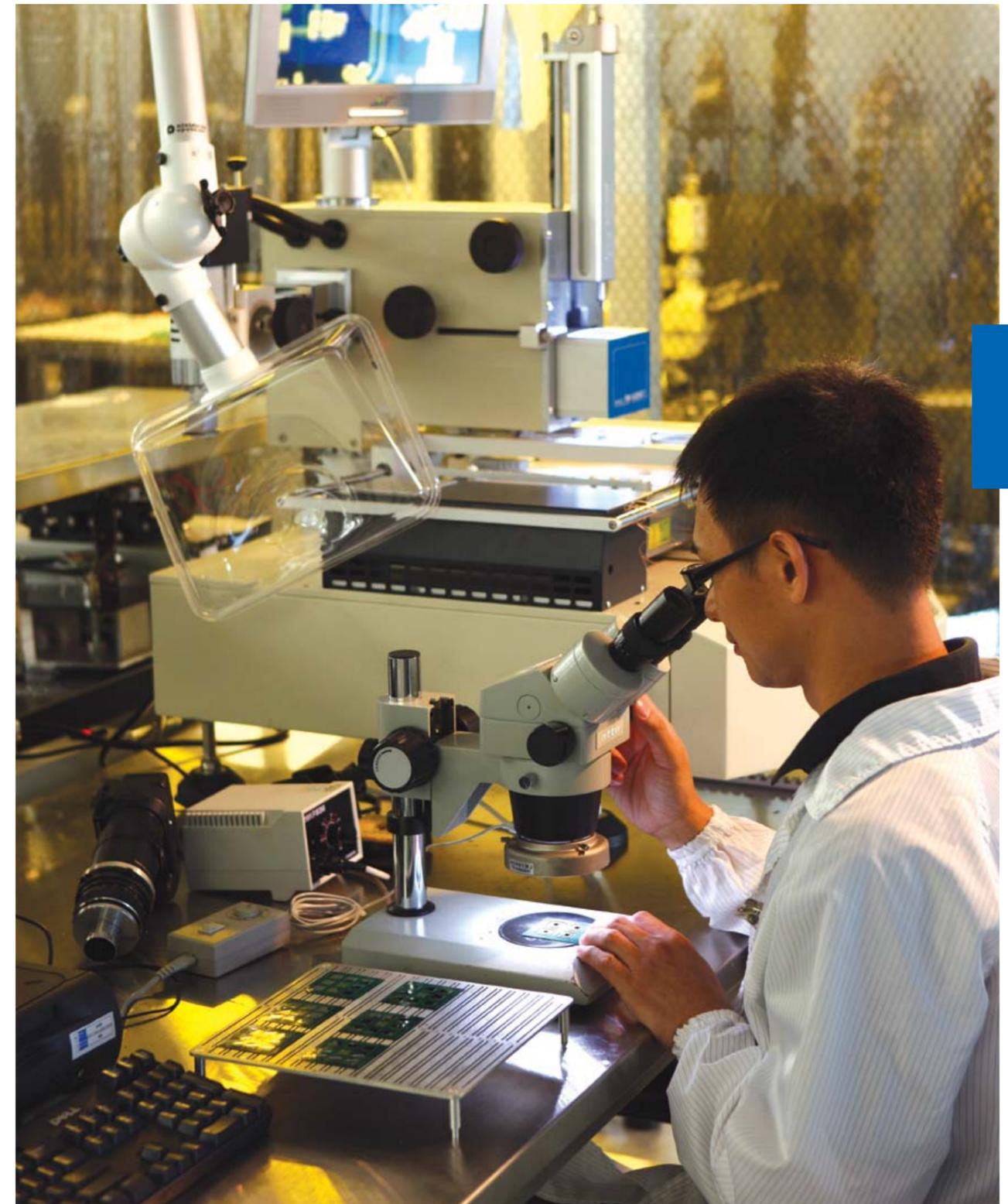
02

03

01 CES award-winning System-in-Package

02 LED MR16

03 Pico Projector



Process control during prototype assembly of electronic package

# Material & Packaging Technologies



## Developments

The current R&D activities are focused on the following areas:

### LED Technologies

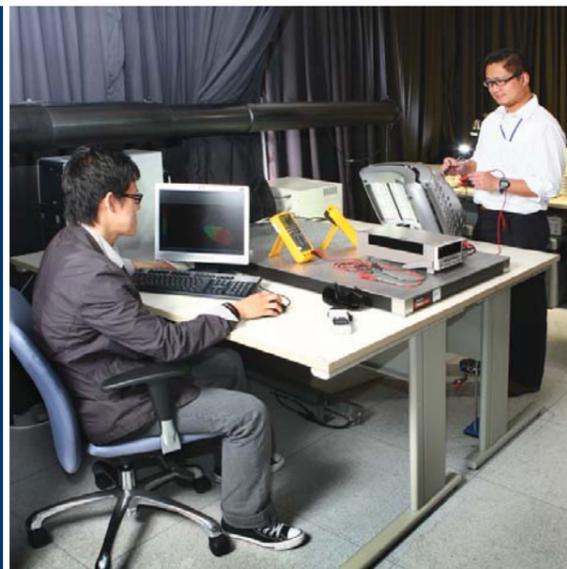
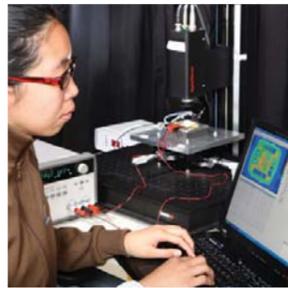
- LED chips, packaging, scanning mirrors, and their applications on TV and miniaturized projector systems and general lightings.

