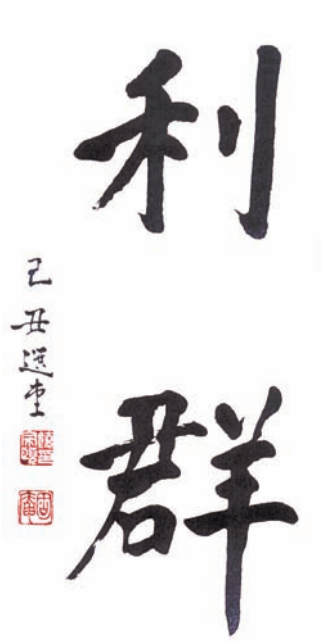
CUHK MoE-Microsoft Key Laboratory of Human-Centric Computing and Interface Technologies

香港中文大学利群计算及界面科技教育部—微软重点实验室



Introduction

Human-centric computing and interface technologies embrace "ease-of-use" in content processing and communication, with the aim of bringing the power of information to a multitude of aspects of our daily lives. Our objective is to understand how humans create, convey and consume information, to draw inspiration from such understanding, and to engineer enabling technologies that empower a diversity of users. For example, our technologies can endow the computer with perceptual abilities, i.e. senses of sight, hearing and touch; as well as expressive abilities, such as the ability to speak and to gesture. Our technologies can also generate audiovisual, multi-view visualizations of data to assist people in information mining and knowledge extraction. Our technologies can even transcend spatial constraints to facilitate interactive communication and global collaboration among groups of users. In this pursuit, we have organized our research agenda into five thematic areas:

Computer vision – covers the sciences and technologies that enable the computer to "see".

Computer graphics – covers the sciences and technologies that facilitate the representation and manipulation of visualizable data.

Speech and multimodal processing – covers the sciences and technologies that enable computers to "speak" and to "hear", which are complemented with gestural motion processing to support natural user interactions.

Multimedia processing and retrieval – covers the sciences and technologies that discover and extract meaningful patterns from text, audio and visual data to support information organization and retrieval.

Communication and networks – covers the sciences and technologies for the manipulation and transmission of information through interconnected computers.

Since 2005, the CUHK MoE-Microsoft Key Laboratory of Human-Centric Computing and Interface Technologies has been building cohesion between CUHK and Microsoft Research Asia (MSRA) in our core competencies and research areas of common interests. We continue to develop an excellent research programme that provides infrastructure and inspiration for our faculty, researchers and students, as they collaborate in pushing the frontiers of technology. We also strive to nurture and educate future leaders in our field. The conferment of national status on our Key Laboratory provides great encouragement and recognition for our diligence and dedication to education, research and technological development.

The Inauguration Ceremony of the Microsoft-CUHK Joint Laboratory for Human-Centric Computing and Interface Technologies in May 2005. Officiating guests included Professor Lawrence J. LAU, Vice-Chancellor of CUHK; Professor Hsiao-Wuen HON, Managing Director of MSRA; Professor Andrew YAO, Distinguished Professor-at-Large of CUHK and Professor Peter YUM, Dean of Engineering of CUHK.

微软－香港中文大学利群计算及界面科技联合实验室于 2005 年 5 月举行的成立典礼。主礼嘉宾包括香港中文大学校长刘遵义教授、微软亚洲研究院院长洪小文教授、香港中文大学计算机科学与工程学系博文讲座教授姚期智教授及香港中文大学工程学院院长任德盛教授。

前言

以人为本的计算和用户界面技术旨在开发简便易用的内容处理与通讯技术，把信息的力量应用到日常生活中。我们的研究目标是通过理解人们如何创造、传达及使用信息，并利用从理解过程中获得的启示，去开发能满足不同用户需求的技术。举例来说，我们的技术能够赋予计算机感知的能力，比如视觉、听觉与触觉；更能够赋予计算机表达的能力，比如说话和以动作示意。这些技术可以通过创建视听兼备、多角度的可视化数据来协助人们发掘信息、获取知识。这些技术甚至可以突破地理的局限，促进不同用户组之间的互动交流及全球性的协作。据此，我们将研究议程分为 5 个专题领域：

计算机视觉 — 包含让计算机可以「看」的科技。

计算机图形 — 包含促进可视化数据的表达性和可操控性的科技。

语音和多模态处理 — 包含令计算机可以「听」和「说」，同时辅以示意动作的处理以达成自然的人机互动的科技。

多媒体处理与检索 — 包含从文本、音频、视频数据中发掘提炼出有意义的模式，从而支持信息的组织与检索的科技。

通讯与计算机网络技术 — 包含在联网计算机之间处理和传播信息的科技。

从 2005 年开始，香港中文大学利群计算及界面科技教育部 — 微软重点实验室（下简称「重点实验室」）便致力于增强香港中文大学（下简称「中文大学」或「中大」）与微软亚洲研究院之间的凝聚力，尤其是在彼此关注的核心研究领域方面。我们一直在拓展优秀的研究计划，为我们的教员、学者和学生们提供基础设施与灵感，从而推进更多前沿科技的涌现，同时也培育本学科的未来领导人才。我们的实验室获授予教育部重点实验室的地位，给我们莫大鼓励，也肯定了我们长期以来在教学、研究与技术开发事业上的贡献。

The Plaque Unveiling Ceremony of the CUHK MoE-Microsoft Key Laboratory of Human-Centric Computing and Interface Technologies in November 2008. Officiating guests included Professor Ming XU, Counselor of the Department of International Cooperation and Exchange of MoE; Professor P.C. CHING, Pro-Vice-Chancellor of CUHK; Professor Rick RASHID, Senior Vice President (Research), Microsoft Corporation and Professor Hsiao-Wuen HON, Managing Director of MSRA.

香港中文大学利群计算及界面科技教育部 — 微软重点实验室揭牌仪式于 2008 年 11 月在北京微软亚洲研究院十周年之际隆重举行。香港中文大学副校长程伯中教授代表本校进行揭牌仪式。当日的主礼嘉宾包括教育部国际司教育参赞许明教授、微软公司高级副总裁里克雷斯特教授及微软亚洲研究院院长洪小文教授。

Research Highlights

Since 2005, the Key Laboratory has built up a team of about 30 professors and 60 postgraduate students (at both Master and PhD levels). We have published over 250 research papers in prestigious journals and conference and proceedings. Our publications have received awards at ACM-HK Postgraduate Research Day (2005 and 2009), PAKDD2006, ROBIO2006, Microsoft Joint Laboratory Symposium 2006, Beijing-Hong Kong International Doctoral Forum (2007 and 2008), etc. Our students have been awarded Microsoft Fellowships in successive years since 2003. The following is a brief description of our research in the five thematic areas.

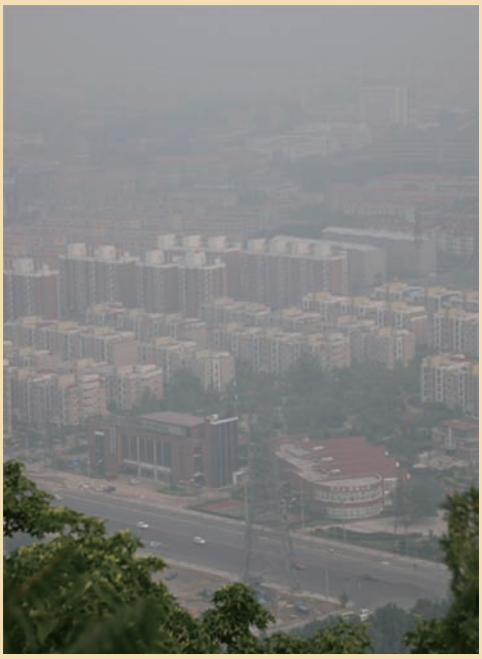
Area 1: Computer Vision

This area covers the sciences and technologies that enable the computer to "see". Our work includes machine learning for face recognition, three-dimensional reconstruction from planar drawings or gestures in free space, image processing, segmentation, searching and mosaicking. Illustrative projects include the removal of haze from images and Robotic Vision for Calligraphy Learning.

Single Image Haze Removal

By Professor Xiaoou TANG, Mr. Kaiming HE and Dr. Jian SUN

Our haze removal technology can remove haze from a single image and recover a depth map with the help of the thickness of the haze. We collected and systematically analysed a large number of hazy and haze-free photos. A novel natural phenomenon in images called "Dark Channel Prior" was discovered, which was used to estimate the thickness of haze. According to this phenomenon, haze removal can be achieved by locally recovering the colours at different regions of the photo with reference to the thickness of the haze, with the aim of achieving complete haze removal.



