Forum on Telemedicine

Experts in the telemedicine and telecom fields converged in the Emerging Technologies Forum organized by the KTO to share views on the latest advances and applications of telemedicine in Hong Kong. On the panel were Mr Raymond Choi, President of Celki Medical Company, Dr K F Tsang of the Electronic Engineering Department, and Dr Kris Srikrishnan of IBM Research. Among the 130 attendants were experts and industrialists in telemedicine and ICT, as well as decision makers and practitioners of the medical field. Threading through the presentations were issues concerning the appeal, applications, and promotion of telemedicine in Hong Kong and globally.

Heralding the advent of telemedicine is the widespread use of information and communication technology (ICT). Wireless communication technologies that traverse the barrier of time and space have revolutionized the manner medical services are delivered. Remote villages and crowded cities alike, communities the world over are beginning to benefit from the advantages of telemedicine, including timely diagnosis, easier access to specialists, fewer and shorter hospital admissions, and continuous monitoring of chronic illnesses.
Regional differences in telemedicine application
According to Dr Srikrishnan, the applications of telemedicine and promotion for its use varied greatly in Europe and the US. In the European model, the government took a lead in applying telemedicine in public hospitals and medical teaching colleges. In tele-monitoring, which is part of telemedicine, clinicians or nurses would check the data transmitted to the nursing station and alert for irregularities before passing it on to physicians for further action. To make tele-monitoring compatible with hospital workflow, physicians would participate in the R&D of telemedicine devices alongside IT and engineering professionals. In the US, tele-monitoring services were provided by small companies contracted by hospitals. There is a growing expectation that use of tele-monitoring for critical care patients and elderly at home setting will lead to better care. Telemedicine provides the lifeline for remote locations, such as the island of Tristan da Cunha, which was linked up with clinicians in the University of Pittsburg Medical Center via satellite. The project was conducted by IBM.

The appeal of telemedicine
All speakers pointed out that a fast ageing population necessitated effective means to monitor diseases, especially chronic ones whose therapies were often delivered at the patient's home. Telemedicine was shown to be beneficial to the reduction of hospitalization frequency and length of stay, because changes in health condition could be detected early, and the physician-in-charge could be alerted. A good example was the monitoring of sleep apnea patients by TeleTREK, a system developed by Mr Choi’s company CELKI. The system registered the frequency of apnea events, identified problems of machine use, and was capable of indicating patients' adherence to physicians' prescribed treatment. Dr Tsang’s ZigBee Hybrid Platform was also a good example of how wireless communication could bring about wireless tele-monitoring. By tapping into WiMAX, the system could accommodate both wired and wireless applications.

Promotion of telemedicine
On the promotion of telemedicine, the speakers agreed that the establishment of industrial standards was critical to global acceptance and use of telemedicine. In Dr Srikrishnan’s terms, vertical standards across the telehealth industry "would ensure interoperability between customers and suppliers”. It will also avoid monopolistic operations or entry barriers and promote competition.

Sharper 3D Vision: for Knowledge Exchange and Home Entertainment
A shared interest in autostereoscopic (3D) display technology has brought about meaningful exchanges between the University and a public hospital in Hong Kong. Such exchanges serve as a good example of knowledge transfer that not only benefits the participating parties but the community too.

Dr Peter Tsang of the Electronic Engineering Department is an expert in advanced 3D display technology that precludes the use of coloured spectacles or 3D glasses. It was last year when, through an intermediary, he first came into contact with the hospital, which had been developing a 3D surgical training system on its own. The interchange of ideas between Dr Tsang and the hospital eventually led to the licensing of Dr Tsang’s technology.

The uniqueness of Dr Tsang’s invention lies in its capacity to integrate seamlessly the production, storage, broadcast, and retrieval of 3D images with the existing infrastructure. Currently, 3D autostereoscopic images or video clips are usually generated with computer graphics, or through lengthy rendering
of pre-recorded, multi-view signals. With Dr Tsang’s 3DTV enabling technology, the autostereoscopic contents can be captured in real time, and distributed via existing video chains.

Dr Tsang has always aspired to making 3D display an affordable home entertainment experience. This dream was partially fulfilled when his first patent was granted in 2003. He patented an adapter which allowed an ordinary television to display 3D video.

Dr Tsang’s endeavour is matched by a global effort to take 3D a step closer to domestic application: elsewhere, researchers are developing autostereoscopic monitors that allow 3D content to be displayed and viewed on an LCD screen without using polarized glasses. The technology enables multiple views of a 3D scene to be recorded and subsequently reconstructed on an autostereoscopic monitor.