### Advanced Packaging Technologies

- System-in-Package (SiP) based advanced packaging solutions for wireless, automotive and wearable electronics, including low-cost high-performance substrates, 3D packaging and energy harvesting;
- Formed a consortium with more than 25 companies mainly from Hong Kong and the Mainland.

### Photonic Components

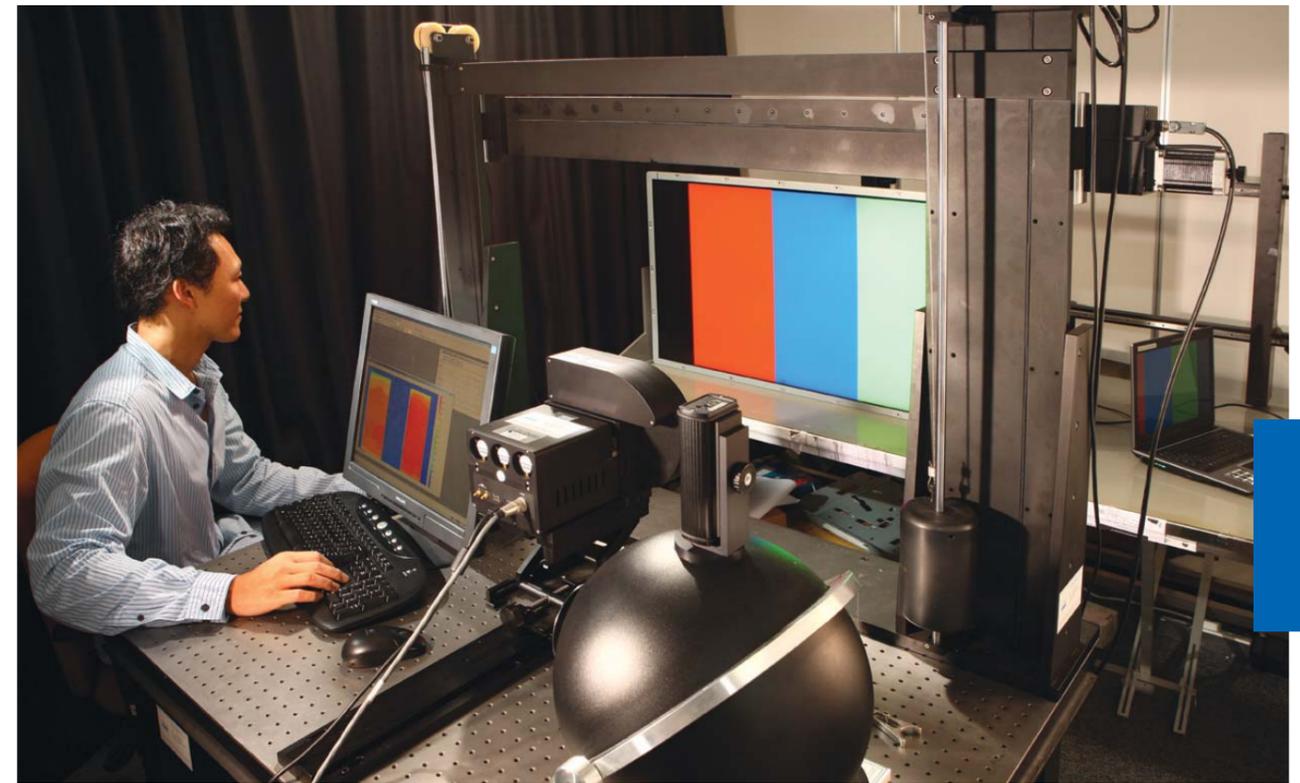
- Anti-shaking camera modules for cell phones, chip scale actuators for auto-focus camera modules, optical sensors, HDMI optical links and solar cells.



01

02

- 01 Non-contact temperature distribution measurement of an electronic package by using IR Microscope
- 02 Integrated Laboratory for LED General Lighting



01

02

03

- 01 Brightness and colour uniformity measurement for Flat Panel Display
- 02 Flexible wearable electronic module
- 03 Substrate design for advanced packaging

# Material & Packaging Technologies



## Achievements

During the year of the report, MPT embarked on the following technological developments:

### High Dynamic Range (HDR) Display Technology

HDR is one of the key next-generation display technologies. MPT has developed the HDR-LCD display technology based on our "Active Dynamic LED Backlight" platform. So far, more than 10 international patents have been filed, and the technology has been licensed to four major companies in Hong Kong and the Mainland. Industrial contributions amounting to HK\$3.8 million have been generated.

### Pico Projector

Developed by ASTRI, the "Personal portable LED micro-projector" has won the recognition of "innovative product" of the 2nd China National Solid State Lighting Innovation Contest. The size of the projector is equivalent to that of a piece of candy, about 20mm x 30mm x 13mm. When the projector is connected to the computer or mobile phone, it can project the best image size from 7 to 15 inches.

### Ultra-thin LED Backlight with Local Dimming and Large-size Public Information Display LCD with Ultra-high Brightness, Environment-friendly and Power-saving Function

ASTRI's two other innovations, "Ultra-thin LED Backlight with Local Dimming" and "Large-size Public Information Display LCD with Ultra-high Brightness, Environment-friendly and Power-saving Function" also won awards. The aim of the contest was to encourage cooperation among universities, research institutes and enterprises in developing LED technology and applications to enhance competitiveness of the Mainland's solid state lighting industry.