研发重点

自2005年起，重点实验室便组成了有大约30名教授和60名（硕士或博士程度）研究生的研发团队，迄今已在重点期刊、国际学术会议以及论文汇编中发表了超过250篇研究论文。我们在ACM-HK研究生日（2005及2009），PAKDD2006，ROBIO2006、微软联合实验室讨论会2006、京港国际博士生论坛（2007 及2008）中，都获得最佳论文奖。我们的学生自2003年开始每年都获授微软学者奖学金。以下分5个专题领域介绍研发进展：

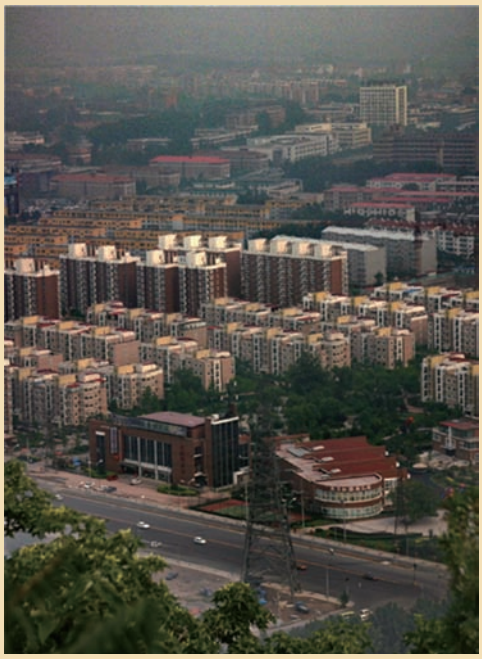
领域 1: 计算机视觉

此领域包含让计算机可以「看」的科技，包括机器学习和人脸识别；根据平面图或者自由空间中的手势或肢体动作完成三维重建；图像处理、分割、搜索、拼接等等。以下介绍的项目包括图片去雾技术和机器人视觉的书法学习的开发。

单一图像的去雾技术

汤晓鸥教授、何恺明先生及孙剑博士

我们的去雾技术可以移除单一图像中的朦胧感，从而恢复有纵深度的清晰图片。我们收集并系统化分析了大量雾化的和清晰的图片，并发现一种图片中的自然现象，即被我们称为「暗原色先验统计」的物理规律，并将之用于判断雾化的程度。根据这一现象， 便能判断图像不同范围中「雾」的浓度，从而回复其原来色彩。



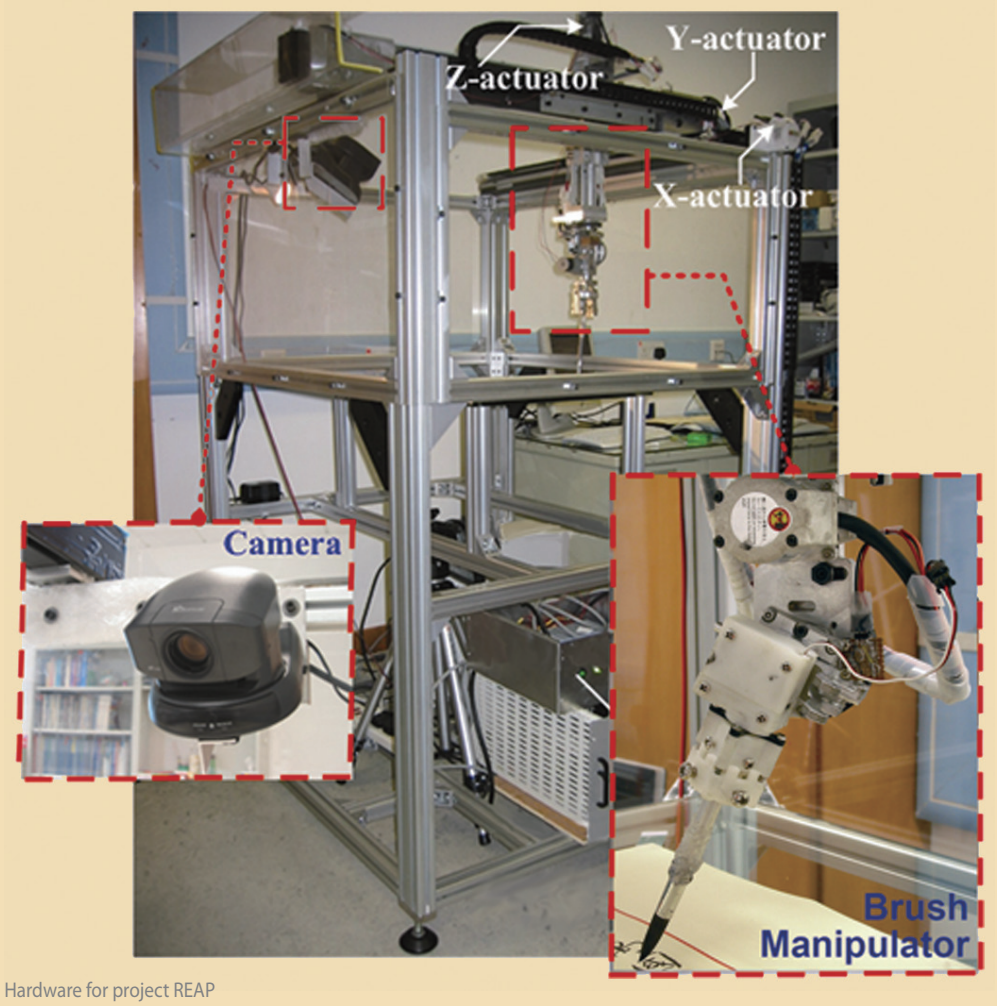
The image that we obtained before (left) and after (right) applying the haze removal technology. This work has received the Best Paper Award in CVPR2009.

原始图像（左）及应用过去雾技术后的图像（右）。此技术于CVPR2009得到最佳论文奖。

Robotic Vision for Calligraphy Learning: A Cultural Engineering Project

By Professor Yeung YAM

We have developed a robot called REAP (Robotic Expression of Acquired Penmanship), which is a robot that attempts to learn Chinese calligraphy and painting by imitation. The robot aims to achieve acquisition, modeling, emulation and rendering of the artistic skills of Chinese calligraphers and painters. The robotic system is equipped with a high precision platform for the fine motion control of a brush-pen. During the writing process, a camera is installed beside the brush-pen to capture its motions to provide visual feedback for analysis and iterative improvement.

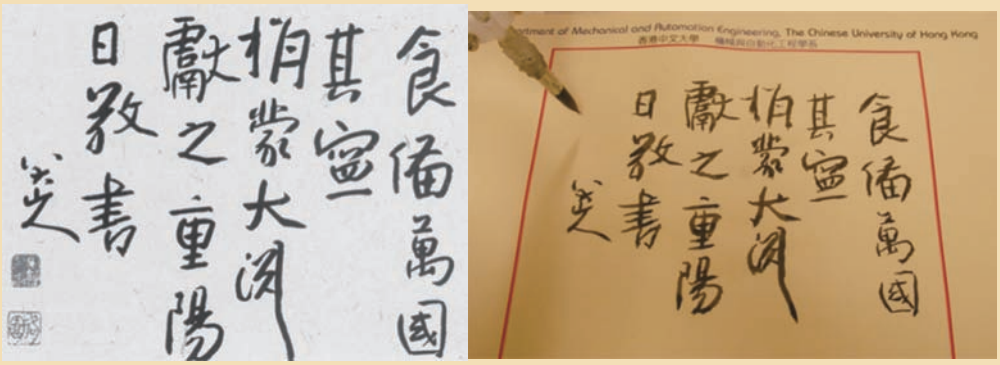


Hardware for project REAP
用于 REAP 机器人系统的设备

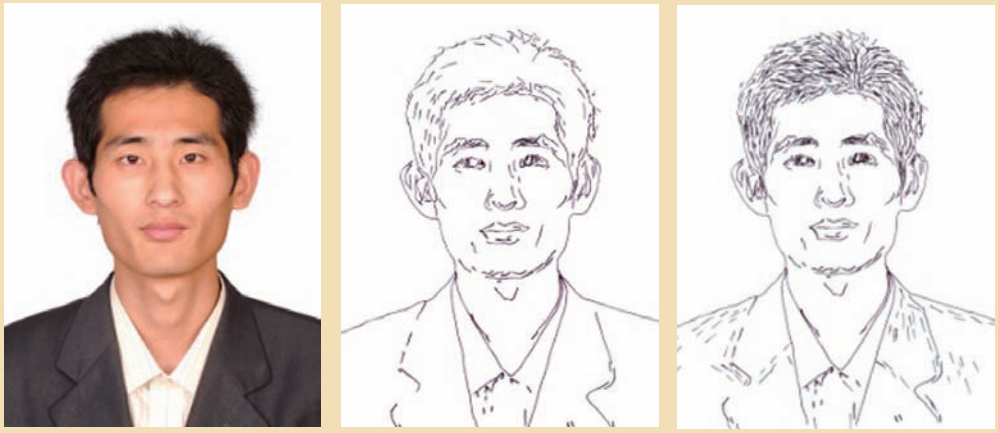
机器人视觉的书法学习

任扬教授

我们开发出一套名为「REAP」的机器人系统，可以通过模仿来学习中国书法和绘画技法，而机器人的任务是要实现对中国书法和国画艺术技艺的采集、建模、模拟和转化。这套系统装备了在高精度微动作控制平台操控下的毛笔，在书写的过程中，装配在笔头旁边的摄像头可以捕捉它的运动轨迹，提供可视化的反馈来帮助自动分析及改进。