To advocate 3D home entertainment is by no means facile, and why did Dr Tsang take on this task? The self-composed scientist attributed his passion for 3D to the House of Wax, a 3D horror film first screened in the 1950s. “There was a scene in the film showing someone throwing a paddle ball that appeared to fly out of the screen. I was intrigued, and later started experimenting on producing 3D illusions by using semitransparent, coloured candy wrappers. I was also fortunate enough to be able to view some fantastic 3D films in Hong Kong and in other parts of the world.”

Dr Tsang believes that 3D technology has a very promising future, as evidenced by the resounding success of the recently released 3D film Avatar. The next major advancement in 3D technology should evolve around digital holographic (DH) technology. Holograms are 3D images that have been projected on and captured from a 2D surface, and a good example of holograms are the greenish images printed on ID cards and credit cards for preventing forgery. With the help of holograms, the DH technology is capable of preserving the optical waves scattered by a 3D object. The recorded optical waves are replayed so that a viewer will be able to see the 3D image of the original object.

To help popularize the technology, scientists the world over are working on faster computing methods for generating holograms. For instance, Dr Tsang has recently developed an algorithm for generating digital holograms economically at over 100 mega pixels per second. So let’s keep our eyes open for 3D home entertainment, which could just be round the corner.

Mangrove Pollution Treatment Project Awarded Major Grant

The Futian Mangrove Research and Development Centre, was awarded an RMB 2.49 million yuan grant by the State Oceanic Administration for a project on rehabilitating estuarine wetland with the help of mangrove plantation. The project is part of a cross-institutional research led by the School of Life Sciences of the Xiamen University, and is Shenzhen’s first ever marine environmental research project to be funded by the State.

Shenzhen Bay, also known as Deep Bay or Hou Hoi Wan, is located at the estuary of the Pearl River, and was once lined by marshes and fish farms. Over the
past 30 years, industrial development, reclamation, and population growth in Shenzhen have burdened Shenzhen Bay with pollutants and toxic chemicals. The consequence is the depletion of bio-diversity and vegetation, as well as landscape degradation.

There are various ways to tackle marine pollution, and surprisingly mangrove plantation is among one of them. Microorganisms that can decompose toxins and pollutants can be found on the roots and soil of mangrove plants, and that explains why mangrove plantation plays a pivotal role in maintaining the delicate balance of the wetland ecology.

The research team proposes to implement a mangrove bioremediation project to combat marine pollution in Shenzhen Bay. Bioremediation is the restoration of destroyed natural environment by using microorganisms, fungi, green plants or enzymes. While bioremediation is widely adopted to clean up crude oil, rehabilitate land, and purify waste water, its use in tandem with mangrove plantation is not at all popular, and much less in mainland China.

The principal investigator of the project is Dr Zan Qijie, Invited Researcher of the Futian Mangrove Research and Development Centre. A specialist in wetland restoration, Dr Zan said, “Our objective is to create a healthy and sustainable wetland ecology on the shores of Shenzhen Bay.”

The research project will last for three years. First, the research team has to reconstruct the ecological profile of Shenzhen Bay area before the onset of widespread pollution. This will help the team set goals and establish benchmarks for evaluation. The next step is the designing of remediation procedures and technologies. This includes the selection of salt-tolerant mangroves and the location for building the 30-hectare mangrove plantation as a pilot site.

The Director of the Futian Mangrove Research and Development Centre, Prof Nora Tam, is also a core member of the research team. She regards the grant as a recognition of the Centre’s commitment to wetland research. “I hope that more people will come to appreciate the value of wetland conservation as a result of the research project, especially the pilot mangrove site,” she said.

The Advanced Coatings Applied Research Laboratory (ACARL) of the Manufacturing Engineering and Engineering Management (MEEM) Department received a donation from a local manufacturer in recognition of ACARL’s efforts on surface engineering. Dr Lawrence Li, Director of ACARL, said, “My team and I are much heartened by the donation, which represents industry’s appreciation towards our efforts spent on advanced coating and machining. We will continue to contribute to industry through quality research and supporting services.”

ACARL was set up in 2000 to spearhead the application of thin films and coating technologies in Hong Kong.
P rof Steve Ching, University Librarian of CityU, shared his views on the development and adaptation of radio-frequency identification (RFID) technologies to libraries at the CUBIC wine tasting gathering held on July 9.