### High-power LED-based MR16 Spotlight

The high-power LED-based MR16 Spotlight incorporating two ASTRI IPs solves the heat spreading and dissipation problems. The LED lamp can inject more power for brighter light and is licensed to a Hong Kong company for mass production.

### Cost-effective and Reliable Packaging Technologies for Tire Pressure Monitoring System (TPMS)

The above TPMS-related technologies provide a total solution for automotive electronics-related industries. The TPMS project can be used as a fine example for demonstrating the distinctive advantages for timely, cost-effective and reliable product implementation. Several international patents have been filed and more than HK\$4.6 million of industrial contribution has been committed.

### Anti-shaking Compact Camera Module

This is an optical anti-shaking compact camera module for next-generation camera phone applications. This technology enables users to take clear and sharp photos or stable videos even under a shaky condition or inside a moving vehicle. This project has obtained development support from a tier-1 company and several international patents have been filed.

## Project Highlights

	Project Name	Description	Date
1	High Dynamic Range (HDR) Display Technology	HDR is one of the key next-generation display technologies. ASTRI has developed the HDR-LCD display technology based on "Active Dynamic LED Backlight" platform, which includes filing more than 10 international patents, technology licensing to four Hong Kong and Mainland tier-1 companies, and receiving over HK\$3.8 million of industrial contribution.	Jun 07 ~ Nov 08
2	Pico Projector	For portable electronics embedded with projection function, ASTRI has successfully developed two modules using LCoS panel and LED sources with sizes of 15cc and 8cc respectively. This technology has won the "Innovation Product Award" of the 2nd China National Solid State Lighting Innovation Contest 2008.	Dec 07 ~ Jan 10
3	High-power LED-based MR16 Spotlight	The high-power LED-based MR16 spotlight incorporating two ASTRI's IPs solves heat spreading and dissipation problems. This LED lamp is able to inject more power for brighter light, and has been licensed to a Hong Kong company for mass production.	Sep 06 ~ Sep 08
4	Cost-effective and Reliable Packaging Technologies for Advanced Tire Pressure Monitoring System (TPMS)	The key technologies provide a total solution to automotive electronics-related industries. TPMS is used as a fine example for demonstrating the distinctive advantages based on the above technologies for timely, cost-effective and reliable product implementation. Several international patents have been filed and more than HK\$4.6 million of industrial contribution has been committed.	Mar 07 ~ Jul 10
5	Anti-shaking Compact Camera Module	We have developed an optical anti-shaking compact camera module for next-generation camera phone applications. This technology allows users to take clear photos or stable videos even under a shaky condition or in a moving car or train, and has obtained tier-1 company development support. Several international patents have been filed.	May 07 ~ Sep 09
6	Ultra-thin LED Backlight for LCD TV	This ultra-thin LED backlight with light mixing distance down to 15-25mm targets the slim LCD TV market. With the proprietary design of secondary optical components, these backlights could employ medium power to high power, white or red/green/blue LEDs. LCD TV with these backlights would reveal a more vivid color and brighter image.	Jun 07 ~ Nov 08

## Project Highlights

	Project Name	Description	Date
7	Thin-film-based Vertical-LED Chips	This novel patented vertical-LED technology is licensed to two major LED chip makers in the Greater China region. More than 10 international patents have been filed, and more than HK\$2 million of industry contribution has been secured.	Mar 07 ~ Jul 09
8	A Design Advisor for Virtual Manufacturing and Qualification Testing of 3D Stacked Package	A design advisor is developed for development of 3D stacked packages, with which the entire manufacturing processes and qualification tests can be accurately modeled, the potential manufacturability and reliability related problems can be thus predicted. Furthermore, the root causes of the detected problems and recommendations can be provided by the model. Several international patents have been filed and there will be more than HK\$1.5M of industry contribution.	Jan 08 ~ Mar 10
9	System-in-Package Technology Platform	In the 2006 International Consumer Electronics Show (CES), one of our tier-1 customers received the CES Award in the area of computer peripherals, in which their product used ASTRI's System-in-Package solution to enable their product to win the award among thousands of participants. Several international patents have been filed with more than HK\$1.2M of industry contribution.	Sep 05 ~ Nov 07
10	Optical HDMI Cable	We developed the next-generation Optical HDMI cable based on the well-established optoelectronics platform and technologies. The cable has 3.4Gb/s/channel throughput (3 data channels) with fully functional control signal access and can reach transmission distance beyond 100m. The cable is HDMI 1.3b standard compatible with small form factor. This technology has been licensed to two Hong Kong-based tier-1 customers for commercialization, and a patent has been filed.	Dec 06 ~ May 08

ASTRI's Subsidiary

# Hong Kong Jockey Club Institute of Chinese Medicine (HKJCICM)

The Hong Kong Jockey Club Institute of Chinese Medicine was set up by the Hong Kong SAR Government in partnership with The Hong Kong Jockey Club as an ASTRI subsidiary. It is governed by a separate Board of Directors and receives a HK\$500 million pledged donation from The Hong Kong Jockey Club Charities Trust for researching and developing Chinese medicine (CM).

Under the strategy of innovation and technology development, HKJCICM pursues a public mission to spearhead value-added development of CM and the industry through quality, science, evidence and application.

# HKJCICM



## Work Scope

- CM standardization & quality control;
- CM and natural product applied R&D;
- Information & exchange; and
- Value-added management for technology transfer and commercialization.