A Bada Shanren calligraphy (right) and the replicated copy by REAP (left)
八大山人书法真迹（右）及使用 REAP 复写的书法（左）



Pen and Ink Drawing by REAP
使用 REAP 的笔迹及墨水绘图

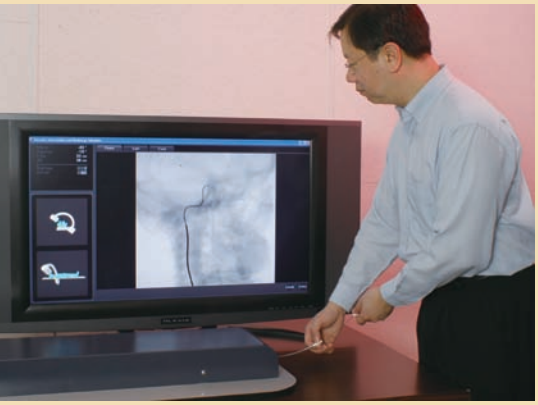
Area 2: Computer Graphics

This area covers the sciences and technologies that facilitate the representation and manipulation of visualizable data. Our work includes virtual reality, digital photography enhancement, automatic colourization methods and animation of still images. Illustrative projects include simulation of three-dimensional anatomic models for medical training, as well as manga (i.e. Japanese comics) production and colorization.

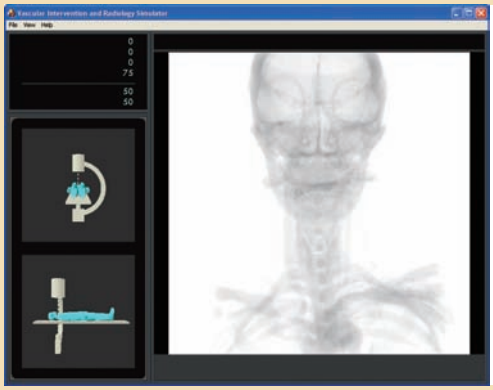
Vascular Intervention Simulation System

By Professor Pheng Ann HENG and Professor Simon Chun Ho YU

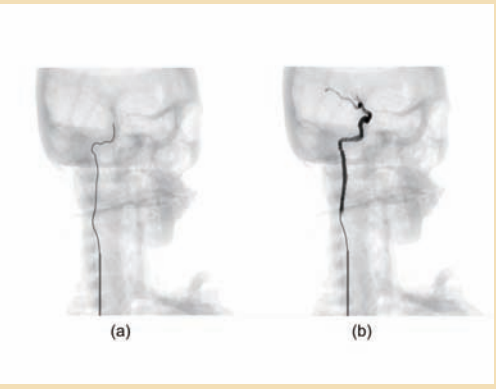
Common killer diseases, such as blood vessel blockage and cancer, were previously great challenges for doctors and surgery was considered the only treatment option. With the development of Vascular Interventional Radiology (VIR), doctors can perform image-guided and minimally-invasive therapeutic operations using medical imaging devices and medical equipment through tiny pin-hole punctures on the patient's body. We have developed a system that can reconstruct a three-dimensional anatomic model of organs and the vascular network from data base on Chinese human anatomy. The system supports interactive visualization and navigation, physiological simulation for respiration and blood flow, as well as realistic simulation with multi-sensory feedback for the VIR procedure. The system can greatly enhance the effectiveness of VIR training and evaluation.



Demonstration of the "Vascular Intervention Simulation System"
示范操作「血管介入治疗模拟系统」



"Vascular Intervention Simulation System"
「血管介入治疗模拟系统」



Computational Manga System

By Professor Tien Tsin WONG and Professor Pheng Ann HENG

The production procedures of manga (Japanese-style comics) are highly complicated, time-consuming and labor-intensive. We have developed a system to enhance the production efficiency. We have developed two methods that can convert digital images into mangas. The first method emphasizes the structure information embedded in the original image, especially since human perception weights structural content more heavily than absolute intensity. In this way, we can produce better manga background than existing methods. Further requirements from professional manga artists relates to consistency in style. Hence the second method lays different types of screens on colored regions in the image to maintain color consistency across different regions. In this way, we can automate the handcrafted processing by manga artists which is conventionally tedious and labor intensive.

领域 2：计算机图形

此领域包含促进可视化数据的表达性和可操控性的科技，工作包括虚拟现实科技、数字化图像增强技术、图片自动上色方法和静止图片动画化技术。以下展示的项目包括三维模拟人体模型技术在医学培训中的应用，以及数码漫画制作系统及著色方法。

血管介入治疗模拟系统

王平安教授及余俊豪教授

血管梗阻和癌症这些常见的致命疾病，对外科医生来说，一直是巨大的挑战，手术被认为是唯一的治疗选择。血管介入技术的发展，令医生可以在视像设备的指引下，通过在病人身体上开出的微小针孔进行微创手术。我们开发的这套系统可以根据中国人体解剖模型数据库中的资料来重建三维化的人体器官和血管网络体系。系统支持交互可视化及导航、呼吸及血液循环的生理仿真，以及基于多传感器网络反馈的实际仿真。这套系统可以大大提高血管介入技术的培训和评价的有效性。

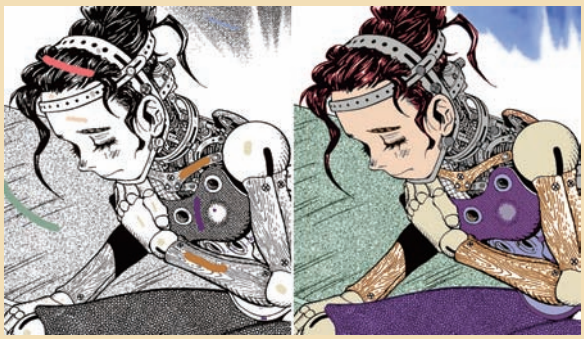
数码漫画系统

黄田津教授及王平安教授

漫画的制作过程非常复杂、耗时且费力。我们开发的系统内含两种方式，将普通的数码图像转换成漫画，提高制作效率。第一种方法尝试通过加强原始图片中内嵌的结构信息来抖动图片，因为用户对结构的关注多于对绝对色度的关注。通过这方法，可以制作出比现时更好的漫画背景。然而专业的漫画家们对漫画整体风格的一致性有较高的要求，所以第二种方法把不同类型的色域掩膜覆盖在原始图片上，从而保持色度分辨率。通过这些方法，漫画家冗长而又劳累的漫画背景手动制作过程就可自动化。

Colorization on regions without closed boundaries

运用「漫画著色」功能(右一)可避免颜色「出界」的问题(左一至三)

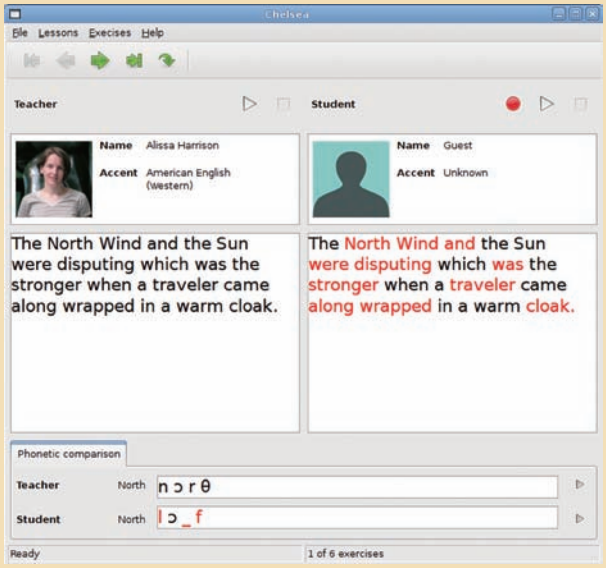


Pattern-continuous colorization

基于图案边界分类的「漫画著色」功能

Area 3: Speech and Multimodal Processing

This area covers the sciences and technologies that enable the computer to "speak" and to "hear", which are complemented with gestural motion processing to support natural user interactions. The area has a diverse scope spanning large-vocabulary speech recognition, spoken document retrieval, speaker verification, text-to-audio-visual synthesis, computer-assisted pronunciation training and multimodal interactions. Illustrative projects include the following:



Desktop version of CAPT system

CAPT 系统的桌面版本

Embedded version of Crystal

Crystal 语音合成系统嵌入式版本

Speech Synthesis (Text-to-Speech) and Speech Recognition (Speech-to-Text) Technologies

By Professor Helen MENG

We have developed a real-time Chinese text-to-speech synthesizer named Crystal. It accepts Chinese textual input and generates audiovisual output with natural sounding Cantonese/Mandarin speech synchronized with animated lip movements of a virtual speaker (or avatar). The avatar can exhibit facial expressions and head movements that are conducive to communication. We have also adapted conventional automatic speech recognition technologies to support Computer-Assisted Pronunciation Training (CAPT) that aims to improve English pronunciations of native Chinese speakers. The CAPT system can automatically perform mispronunciation detection, diagnosis and corrective feedback generation to facilitate second language acquisition.