In his presentation, Prof Ching gave an interesting account of how the CityU library had been championing the use of Ultra High Frequency (UHF) RFID in library self-service systems over the past few years. The library’s efforts consummated in the invention of a patented EasyCheck machine which allows users to return and check out books by themselves. EasyCheck has attracted much attention from numerous mainland and international libraries.

Widely used in logistics and traffic control, RFID technologies are also making their way into library self-service systems. UHF RFID is hailed for its high speed and data load, and a UHF reader can recognize objects within a distance of up to 10 m. Despite its efficiency, the application of UHF RFID in libraries is still in its incipient stage. Most self-check machines are supported by HF RFID and barcode technologies, and therefore switching to UHF RFID must be well justified.

At CityU, the opportunity to apply UHF RFID coincided with the library’s need to create a learning commons to bring together facilities to support learning. What used to be the circulation counter is now a multi-purpose lobby for exhibitions. Space is also assigned for video viewing and seminars.

The use of UHF RFID machines in the Semi-Closed Collection of the Library as a pilot test yielded satisfactory results in transaction volume, deployment of workforce, and user evaluation. The technology also improves the efficiency of re-shelving and inventory management. Yet, to realize the full potential of the RFID library machines, the library must make provisions for user education and personnel redeployment.

According to Prof Ching, UHF RFID was only the service transformation enabler, while users and staff members were the critical factors that must be handled tactfully during the re-engineering process. User education was essential during the transition from “being-served” to “DIY”. Released manpower must be retrained and redeployed to upgrade and expand library services. For example, the once front-line staff of the Semi-Closed Collection had been retrained and were since then responsible for liaising with faculties at the back end to improve the collection.

In terms of interlibrary cooperation, Prof Ching put great emphasis on the need to standardize the data model, that is, the way data are programmed onto the RFID tags. A shared data model ensures interoperability between different RFID systems and tags, and therefore is crucial to interlibrary resource sharing. A User Group comprising libraries from the mainland China and Hong Kong has been formed with an aim to devise a standard data model for the Greater China area.

The wine tasting gathering was attended by about 70 guests, many of whom were executives from the IT and telecom field.
Visit by Healthcare Device Industries Association

About 20 members of the Hong Kong Medical and Healthcare Device Industries Association (HKMHDIA) visited CityU on 6 August to explore opportunities for research collaboration and tech transfer. During visits to the Product Safety and Hazard Analysis Laboratory and the Networking Laboratory, the delegates met with CityU researchers and were introduced to the University’s air purification, HIV monitoring, and telemedicine technologies. The half-day event ended with a discussion and partnership matching session, and several companies have shown interest in CityU’s technologies. The visit was co-organized by the HKMHDIA and the KTO.

Licensing Deals

From May to August 2010, CityU Research Limited (CityUR) signed three licensing agreements with local and national enterprises, and one marketing agreement with a global patent agency.

CityU patents marketed internationally
According to an agreement signed with an IP marketing agency, CityU’s patents would be advertised on the agency’s trading platform. The arrangement is expected to increase the exposure of the University’s intellectual properties, making them known to potential licensees in overseas markets.

3D technology to empower designs of electronic products
Dr Peter Tsang’s 3D display technology is licensed to two local companies specializing in electronic products. Dr Tsang’s technology stores, distributes, and displays multiple views of the same object in the way 2D video signals are handled. This makes 3D display more affordable and accessible.

Mobile communication technology to enhance video surveillance
The WeZOOM technology developed by Prof Jia Weijia of the Computer Science Department is licensed to a mainland electronic information enterprise. WeZOOM is a software tool that connects 3G mobile network, WiFi, and the internet. With WeZOOM, video surveillance can be implemented via 3G phones, PDAs, and laptops.

Granted Patent

Apparatus and method for focused electric field enhanced plasma-based ion implantation by Prof Paul Chu (AP)
US patent no.: 7741621

Plasma-based ion implantation is useful for modifying the surface properties of materials and therefore enjoys wide industrial application. Typically, the objects to be treated are immersed in plasma from which ions are extracted and implanted in the surface of the objects. Conventional plasma-based ion implantation techniques fail to provide a single plasma source that contains ions of all possible elements, thus making it difficult to implant materials with a low melting point and high vapour pressure, such as sulphur, boron, phosphorus, silicon and geranium. The method developed by Prof Chu seeks to solve the problem stated above by generating an electron focused electric field to enhance the ionization of the plasma. The implantation material is generated by evaporating a source material in an evaporation chamber to create a vapour which is then led by a conduit to the implantation chamber.
CityU Business and Industrial Club
城大工商協進會

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