## Chinese Medicine Laboratory

Underpinning the importance of quality in modernizing CM, HKJCICM has set up a Chinese Medicine Laboratory as a central and networked expert platform to support sector-relevant initiatives and R&D projects. It is staffed by a team of scientists with research competence in pharmacognosy, phytochemistry, natural product discovery, analytical development and quality control. It offers professional expertise and services in:

- Authentication of Chinese herbal materials;
- CM herbal preparations and quality assessment;
- Ingredient verification;
- CM natural product applied research; and
- Analytical methodology development and provision of research tools for quality control.

## Developments

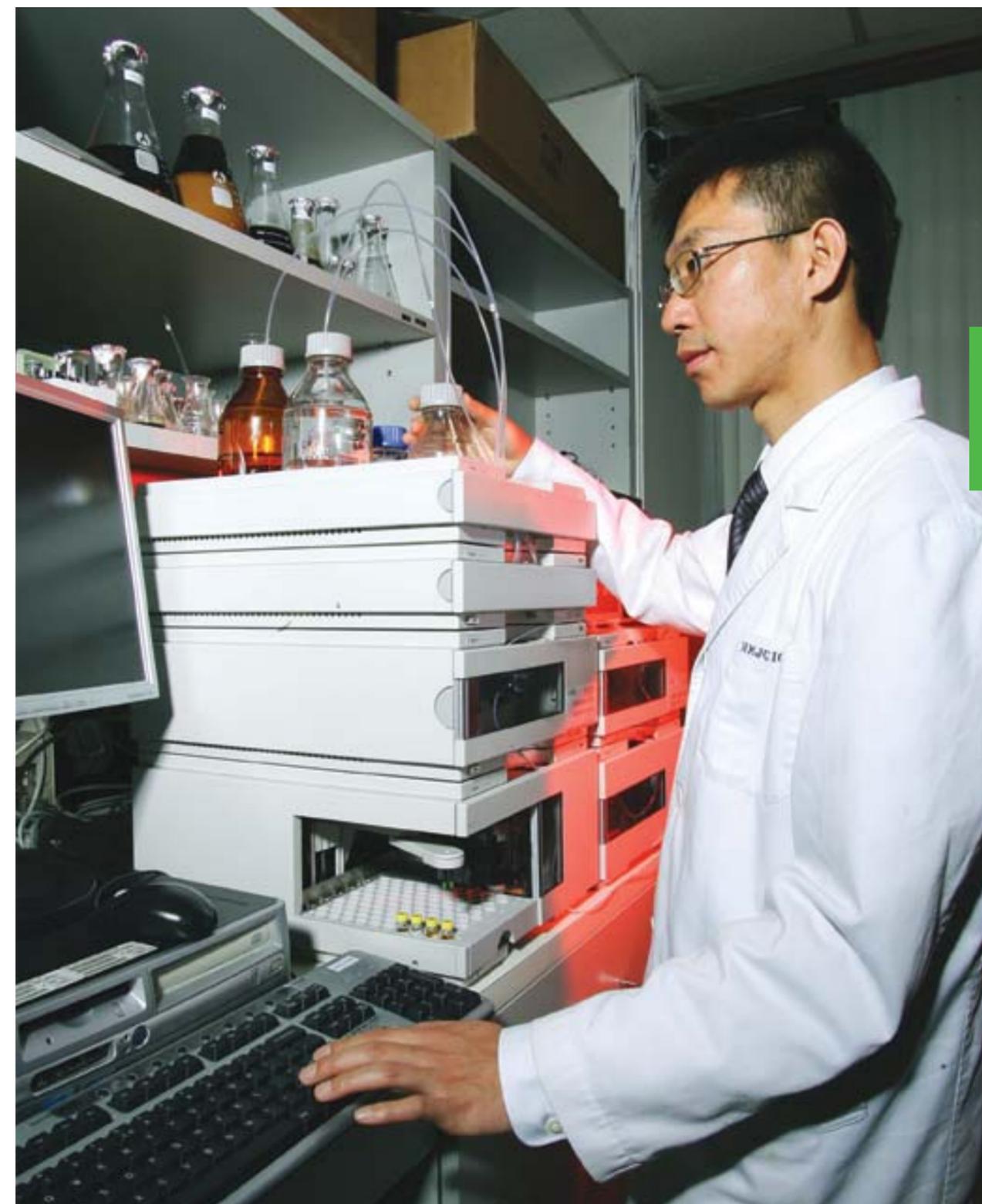
HKJCICM is building a portfolio of R&D products and technologies in partnership with research-based organizations. With science and evidence-based development, the institute focuses on applied research and has strengthened business development to facilitate application and commercialization.

The institute adopts a visionary and progressive approach to advance CM in a modern context. HKJCICM will continue to strengthen its connection with industry through the following developments:

- Provide sector-relevant information via the "Chinese Medicine Hong Kong" platform ([www.hkjcicm.org](http://www.hkjcicm.org));
- Advance standardization of CM and provide technical intermediary through the CM Laboratory and its network;
- Champion herbal product innovations and applications, benefiting human health; and
- Coordinate marketing and promotion of CM developments in Hong Kong to international communities.

The institute has a management team of dedicated professionals spanning different cultures and disciplines. Its technical, information and business development platforms are positioned to enable the institute to advance science and evidence-based developments and facilitate applications.

HKJCICM has ten on-going R&D projects in collaboration with local universities and mainland institutions. Project milestones have been reached with prevailing opportunities for co-development, technology transfer and commercialization.