Asia Signopedia

By Professor Ronald CHUNG and Professor Gladys Wai Lan TANG

This project aims to build a sign language knowledge base named the ASIA-SIGNOPEDIA. It is a database of Asian sign languages that is to be constructed by the various sign language communities themselves in Asia, via the internet. There is a web page constructed to let anyone in the world browse the database through it, or input entries to it. The web site also serves the purposes of stimulating a wider discussion about hearing impairments and sign language studies in the Asia-Pacific region, enhancing intercultural communication among people with hearing impairments, fostering their communication with people having normal hearing, and raising general awareness about the difficulties faced by the hearing-impaired community and the general misconceptions about sign languages. Sign languages cannot be spoken, yet the database should be understandable also to those who are not familiar with them. Thus the database has to be multi-modal, consisting of both video entries, text entries etc. At the moment, input to the database need only be in video form or text form or both. It is the objective of the project that in the future, for easier understanding of others and for better documentation, the gesture displayed in each given video clip could be extracted, and illustrated in more abstract and elaborate form. That would require further research and application of vision technologies.

领域 3：语音和多模态处理

此领域包含了令计算机可以「听」和「说」，同时辅以手势或肢体动作的处理以达成自然的用户互动过程的科技。这领域多样化的范畴横跨大词汇库语音识别、口语文献检索、说话者验证、从文本到视听的合成、计算机辅助发音训练和多式联运的相互作用。以下介绍几个相关的项目：

语音合成（文本到语音）及语音识别（语音到文本）技术

蒙美玲教授

我们开发了一个实时的汉语文本到语音的合成器，名为「晶晶」。她通过一个虚拟人物的形象，将汉语的文本输入以视听兼备的方式表现出来。「晶晶」可以用广东话或普通话进行语音合成，并同时做出唇部的动作，还可以做出面部表情和头部动作以帮助交流。我们更把自动语音识别技术改造，使它可以支持计算机辅助发音练习（CAPT），从而提高以中文为母语的英语学习者的发音。CAPT 系统可以自动侦测误读、诊断和反馈正确读音，有助用者掌握第二语言。

亚洲手语百科全书

锺志杰教授及邓慧兰教授

这一计划的目标是建立一个名为「亚洲手语百科全书」的资料库，其中的数据是由亚洲不同国家手语社群通过互联网创建的。我们建立了一个完全开放的网站，世界各地的用户都可以获取我们的资料，也可以上传数据。这一网站同时为许多议题提供辅助平台，比如说在亚太地区激发更广泛的关于听力障碍和手语学习的讨论；增强听力障碍者之间的跨文化交流；提高对听力障碍人群所面临困难和普遍的手语误读的广泛认识。手语不能以语音表达，但这数据库也应可让不熟悉手语的人所理解，因此它必须是多模态的，包含视频和文本等不同模态的资料。到目前为止，我们仅支持录入视频资料、文本资料或二者兼备的资料。此项目的远景目标是让每一个特定视频中的手语都可以被提取，并以更抽像及完备的形式描述，从而使得归档及相互理解变得更为容易。这需要我们进一步的研究和视觉技术的运用。

The three sign for "flower" collected through our website
通过我们的网站收集到的三种表示“花”的手语符号

The video shows the sign of "father" on the website
网站上用于演示「父亲」这个符号的视频

Area 4: Multimedia and Web Data Mining

This area covers the sciences and technologies that discover and extract meaningful patterns from text, audio and visual data to support information organization and retrieval. Our work has three main emphases, namely, multimedia processing, web engineering and machine learning. Illustrative projects include a plagiarism detector and a data mining engine for the job market.

VeriGuide

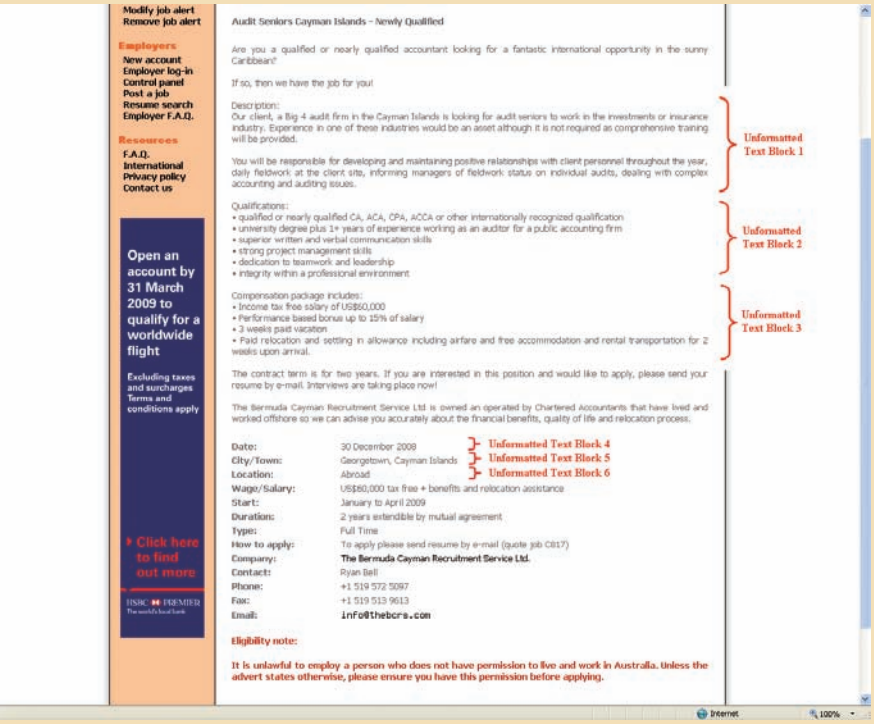
By Professor Irwin KING

VeriGuide is a web-based system using advanced matching algorithms to detect suspected plagiarized sentences in English, Traditional Chinese and Simplified Chinese. The system can perform readability assessment by computing the readability scores of submitted assignments to assist the detection of suspected plagiarized sentences and for reading assessment. In other words, the system can track the student's writing performance longitudinally. VeriGuide can also serve as an assignment collection system for students and educators who need course management support.

Mining Employment Market Information via Text Mining

By Professor Wai LAM

We have developed an information extraction framework for analyzing online job advertisements across different domains (or industries) from different regions worldwide. Our approach is able to extract precise information from the text content and support useful employment market analysis locally and globally. Unlike most existing works, which can only extract information from a single domain, one characteristic of our framework is that it can adapt to extract information across different domains. To achieve this, we formulate our extraction learning as a domain adaptation problem. Unformatted text blocks are detected automatically based on an unsupervised learning model. This allows generation of highly effective features for text fragment classification, which enables easy adaptation to a large number of online job advertisements in different and new domains. Effective performance has been obtained from extensive experiments covering the domains of accounting, logistics, healthcare, tourism, legal and marketing.