Building on technical competency, partnership and network to advance Chinese medicine and industrial development

# Supporting Services



## Supporting Services

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## Corporate Governance

### Internal Audit Department

An internal audit team reporting to the Audit Committee has been set up to assist the Board by providing it with information and assurance on internal management controls and observations on major control inadequacies.

As required by ASTRI's Corporate Governance Manual, the Internal Audit Department, during the year, carried out annual audits to meet coverage requirements specified by the Board in accordance with the determined priorities.

The Corporate Governance Manual also required the Department to review the internal control system and report the efficiency and effectiveness of such system to the Board via the Audit Committee. With respect to this requirement, a semi-annual internal audit progress report was presented to the Audit Committee.

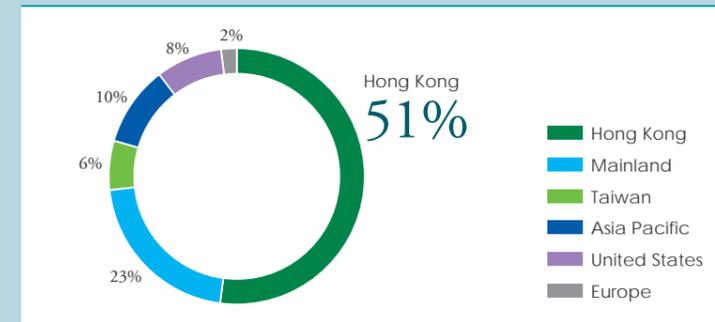
### Compliance Officer

The Board of Directors also appointed the Head of Internal Audit as the Compliance Officer in April last year to assist its governance function by providing timely information to the Audit Committee on the compliance status of ASTRI regarding policy and procedures of project management, finance, human resources, and administrative management. To ensure continuous compliance with the Guide to ITSP (Information and Technology Support Programme), ASTRI's corporate governance policy, ISO procedures and other relevant guidelines, the Compliance Officer is required to submit quarterly reports to the Audit Committee.

## Business Strategy and Legal

The Business Strategy and Legal Departments assist R&D teams in industrial collaboration and technology commercialization by preparing licensing arrangements and contract drafting. During the year, they actively participated in contract negotiations with licensees; provided commercial and legal advice to R&D teams and supported them in meeting ASTRI's annual technology transfer targets. In 2007/08, ASTRI achieved over 50 per cent increase in business deals compared with the previous year. While licensees are predominantly from Hong Kong and the Mainland, some are from Asia Pacific, the United States and Europe.

Contract Distribution in 2007/08



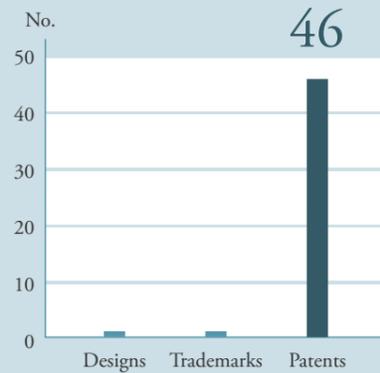
# Supporting Services



## IP and Project Management

Over the years, ASTRI has placed considerable efforts in protecting its research output in the form of intellectual property. Typically, intellectual property is protected by patents, trademarks and copyright of reference designs, in addition to regular engineering design documentation.

During the past year, ASTRI has filed in the United States and the Mainland patent registrations for 46 of its inventions. It also registered one trademark in Hong Kong, and one design on the Mainland and Hong Kong. On the whole, ASTRI's research output compared very favourably with other R&D research institutes in the region.



## Information Technology

The Information Technology Department is in charge of the network infrastructure, system administration, IT security protection, office automation, solution development, technical support and services to the whole company, coordination and consultation to R&D domains on IT needs.

To cope with increasing demands for Internet access, growing complexity of development and application systems, the major IT activity in 2007-08 was upgrading Internet connection and Security Gateway.

In July 2007, a new product, Network Box, was deployed as the security gateway of Internet connection. This new product includes hardware protection set-up and providing round-the-clock monitoring services. The new solution has halved ASTRI's operating costs while maintaining the same level of human resources.

## Quality Management

ASTRI's Headquarters was accredited the ISO9001:2000 in April 2006 under the scope "Provision of internal supporting services to research and development activities and governing bodies". So far, ASTRI has conformed to all audit requirements over the years.

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# Finance

## Overview

During 2007/08, ASTRI continued to be prudent in its financial management.

In brief, the income for the year amounted to HK\$302,908,670 comprising HK\$119,907,000 from recurrent subvention, HK\$157,622,477 from R&D projects funded by the Innovation and Technology Fund, HK\$10,697,850 received from industry contribution to R&D projects, HK\$14,015,748 project fund from Hong Kong Jockey Club Institute of Chinese Medicine Limited, HK\$100,498 income from royalty and other commercialisation fee, and HK\$565,097 from bank interest. The total recurrent expenditure amounted to HK\$114,260,207 for the year comprising mainly –

- (a) HK\$71,540,700 in respect of salaries and related benefits,
- (b) HK\$14,043,629 in respect of office rental and related building management fees,
- (c) HK\$8,946,738 in respect of consultancy fee, patent expense, and legal and professional fee, and
- (d) HK\$19,729,140 in respect of ASTRI's operating expenses.

As the amount of financial returns on the allocations from the ITF is required to be returned to the Government, ASTRI in 2007/08 returned a total of HK\$518,087 which included the licensing and royalty income.

In line with the agreement with the Innovation and Technology Commission, the amount of HK\$541,345, which represented the bank interest generated from subvention allocation in respect of existing ITF projects, was returned to the Government. After the refund to the Government and the provision for taxation, the surplus for the year on accrual basis is HK\$2,271,010.

The consolidated accounts for the year ended 31 March 2008 of ASTRI and its subsidiary, HKJCICM, have been audited by the external auditor with a clean audit opinion and an extract of the consolidated income and expenditure accounts and consolidated balance sheet was set out on the following pages.



## Consolidated Income and Expenditure Account

For the year ended 31 March 2008

	2008 (HK\$)	2007 (HK\$)
<b>SUBVENTION</b>		
Income from Government subvention	119,907,000	119,907,000
Administrative expenses	(114,260,207)	(119,851,198)
Surplus on subvention	5,646,793	55,802
<b>PROJECT FUNDING FROM INNOVATION AND TECHNOLOGY FUND AND INDUSTRY CONTRIBUTION</b>		
Project fund income		
Innovation and Technology Fund	157,622,477	136,183,957
Industry contribution	10,697,850	5,229,587
Project expenditure	(169,120,327)	(141,413,544)
Balance on project funding	(800,000)	-
<b>PROJECT FUNDING FROM HONG KONG JOCKEY CLUB</b>		
Project fund income	14,015,748	22,945,228
Project expenditure	(14,015,748)	(22,945,228)
Surplus on project funding	-	-
<b>OTHER INCOME</b>	665,595	2,233,972
<b>AMOUNT REFUND TO THE GOVERNMENT OF HONG KONG SAR</b>	(518,087)	(3,795,583)
<b>SURPLUS (DEFICIT) BEFORE TAXATION</b>	4,994,301	(1,505,809)
<b>TAXATION</b>	(2,723,291)	(6,019,169)
<b>SURPLUS (DEFICIT) FOR THE YEAR</b>	2,271,010	(7,524,978)

## Consolidated Balance Sheet

At 31 March 2008

	2008 (HK\$)	2007 (HK\$)
Non-current asset		
Plant and equipment	8,049,249	13,465,960
Current assets		
Other receivables, prepayments and deposits	99,072	380,159
Bank balances and cash	120,480,326	62,852,530
	120,579,398	63,232,689
Current liabilities		
Other payables and accrued charges	3,994,398	796,995
Receipts in advance	68,971,648	18,252,455
Amount due to the Government of Hong Kong SAR	541,345	763,179
Amount due to Hong Kong Jockey Club	1,892,791	587,931
Tax payables	678,535	6,019,169
	76,078,717	26,419,729
Net current assets	44,500,681	36,812,960
Net assets	52,549,930	50,278,920
Capital and reserve		
Share capital	2	2
Accumulated surplus	52,549,927	50,278,917
Shareholders' funds	52,549,929	50,278,919
Minority interest	1	1
Shareholders' funds	52,549,930	50,278,920

## A Year in Capsule

May 2007 ~ October 2007	50
October 2007 ~ March 2008	52

# A Year in Capsule



May June July August September October

2007



**17 May 2007**

Visit by a five-member senior delegation from the Chinese Academy of Science.

**22 May 2007**

Visit by a senior Chinese Technology Delegation led by Mr. Cheng Jinpei, Vice-Minister of the Chinese Ministry of Science and Technology, and Prof. Xu Rigan, Vice-President of the Chinese Academy of Engineering.

**17 July 2007**

Visit by a 23-member delegation of the Department of Science and Technology, Guangdong Province.

**01 14-17 August 2007**

ASTRI again co-organized the Eighth International Conference on Electronics Packaging Technology (ICEPT) in Shanghai. It was attended by more than 400 participants from various countries.

**02 4 September 2007**

To further promote ASTRI's latest technological achievements and breakthroughs, more than 30 journalists were invited to tour its laboratories. The "Media Lab Tour" was a major highlight of the Media Workshop initiated by the Innovation and Technology Commission.

**03-04 5 September 2007**

More than 200 participants from the industry and academic sectors joined ASTRI's first Industry and University Consultation Forum Hong Kong (IUCF HK) at Science Park. The Forum introduced ASTRI's various technology programmes and R&D endeavours, solicited initiatives for projects, and sought from industry and universities collaboration on developing a wide spectrum of innovative technologies.

**05-06 7 September 2007**

Following the successful Forum in Hong Kong, the event was staged again in Shenzhen, with support from the Shenzhen Municipal Government, Shenzhen Bureau of Science, Technology and Information and Hong Kong's Innovation and Technology Commission. The Forum attracted more than 300 participants from over 100 local and overseas enterprises and universities.

**14-18 September 2007**

Some of ASTRI's technological accomplishments were on display at the "Innovation Expo 2007", a biennial event organized by Innovation and Technology Commission with aims to enhance public awareness on Hong Kong's achievements in innovation, technology and design, as well as to nurture the interest and talent of the younger generation in these areas.

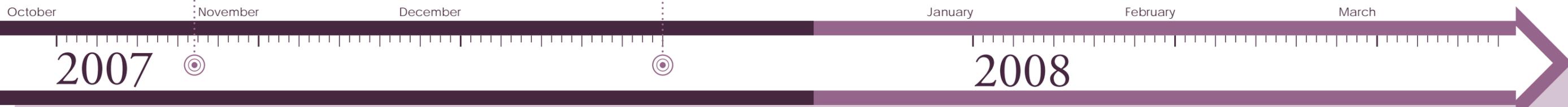
**07 17 September 2007**

Visit by a delegation comprising representatives from the Chinese National Office for Science and Technology Awards, China Association of Children's Science Instructors, State Council's Three Gorges Project Construction Committee, China Three Gorges Project Corporation, Hong Kong and Macau Affairs Office, and the provincial governments in the Pearl River Delta region.