An example of the online job advertisement collected for experimentation

一个用于实验的线上广告的例子

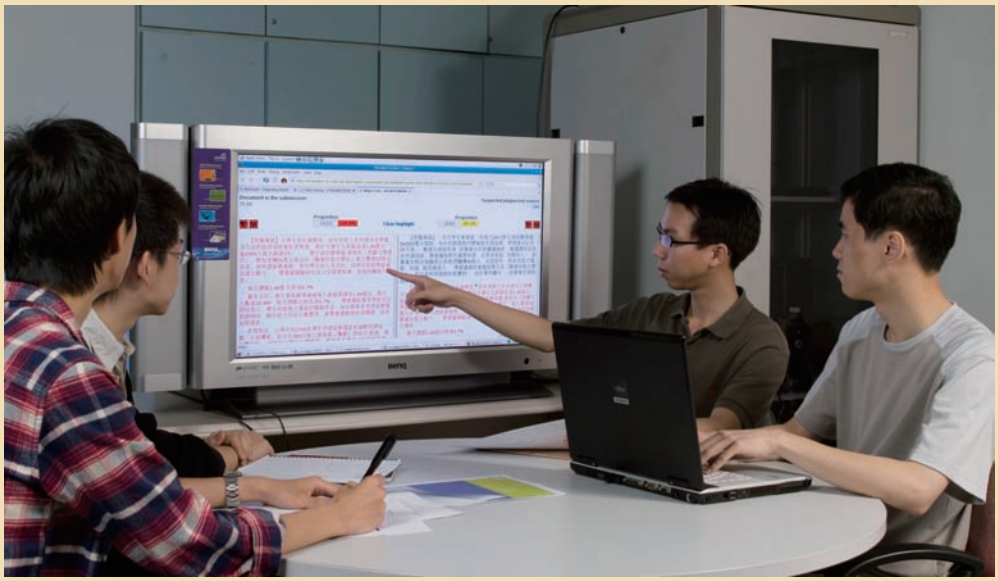
领域 4: 多媒体和网络数据挖掘

此领域包含了从文本、音频、视频数据中发掘和抽取出有意义的模式，从而支持信息的组织与检索的科技。我们的工作著重三个方面：多媒体处理、网络工程和机器学习。以下展示的是剽窃检测和就业市场的资料检索引擎。

维诚

金国庆教授

「维诚」是一个基于互联网的三语（英语、繁体中文和简体中文）检测系统，它通过一个先进的匹配算法，检测涉嫌抄袭的文章。系统可以通过计算可读性分数来评估作业的可读性，从而辅助检测涉嫌抄袭文章。换句话说，系统也可以纵向追查学生的写作表现。「维诚」同时也可以支援师生的课程管理，用作作业递交系统。



The website of VeriGuide
「维诚」的网站

Users are comparing the content side-by-side using our web-based VeriGuide system
用户正在使用我们的「维诚」线上系统比较文章内容

就业市场资料挖掘

林伟教授

我们开发了一个信息提取框架系统，用来分析网络上世界各地不同领域的招聘广告，从这些广告的文本内容提取有用的信息，供分析本地和全球就业市场之用。这系统与坊间的系统不同的地方是可以从多个领域同时获取信息。为了实现这个目标，我们把提取学习公式化为一个领域适应问题，用一个无监督学习模型自动检测出未格式化的文本块。它可以衍生出文本段聚类用的高度有效特徵，进而更容易适使不同领域及新领域的在线招聘广告。这个系统已通过了会计、物流、保健、旅游、法律和市场营销等领域的广泛试验，成效获得验证。

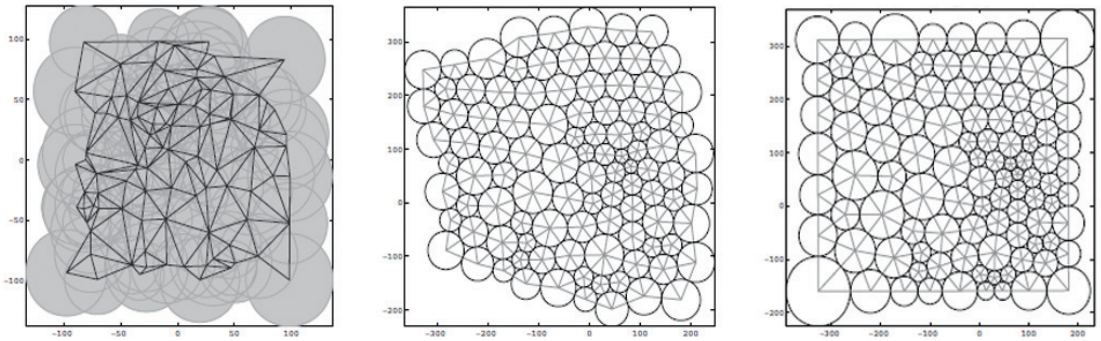
Area 5: Communication & Networks

This area covers the sciences and technologies for the manipulation and transmission of information through interconnected computers. Our work has been in the following directions: sensor networks, network coding and recently also on P2P content distribution. Sensor networks is a field that is maturing and finding new applications, which are usually deployed in a wireless setting. Network coding is a research field that was started by researchers in CUHK, and has lately become a very hot research area. P2P content distribution is evolving into a new paradigm for content distribution adopted by ISPs. The followings are some illustrative projects:

Sensor Networks

By Professor Yun Hui LIU

This line of work investigates the maximum coverage problem of sensor networks and automatic deployment of sensor nodes, the problem of target tracking in mobile sensor networks, formation control of mobile sensor nodes and also applications of mobile sensor networks in environmental monitoring and surveillance.



(a) Initial Deployment (b) Intermediate Circle Packing (c) Final Circle Packing

P2P Network Distribution

By Professor Dah Ming CHIU and Professor John C. S. LUI

In corporation with PPLive, we have performed measurement of a real-world P2P VoD system and described the architecture and design issues in such systems. The work was published in ACM Sigcomm 2008, a very prestigious conference in networking. We have also built theoretical models to help evaluate different algorithms for scheduling how peers move the content, and how to balance the load between peers. We are the first to create a sophisticated model for chunk selection algorithms in P2P streaming that leads to the analytical insights for such algorithms. We also used a simple stochastic model to show the trade-off between system performance and fairness, the latter is often necessary as an incentive for peers to contribute. Finally, in our study of load balancing algorithms, we have pointed out the parallel with multi-path congestion control and dealt with the unique issue of how to minimize server load in a distributed fashion.

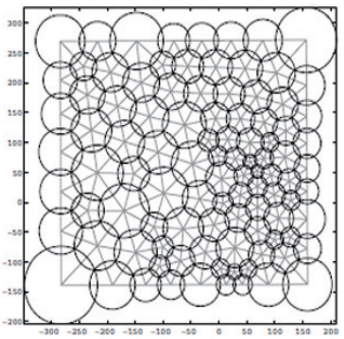
领域 5: 通讯与网络

此领域包含在联网计算机之间处理和传播信息的科技，重点工作是 : 传感器网络 , 网络编码及 P2P 内容的分发。传感器网络是一个日益成熟的研究领域，而且新的应用层出不穷，通常以无线方式部署。网络编码是由中大学者开创的崭新研究领域，最近正成为研究热门。P2P 内容分发正在发展成为网络运营商采用的新模式。以下是一些项目介绍 :

传感器网络

刘云辉教授

这部分工作主要研究传感器网络的最大覆盖问题，以及传感器节点的自动部署、移动传感器网络中的目标跟踪问题、移动传感器节点的编组控制以及移动传感器网络在环境监控领域的应用。



(d) Final Deployment by Overlap Packing

A rectangular coverage of 100 sensor nodes using "circle packing based heterogeneous sensor network deployment." The sensor nodes are initially places in random positions. However, the final deployment result is a unique, maximized and hole-free coverage of a given network topology.

一个使用「基于圆形件排样的异构感测器配置」技术的包含 100 个感测器节点的矩形覆盖。感测器节点最初被随机放置，然而，最终的配置结果在某个特定网路拓扑结构下唯一的、最大化的、没有盲点的覆盖。

P2P 网络分发

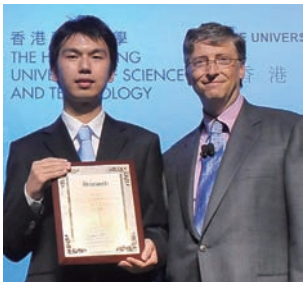
邱达民教授及吕自成教授

通过与 PPLive 合作，我们测控了现实的 P2P 网络点播系统，掌握了系统的结构和设计问题，这项工作已于著名网络会议 ACM Sigcomm 2008 发表。我们同时还设计了理论模型来帮助评价不同的调度节点内容接力的算法，以及如何去平衡用户间的负载。我们率先创造了用于 P2P 流媒体中内容块选择算法的精细模型，这个模型可以用于分析这些算法。我们还通过一个简单的随机模型来展示系统表现和公平性之间的取舍，公平性通常是一个刺激用户更多分享的激励手段。最后，在对负载平衡算法的研究中，我们指出了在多路径拥塞控制的并行性，以及处理了把服务器负载最小化的独特课题。

Awards

Microsoft Research Fellows

The Microsoft Fellowship Programme was established by Microsoft Research Asia (MSRA) to support talented PhD students from top universities in the Asia-Pacific region, who have the potential to become future research leaders. Six of our students have been continuously elected as prestigious Microsoft Research Fellows since 2003. They are Dr. Yao QIAN, Miss Pui-Yu HUI, Mr. Zhenzhong CHEN, Mr. Wei LIU, Mr. Shing Kai CHAN and Mr. Li XU. Each award includes a scholarship and an internship opportunity at MSRA in Beijing.