**08 12-17 October 2007**

The R&D of ASTRI's four domains were on display at the Hong Kong Pavilion of the Ninth China High-Tech Fair (CHTF) in Shenzhen. The pavilion, co-organized by Innovation and Technology Commission Hong Kong Productivity Council and Hong Kong Trade Development Council, was visited by Mr. Frederick Ma Sze-hang, the Secretary for Commerce and Economic Development; Mr. Liu Yingli, Vice-Deputy Mayor of Shenzhen Municipal Government; and other senior officials.

# A Year in Capsule



**09 24 October 2007**  
 ASTRI signed a Memorandum of Understanding with four collaborators on establishing the Hong Kong Digital Terrestrial Television Local Testing Group (DTTG), which is Hong Kong's first organization to support both the roll out and testing of digital TV (DTV) broadcasting technology, particularly for testing set-top boxes and digital TV sets.

**13 - 14 November 2007**  
 ASTRI and WiMedia's China Chapter co-hosted two technical conferences on "WiMedia UWB Technology & Reality Symposium 2007" and "WiMedia UWB Technology & Application Submit 2007" in Beijing. More than 250 engineers and industrial experts from WiMedia Alliance and Mainland research institutions attended the conferences.

**10 6 December 2007**  
 ASTRI co-organized a seminar on "Deployment of Digital TV Broadcasting in Hong Kong -- The Business Opportunities and the Technology Development" with Asia Television Limited, Hong Kong Science and Technology Parks Corporation, Rohde and Schwarz Hong Kong Limited, and Television Broadcast Limited.

**6-7 December 2007**  
 ASTRI took part in the 2007 China (Changsha) Science and Technology Achievements Transformation Fair, which was organized by the Ministry of Education and the Ministry of Science and Technology of the Central Government and the Hunan Provincial Government.

**11 10 December 2007**  
 ASTRI was invited by ITC to participate in the "Chongqing Hong Kong -- Introduction of Hong Kong's R&D Centres & Technology Infrastructure Forum" in Chongqing. The forum aimed at exploring collaborations between industry and academic research, as well as establishing technological cooperation in Hong Kong and Chongqing.

**12 12-14 December 2007**  
 ASTRI again took part in the Inno Design Tech Expo 2007 organized by the Hong Kong Trade Development Council, and co-organized by Hong Kong Design Centre and Hong Kong Science & Technology Parks Corporation.

**14 December 2007**  
 At the WPAN Working Group Annual Technology Conference in Beijing, ASTRI was awarded the "Innovation Award" by WPAN (Wireless Personal Area Networking Working Group of the China National Information Technology Standardization Technical Committee [NITS]).

**13-14 31 December 2007**  
 ASTRI and Tsinghua University held a ceremony at ASTRI to celebrate the establishment of ASTRI-Tsinghua University Multimedia Broadcasting and Communications Joint Research Laboratory. On behalf of ASTRI and Tsinghua University respectively, Prof. Edward S. Yang and Prof. Kang Kejun, signed the Letter of Intent. Guests from The State Administration of Radio, Film, and Television (SARFT) and Tsinghua University were invited to witness the launch of Hong Kong digital terrestrial television broadcasting.

**15 23 January 2008**  
 The A8WIFI Cellular Base Station, jointly developed by ASTRI and ALTAI Technologies Limited, a spun-off company of ASTRI, was awarded the "2007 Hong Kong Awards for Industries: Technological Achievement Grand Award" in the Technological Achievement Category.

**16 17 March 2008**  
 ASTRI's Advanced Packaging Technologies Consortium co-organized a seminar on "3D Packaging: Market Trends, Technologies, Manufacturing & Reliability" with Fudan University and Shanghai Jiao Tong University on the Fudan University campus in Shanghai.

## Staff Movements

As at 31 March 2008

Level	As at 31 March 2007	As at 31 March 2008
1	3	3
2	14	17
3	67	68
4	137	165
5	89	89
6	2	3
Temp	--	--
<b>Total</b>	<b>312</b>	<b>345</b>

ASTRI R&D Groups  
**+10.6%**

Level	As at 31 March 2007	As at 31 March 2008
1	2	2
2	3	1
3	11	10
4	19	21
5	23	21
6	6	5
Temp	4	1
<b>Total</b>	<b>68</b>	<b>61</b>

ASTRI Headquarters  
**-10.3%**

HKJCICM  
**+12.5%**

Level	As at 31 March 2007	As at 31 March 2008
1	1	1
2	1	1
3	1	1
4	6	8
5	7	7
6	--	--
Temp	--	--
<b>Total</b>	<b>16</b>	<b>18</b>

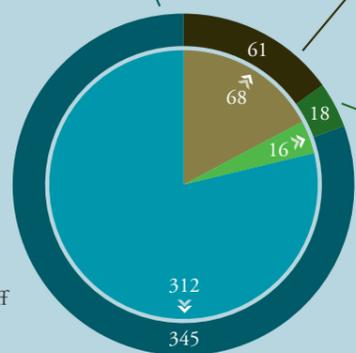
Total No. of Staff  
**+7%**

As at 31 March 2007

Headquarters	R&D Groups	HKJCICM
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As at 31 March 2008

Headquarters	R&D Groups	HKJCICM
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## Annual Remuneration of ASTRI's Senior Executives

For the year ended 31 March 2008

Post	Total Sum of Annual Remuneration FY 1 April 2007 - 31 March 2008 (HK\$)
CEO	\$2,036,870.97 (9 July 2007 - 31 March 2008)
5 second tier executives	\$10,213,591.83
18 third tier executives	\$20,351,006.48

Annual Remuneration FY 1 April 2007 - 31 March 2008 (HK\$)	Number of Staff
\$0 to \$1,000,000	4
\$1,000,001 to \$1,500,000	9
\$1,500,001 to \$2,000,000	7
\$2,000,001 to \$2,500,000	4

## 2007/08 Performance

For the year ended 31 March 2008

	Actual Figures for FY2007/08
<b>1</b>	<b>R&amp;D Programme</b>
Performance of the R&D Programme	
No. of ITF-funded platform projects undertaken	33
No. of ITF-funded seed projects undertaken	27
No. of contract research projects undertaken	33
Income from licensing and sponsorship	HK\$13M
Income from contract service projects	HK\$5M
Industry Participation	
Contribution from licensing and sponsorship	7%
Contribution from all contract service projects	3%
Quality of ITF-Funded R&D Projects	
Total number of patents registered	46
Total number of trademarks registered	1
Total number of designs registered	1
Total number of licensing agreements signed	17
Total number of researchers participated in all ITF-funded R&D projects	345
<b>2</b>	<b>Number of Members Recruited</b>
Advanced Packaging Technologies Consortium	12
Digital Living Platform Consortium	15

## Board of Directors

For the year ended 31 March 2008

<b>Chairman</b>
Dr. Patrick Wang Shui-chung, JP
<b>Non-official Directors (In alphabetical order according to surname)</b>
Mr. Sunny Chai Ngai-chiu
Dr. Roy Chung Chi-ping, JP
Dr. Patrick Lam See-pong
Mr. Henry Leung Kwong-han
Mr. Humphrey Leung Kwong-wai
Dr. Jacqueline Lui Chiu-tong
Mr. Roger Luk Koon-hoo, BBS, JP
Prof. Vincent Y. Shen
Mr. Richard Sun Po-yuen
Mr. Tom Tang Chung-yen, JP
Mr. Henry Tsang Yuk-wong
Mr. Ben Wong Chung-mat, MH
Mr. Peter Wong King-fai
Prof. Wong Wing-shing
<b>Official Directors</b>
Mrs. Rita Lau Ng Wai-lan, JP
Mr. Eddy Chan Yuk-tak, JP

## Movements of Directors

For the year ended 31 March 2008

<b>Directors</b>	
Mr. Eddy Chan Yuk-tak, JP	(appointed on 30 November 2007)
Mrs. Rita Lau Ng Wai-lan, JP	(appointed on 7 August 2007)
Mr. Ho Suen Wai	(resigned on 16 July 2007)
Dr. Allen Wong Chi-yun	(resigned on 20 October 2007)
Mr. George N. Chung	(resigned on 20 October 2007)
Mr. Anthony Wong Sik-kei	(resigned on 30 November 2007)
<b>Alternate Directors</b>	
Mr. Eddy Chan Yuk-tak, JP	(appointed on 30 November 2007 as alternate director to Mrs. Rita Lau Ng Wai-lan, JP)
Mr. Gordon Leung Chung-tai	(appointed on 30 November 2007 as alternate director to Mr. Eddy Chan Yuk-tak, JP)
Mr. Gordon Leung Chung-tai	(appointed on 30 November 2007 as alternate director to Mr. Anthony Wong Sik-kei)
Mr. Anthony Wong Sik-kei	(appointed on 7 August 2007 as alternate director to Mr. Ho Suen Wai)
Mr. Anthony Wong Sik-kei	(appointed on 7 August 2007 and resigned on 30 November 2007 as alternate director to Mrs. Rita Lau Ng Wai-lan, JP)
Mr. Woodhead Geoffrey	(appointed on 17 December 2007 and resigned on 21 December 2007 as alternate director to Mr. Eddy Chan Yuk-tak, JP)

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This Annual Report is published by authority of the Board of Directors of ASTRI

### Editor

David Poon

*Vice President, Corporate Communications & Company Secretary*

### Assistant Editors

Dennis Yip

Jessie Leung

Maggie Chan

*Corporate Communications*

### Designer

Joanna Lai

*Corporate Communications*

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# Our Mission and Goals

The mission of ASTRI is to perform research and development to enhance Hong Kong's competitiveness in technology-based industries.

## Our goals encompass:

- Performing high quality R&D for technology transfer to industry;
- Promoting the greater application of technology in industry;
- Acting as a spawning ground for technology entrepreneurs;
- Enhancing Hong Kong's technology human resources development;
- Acting as a magnet to attract international R&D talent to work in Hong Kong; and
- Providing a focal point for industry-university collaboration.

## HONG KONG APPLIED SCIENCE AND TECHNOLOGY RESEARCH INSTITUTE COMPANY LIMITED

3/F, Building 6  
2 Science Park West Avenue  
Hong Kong Science Park, Shatin  
New Territories, Hong Kong

T : (852) 3406 2800  
F : (852) 3406 2801  
E : corporate@astri.org  
W: www.astri.org

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