CUHK PhD student, Mr. Li XU, received the Microsoft Fellowship Award 2008 from Dr. Bill GATES, Chairman of Microsoft Corporation.

微软主席比尔盖茨博士向我校的徐立同学授予 2008 年微软学者奖学金。

Research Grants

Our Key Laboratory has been awarded ten research grants from the competitive Microsoft Research Asia Regional Funding Programme:

"Intelligent Language Games with Social Interactions: Models and Applications" (2008)

By Professor Irwin KING and Professor Jimmy LEE

"ASIA-SIGNOPEDIA: An Online Sign Language Knowledge Base Composed Collaboratively by Internet Users" (2006)

By Professor Ronald Chi Kit CHUNG and Professor Gladys Wai Lan TANG

"Trustworthy Computing for the Avalanche File Distribution Project" (2005)

By Professor Dah Ming CHIU and Professor John C. S. LUI

"Text Synthesis and Image Completion on Programmable Graphics Hardware (GPU)" (2005)

By Professor Jiaya JIA, Professor Pheng Ann HENG and Professor Tien Tsin WONG

Paper Awards

Best Paper Award in the IEEE Conference on Computer Vision and Pattern Recognition, 2009
"Single Image Haze Removal Using Dark Channel Prior"

By Professor Xiaoou TANG, Mr. Kaiming HE and Dr. Sun JIAN

Best Student Paper Award in 2006 IEEE International Conference on Robotics and Biomimetics, 2006
"Active Sensor Network Deployment and Coverage Enhancement using Circle Packings"

By Miss Miu Ling LAM and Professor Yun Hui LIU

Best Student Paper Award in the 10th Pacific Asia Conference on Knowledge Discovery and Data Mining, 2006
"Extracting and Summarizing Hot Item Features across Different Auction Web Sites"

By Dr. Tak Lam WONG, Professor Wai LAM, and Mr. Shing Kit CHAN

Merit Award in the 6th ACM Hong Kong Postgraduate Research Day, 2005
"Training Conditional Random Fields with Unlabeled Data and Limited Number of Labeled Examples"

By Dr. Tak Lam WONG and Professor Wai LAM

荣誉及奖项

微软学者奖学金

由微软亚洲研究院所创立的微软学者奖学金计划旨在支持来自亚太地区顶尖高校有潜力在未来成为研究领导者的博士生人才。自 2003 年起，我们每一年都有学生获评选为微软学者奖学金得主。六位得奖者是钱瑶博士、许佩瑜、陈震中、刘威、陈圣佳及徐立。他们除获授奖学金，还可到微软亚洲研究院实习，这是取得最前沿科技研究宝贵经验的机会。

CUHK PhD student, Mr. Zhenzhong CHEN, received the Microsoft Research Fellows Award 2005 from Professor Rick RASHID, Senior Vice President (Research), Microsoft Corporation and Professor Harry SHUM, Corporate Vice President, Microsoft.

微软公司高级副总裁里克雷斯特教授及微软公司副总裁沈向洋教授向本校博士生陈震中授予 2005 年微软学者奖学金。

研究资助

重点实验室从微软亚洲研究院的地区性资助计划中获得了十项研究资助，其中包括：

「Intelligent Language Games with Social Interactions: Models and Applications」 (2008)
金国庆教授及李浩文教授

「亚洲手语百科全书 — 由互联网用户协制的亚洲手语知识库」 (2006)
锺志杰教授及邓慧兰教授

「Trustworthy Computing for the Avalanche File Distribution Project」 (2005)
邱达民教授及吕自成教授

「基于可编程图形硬件的纹理合成和图像完成」 (2005)
贾佳亚教授、王平安教授及黄田津教授

论文奖

IEEE Conference on Computer Vision and Pattern Recognition 2009 最佳论文奖
「Single Image Haze Removal Using Dark Channel Prior」
汤晓鸥教授、何恺明先生及孙剑博士

IEEE International Conference on Robotics and Biomimetics 2006 最佳学生论文奖
「Active Sensor Network Deployment and Coverage Enhancement using Circle Packings」
林妙玲小姐及刘云辉教授

第十届 Pacific Asia Conference on Knowledge Discovery and Data Mining 2006 最佳学生论文奖
「Extracting and Summarizing Hot Item Features across Different Auction Web Sites」
黄德霖博士、林伟教授及陈盛杰先生

第六届 ACM Hong Kong Postgraduate Research Day 2005 最佳学生论文优异奖
「Training Conditional Random Fields with Unlabeled Data and Limited Number of Labeled Examples」
黄德霖博士及林伟教授

Joint Research Platform

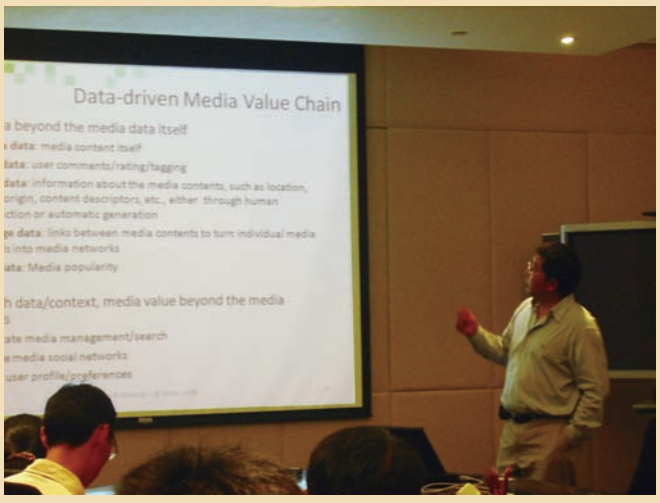
Microsoft Research Asia Internship

Since 2005, Microsoft Research Asia has offered internships to CUHK postgraduate students each year. Thus far, our students have completed 16 internships in Beijing across the various thematic research areas. Some of our students' works have also been incorporated into Microsoft products.

Visits by Microsoft Researchers

World-renowned researchers from MSRA continue to visit CUHK and share their experiences with our faculty and students. They include:

- **Professor Harry SHUM**
  Corporate Vice President of Microsoft
- **Professor Frank K. SOONG**
  Principal Researcher and Research Manager of Speech Group, MSRA
- **Dr. Shipeng LI**
  Principal Researcher and Research Manager of Internet Media Group, MSRA
- **Dr. Sing Bing KANG**
  Researcher of Interactive Visual Media Group, Microsoft Research Redmond
- **Dr. Manish JAIN**
  Post-doctoral Researcher of Microsoft Research



Dr. Shipeng LI, Principal Researcher and Research Manager of Internet Media Group of MSRA, in the lecture.
微软网络多媒体组首席研究主任及研究经理李世鹏博士在讲课。

微软亚洲研究院实习机会

从 2005 年开始，微软亚洲研究院便为中文大学的研究生提供实习机会。我们的学生迄今已经在各种专题研究领域完成了 16 项实习任务。个别研究成果已被整合进微软的产品之中。

微软专家到访

来自微软亚洲研究院的世界知名专家们不间断地到访中文大学，与我们的教授及学生分享宝贵经验。曾到访的专家包括：

- 沈向洋教授
  微软公司副总裁
- 宋謌平教授
  微软亚洲研究院语音组首席研究主任及研究经理
- 李世鹏博士
  微软网络多媒体组首席研究主任及研究经理
- Sing Bing KANG 博士
  微软美国 Redmond 研究院互动视像媒体组研究员
- Manish JAIN 博士
  微软研究院博士后研究员

Mr. David MONG, Chairman of the Advisory Board, Shun Hing Institute of Advanced Engineering of CUHK, presented a souvenir to Professor Harry SHUM, Corporate Vice President, Microsoft.

信兴高等工程研究所顾问委员会主席蒙德扬先生致送纪念品予微软公司副总裁沈向洋教授，以感谢其出色的演讲。

Mutual Visits

CUHK Vice-Chancellor, Professor Lawrence J. LAU, led a university delegation to visit Microsoft's Headquarters in Redmond in 2005 and met with Dr. Bill GATES, Chairman of Microsoft Corporation. Microsoft's technical team gave very impressive presentations and demonstrations of their state-of-the-art technologies in areas including speech, graphics and machine learning.

Professor Lawrence J. LAU, Vice-Chancellor of CUHK, presented a token of appreciation to Dr. Bill GATES, Chairman of Microsoft Corporation.

香港中文大学校长刘遵义教授致送纪念品予微软主席比尔盖茨博士。

In 2005 and 2008, a Microsoft delegation visited the Faculty of Engineering at CUHK. Our Key Laboratory showcased research covering the areas of wireless and networking, robotics, multimodal human-computer interface, text mining, digital entertainment and multimedia processing.

Group picture of the CUHK delegation and Microsoft representatives: (from left to right) Professor Frank K. SOONG, Professor Helen MENG, Professor Jack CHENG, Professor P. C. CHING, Professor Andrew YAO, Professor Lawrence J. LAU, Professor Harry SHUM, Professor John C. S. LUI and Ms. Lolan SONG.

香港中文大学代表团及微软代表合照：(从左至右) 宋謌平教授，蒙美玲教授、郑振耀教授、姚期智教授、刘遵义教授、沈向洋教授、吕自成教授及宋罗兰女士。

互访

香港中文大学校长刘遵义教授于 2005 年率领大学代表团拜访了微软位于美国 Redmond 的总部，会见了彼时的微软主席比尔盖茨博士。微软公司的技术团队向他们展示了令人印象深刻的多方位先进技术，包括语音、图形学及机器学习等。

微软代表团也在 2005 和 2008 年到访中文大学工程学院。重点实验室为他们展示了一系列科研成果，包括无线网络和计算机网络技术、机器人、多模态人机交互界面、文本挖掘、数字化娱乐以及多媒体处理等等。

Professor Peter YUM, Dean of Engineering, CUHK, delivered a welcoming speech for the Microsoft delegation during their visit in 2005. Members of the audience include Professor Rick RASHID, Senior Vice President (Research), Microsoft Corporation; Professor Harry SHUM, Corporate Vice President, Microsoft; Dr. Daniel T. LING, retired Corporate Vice President (Research), Microsoft; Professor Hsiao-Wuen HON, Managing Director, MSRA; Professor Ronald L. RIVEST, Andrew and Erna Viterbi Professor of Electrical Engineering and Computer Science, MIT; Professor Jeannette M. WING, President's Professor of Computer Science, CMU's Department of Computer Science; and Professor Victor ZUE, Director of the Computer Science and Artificial Intelligence Laboratory, MIT.

工程学院院长任德盛教授于 2005 年微软专家到访期间向微软代表团致欢迎辞。微软代表团成员包括微软公司高级副总裁里克雷斯特教授、微软公司副总裁沈向洋教授、前微软公司副总裁 Daniel T. LING 博士、微软亚洲研究院院长洪小文教授、美国麻省理工学院计算器科学系 Andrew 与 Erna Viterbi 具名教授 Ronald L. RIVEST 教授、卡内基梅隆大学计算机科学系系主任 Jeannette M. WING 教授及美国麻省理工学院计算机科学及人工智能实验室主任舒维都教授。

Our professors and students introduced research projects to visiting members of the Microsoft delegation in 2008. Professor Hsiao-Wuen HON, Managing Director of MSRA; Dr. Eric CHANG, Director of Technology Strategy of MSRA; Dr. Zheng ZHANG, Research Area Manager, MSRA; visited the technology demonstrations from Professor Helen MENG's research team.

我们的教授及学生于 2008 年微软专家到访期间向微软代表团介绍我们的科研技术。微软亚洲研究院院长洪小文教授、微软亚洲工程院工程总监张益肇教授及微软亚洲研究院副院长张峥博士在参观本校工程学院副院长（科研）蒙美玲教授科研团队之研究成果。

Cross-Institutional Academic Exchange

Distinguished Lectures

World-renowned scholars continue to be invited by our Key Laboratory to give Distinguished Lectures. They include:

Professor Shankar SASTRY, Dean of the College of Engineering, University of California at Berkeley, was an invited speaker among the Key Laboratory's Distinguished Lectures.

加州大学伯克利分校工程学院院长 Shankar SASTRY 教授在讲课。

Professor Shankar SASTRY
Dean, College of Engineering, University of California at Berkeley, USA

Professor Fred JUANG
Motorola Foundation Chair Professor, Georgia Research Alliance Eminent Scholar
Georgia Institute of Technology, USA

Professor Lawrence RABINER
Professor, Department of Electrical and Computer Engineering
Rutgers University, USA

Professor Roger MOORE
Chair of Spoken Language Processing
University of Sheffield, UK

Professor Alfred HERO
Department of Electrical Engineering and Computer Science
University of Michigan, Ann Arbor, USA

Mr. David MONG, Chairman of the Advisory Board, Shun Hing Institute of Advanced Engineering of CUHK, presented a souvenir to Professor Lawrence RABINER, Professor, Department of Electrical and Computer Engineering, Rutgers University.

信兴高等工程研究所顾问委员会主席蒙德扬先生致送纪念品予美国罗格斯大学电子与电脑工程系教授 Lawrence RABINER 教授以感谢其出色的演讲。

Professor Helen MENG and Professor Frank K. SOONG, Co-Directors of our Key Laboratory, presented a souvenir to Professor Fred JUANG, Motorola Foundation Chair Professor and Georgia Research Alliance Eminent Scholar, School of Electrical and Computer Engineering, Georgia Institute of Technology, after his Distinguished Lecture.

本重点实验室的联席主任蒙美玲教授及宋謌平教授致送纪念品予乔治亚理工学院电机及计算机工程学院摩托罗拉基金会讲座教授及 Georgia Research Alliance Eminent Scholar 庄炳煌教授。

跨机构学术交流

杰出学者讲座

重点实验室邀请了多位世界知名的学者到访，并举办杰出学者讲座，主讲的学人包括：

Shankar SASTRY 教授

美国加州大学柏克莱分校工程学院院长

庄炳煌教授

乔治亚理工学院电机及计算机工程学院摩托罗拉基金会讲座教授及 Georgia Research Alliance Eminent Scholar

Lawrence RABINER 教授

美国罗格斯大学电子与电脑工程系教授

Roger MOORE 教授

英国谢菲尔德大学 Spoken Language Processing 主席

Alfred HERO 教授

美国安娜堡密歇根大学电子工程及计算科学学系

Professor Alfred HERO, R. Jamison and Betty Williams Professor of Engineering, University of Michigan, in the lecture.

美国安娜堡密歇根大学电子工程及计算科学学系，R. Jamison 与 Betty Williams 具名教授 Alfred HERO 教授在讲课。

Professor P. C. CHING, Pro-Vice-Chancellor of CUHK, presented a souvenir to Professor Roger MOORE, Chair of Spoken Language Processing, University of Sheffield.

香港中文大学副校长程伯中教授致送纪念品予英国谢菲尔德大学 Spoken Language Processing 主席 Roger MOORE 教授。

Beijing-Hong Kong International Doctoral Forum

Our Key Laboratory has been sponsoring the Beijing-Hong Kong International Doctoral Forum annually since 2006. The forum is a new type of activity conceived jointly by CUHK and Tsinghua University. The objective is to assemble top PhD students from across China, Hong Kong and other countries to facilitate exchange of ideas and experiences, as well as cultivate critical thinking and opportunities for potential collaborations. The students can also compete for various research awards, such as the Best Paper Award, Best Poster Award and Best Presentation Award. The forum is hosted by CUHK and Tsinghua University in alternating years. The activity has received support from the Ministry of Education of China.

Participants of the Second Beijing-Hong Kong International Doctoral Forum. Officiators include Professor Andrew YAO, Distinguished Professor-at-Large of CUHK; Professor P. C. CHING, Pro-Vice-Chancellor of CUHK; Professor Shiqiang YANG, President of Multimedia Committee of China Computer Federation; Professor Helen MENG, Associate Dean (Research), CUHK's Faculty of Engineering; Dr. Gerardo RUBINO, Senior Research at INRIA Rennes/IRISA.

第二届京港国际博士生论坛的参加者。与会嘉宾包括香港中文大学博文讲座教授姚期智教授、香港中文大学副校长程伯中教授、中国电脑学会多媒体委员会主席杨士强教授、香港中文大学工程学院副院长(科研)蒙美玲教授及法国 INRIA Rennes/IRISA 高级研究员 Gerardo RUBINO 博士。

The First Microsoft Joint Laboratory Symposium

Our Key Laboratory hosted the First Microsoft Joint Laboratory Symposium in December 2006. Representatives from the eight universities with Microsoft Joint Laboratories, i.e. Peking University, Tsinghua University, Shanghai Jiaotong University, University of Science & Technology of China, Zhejiang University, Harbin Institute of Technology, the Hong Kong University of Science and Technology and the Chinese University of Hong Kong, gathered at CUHK to report significant achievements and discuss future developments.

Participants of the First Microsoft Joint Laboratory Symposium. Officiators included Mr. Huanzhong XIE, Director General of MoE; Professor Kenneth YOUNG, Pro-Vice-Chancellor of CUHK; Professor P. C. CNING, Pro-Vice-Chancellor of CUHK; Professor Harry SHUM, Corporate Vice President, Microsoft; Professor Hsiao-Wuen HON, Managing Director of MSRA; Professor Fred JUANG, Motorola Foundation Chair Professor and Georgia Research Alliance Eminent Scholar, School of Electrical and Computer Engineering, Georgia Institute of Technology and the directors of the eight Microsoft joint laboratories.

第一届微软亚洲研究院联合实验室研讨会参加者。与会嘉宾包括国家教育部谢焕忠司长、香港中文大学副校长杨岗凯教授、香港中文大学副校长程伯中教授、微软公司副总裁沈向洋教授、微软亚洲研究院院长洪小文教授、乔治亚理工学院电机及计算机工程学院摩托罗拉基金会讲座教授庄炳煌教授及来自八所微软联合实验室的实验室主管。

Internship Programme with the Indian Institute of Technology

Our Key Laboratory introduced an internship programme with the Indian Institute of Technology (IIT) in 2007. Students from IIT were selected to work in CUHK for a summer in the areas of robotics, speech processing and networking. Some of them continued their research after they returned to India.

京港国际博士生论坛

重点实验室自 2006 年开始资助京港国际博士生论坛。这个论坛是在中文大学和清华大学的联合构想下诞生的全新活动形式，旨在推进中国大陆、香港以及其它国家 / 地区顶尖博士生之间的研究构想、研究经验的交流，为启发性思维和可能的合作创造机会，设立多个奖项供学生角逐，包括最佳论文奖、最佳海报奖、最佳演讲奖。论坛由中文大学和清华大学轮流主办，同时也获得中国国家教育部的大力支持。

第一届微软联合实验室研讨会

重点实验室于 2006 年 11 月主办了第一届微软联合实验室研讨会。来自八所微软联合实验室的主管汇聚在中大发表重要的研究成果，也探讨了未来的发展构想。这八所大学是：清华大学、北京大学、上海交通大学、中国科技大学、浙江大学、哈尔滨工业大学、香港科技大学以及香港中文大学。

与印度工程学院的合作实习计划

重点实验室于 2007 年推出与印度工程学院 (IIT) 合作的实习计划。经过选拔的 IIT 学生可在中文大学暑期实习会，他们的研究主题集中在机器人、语音处理以及计算机网络技术上。部分学生返回印度之后仍然继续从事该方面的研究。

Professors from CUHK and students from the IIT
香港中文大学的教授及印度工程学院学生的合照

An IIT student presenting his internship project work in CUHK
一位印度工程学院的学生在报告他在香港中文大学的工作

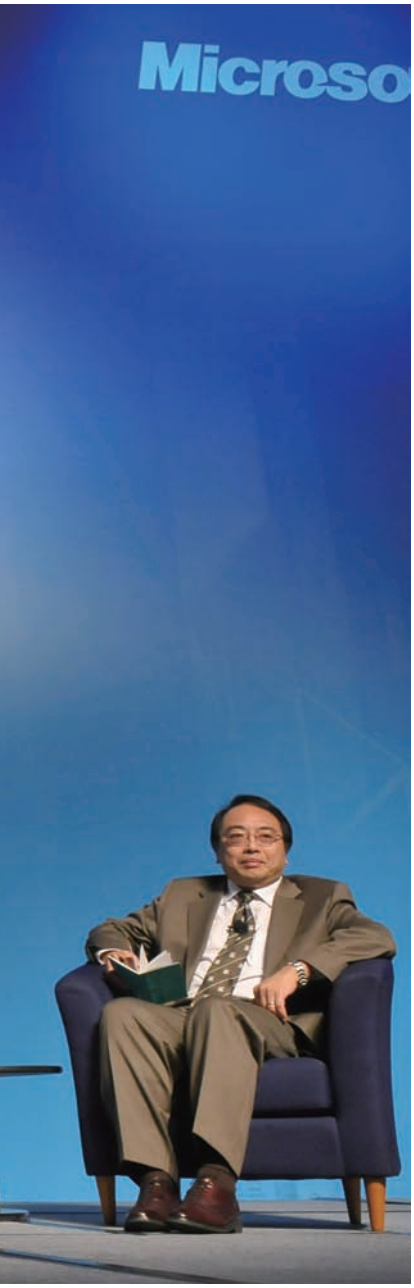
Microsoft Research Asia 10th Anniversary Innovation Forum

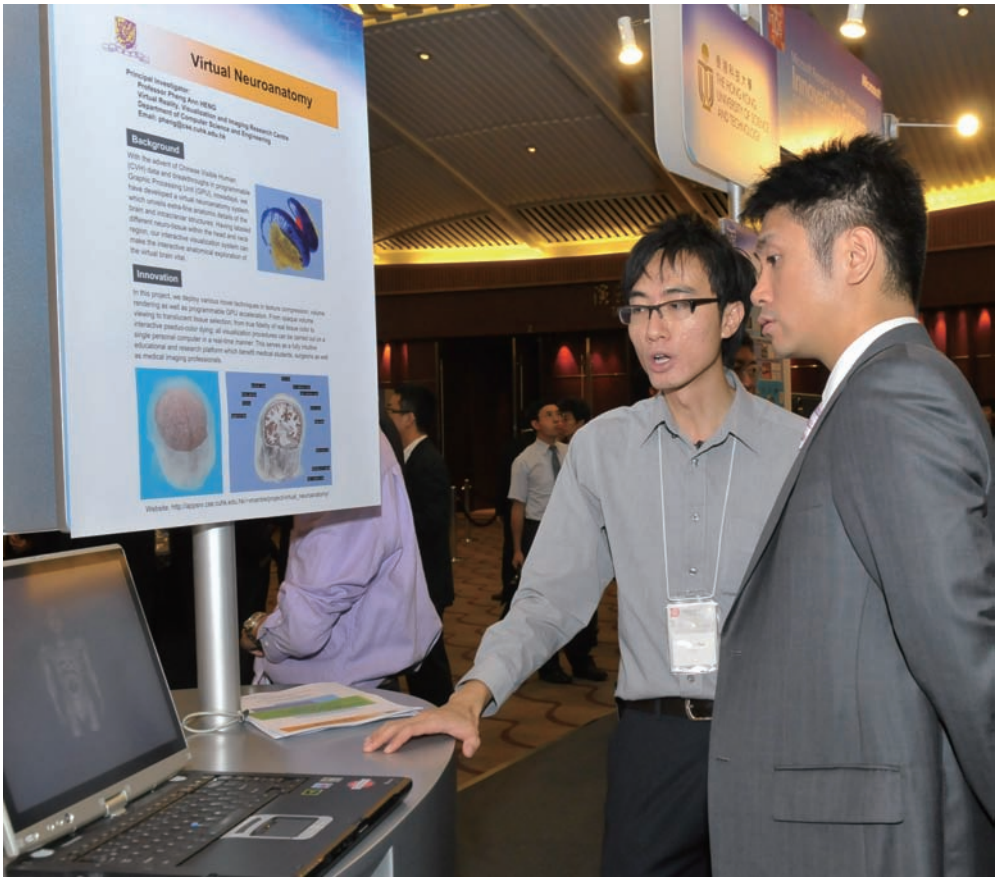
The MSRA 10th Anniversary Innovation Forum held at the Hong Kong Convention and Exhibition Centre in August 2008 featured CUHK Vice-Chancellor, Professor Lawrence J. LAU and Dr. Bill GATES as invited panelists for the discussion entitled "Technology and Society – Dialogue with Visionaries". More than 1,500 guests, academics and students were in attendance. Our Key Laboratory hosted a mini technology exhibition demonstrating our latest technologies. CUHK's PhD student, Mr. Li XU, also received the Microsoft Research Asia Fellowship Award from Dr. Bill GATES.

Panel discussion among Professor Lawrence J. LAU (Vice-Chancellor of CUHK), Dr. Bill GATES, Professor Paul CHU and Professor Lap Chee TSUI (from left to right)
香港中文大学刘遵义校长、比尔盖茨博士、朱经武教授及徐立之教授（左至右）一同参与圆桌讨论

微软亚洲研究院 10 周年庆典创新论坛

2008 年 8 月，微软亚洲研究院 10 周年庆典创新论坛，在香港会展中心举办，中文大学校长刘遵义教授获邀与比尔盖茨博士一同参与标题为「科技与社会 — 远见者的对话」 的圆桌讨论，出席嘉宾、学者和学生逾 1,500 人。重点实验室在论坛下午的科技展览中演示了最新的科技成果，我校的徐立同学同时也获得由比尔盖茨博士亲自颁发的微软学者奖者金。





Researchers of our Key Laboratory demonstrated our research prototype systems at the mini-exhibition of the MSRA 10th Anniversary Innovation Forum.

本重点实验室的研究员于微软亚洲研究院 10 周年庆典创新论坛的科技展览中演示了我们的科研系统。

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