Coming soon to an install near you...

Singapore's UTown has been designed to transform education in the Lion State but will its A/V installation change how zoning is achieved elsewhere? **Richard Lawn** investigates

SINGAPORE HAS LONG BEEN regarded as a welcome stopover for relaxing, shopping and sightseeing by world-weary travellers on long-haul flights. But in accordance with the government's iN2015, the Lion State is now looking to attract international students for much longer stays during which they can pursue academic courses in their growing universities.

Singapore's 10-year master plan to grow the infocomm sector and use infocomm technologies to enhance the competitiveness of key economic sectors is now beginning to bear fruits. Whilst the pro-high technology policy has attracted billions of dollars of foreign investment in the fields of bio-technology, IT and research, the government also continues to allot some 20 per cent of its annual budget towards developing educational institutes in the state.

As a result, Singapore has also established itself as a favourite destination for foreign students from Asian countries such as India, enrolling in the various technical, medical and business schools. The Ministry of Education (MoE) is responsible for monitoring, controlling and administering the education system, including the two public and two private establishments (the National University of Singapore and Nanyang Technological University, and the Singapore Management University and SIM University, respectively).

In addition, the government is investing in a new 'Fourth' university, as well as collaborating with Yale on the NUS-Yale Liberal Arts campus.

Green open spaces characterise UTown

Further expansion has been sought by admitting foreign institutions to provide trans-national higher education, which has led to the government formulating the Global Schoolhouse policy. As a result, the government is pumping financial support into universities in order to establish operations in the state, with an aim of attracting 150,000 international students by 2015 to study at both private and state-run institutions.

As part of this makeover, an 18-hole golf course adjacent to the Ayer Rajah Expressway on Dover Road has been converted into NUS University Town (UTown) as an extension of the NUS Kent Ridge campus. Opening its doors in late 2011, Singapore's first-of-its-kind higher learning landscape geared up to become the home for 2,400 undergraduates, 1,700 graduates and 1,000 researchers. Whilst undergraduates and graduates are housed in both the residential colleges and graduate residences, researchers from world-class institutes are gathering under one roof to form a hub of innovation at the Campus for Research Excellence and Technological Enterprise (CREATE).

UTown has been designed to stimulate academic study

The purpose-built facilities have been designed to encourage an open exchange of ideas, promoting creativity, innovation and enterprise. UTown's design has successfully integrated green concepts into the master planning and building, blending living and learning as one, so that the spaces in UTown can extend learning beyond the classrooms, allowing discussions from the seminar rooms to spill over into the side cafes and other informal learning spaces. From research facilities and computer labs, lecture theatres to seminar rooms, e-learning cafes and clusters of study spaces, the ERC has been designed to be the pulse of activities at UTown. Each college is also equipped with facilities such as theme rooms, multipurpose halls, dining areas, student lounges and common lounges.

In all, 23 buildings and towers are interlinked and grouped into seven building clusters with nearly 500 individual audio zones. Tec Revox was the installer with Jack Tay as senior project manager. Tec Revox was subcontracted to Johnson Controls, who won the entire ELV/building management systems contract and was responsible for creating a network of emergency evacuation, paging and BGM systems.

In keeping with UTown's high tech image, the MoE was keen to promote a future-proofed fibre/UTP based infrastructure, including the sound system. At the outset, a MediaMatrix Nion NX platform was selected as the DSP foundation, operating over the local area network (LAN). Entertainment technology has a habit of rapidly evolving, and when implementing technology into large construction projects, newly launched products can sometimes muscle into a project. Particularly when labour and installation costs can be decreased or the equipment promotes an ease of use.

Tec Revox created a GUI with 120+ zones on one screen

In the case of UTown, a wholly IT based solution was adopted and implemented by Tec Revox under the supervision of Johnson Controls and the M&E Consultant, Beca Carter. Once the project was underway, it was apparent that there were problems in trying to display the status of 500 zones across one or two display screens. The final solution used a web-server in the paging host processor combined with a mouse-over feature that displayed the name, status and other attributes of any zone.

To avoid the end user having to write HTML code, the paging host processor includes an 'HTML Builder'

that provides a drag and drop graphical interface and compiles the required back-end code once the configuration is saved. The solution allows any PC (or even a smartphone or tablet) to become a Pagestation by using its web-browser to connect to the paging system host and trigger a message. The use of common browsers avoids the need for a custom app or software to be loaded into the Pagestation. In addition, updates are made at the paging system host and deployed through the webserver without requiring any software or firmware updates at the Pagestation.

The majority of zones require simple paging and as such the scale of DSP processing required was identified to be low. For those zones without sound reinforcement, paging was achieved by setting Pagestation (source) network addresses to

An audio EQ rack with MTS amplifiers, MediaMatrix Nion NX DSP and ION 8.8 COMS

connect to Zone (destination) addresses. A simple Ethernet switch did the routing, without the need for a costly DSP processor.

There are seven fire command centres (FCCs) with one designated as the central FCC. Here, a PC/RCF paging station has priority over the rest of the network. However, for everyday paging needs, a text to speech (TTS) system has been adopted, removing the need for a 'live operator'. The TTS system allows the message to be typed in via a PC keyboard. The text message is converted into an audio file via a software based TTS processor inside the Paging host processor. TTS Paging can be conducted in five languages – English, Korean, Japanese, Mandarin and Spanish. From the central FCC PC, the TTS language can be selected in the web browser dialogue box, whereby standard recorded messages can be triggered or bespoke messages can be typed in. As the world's most used relational database management system (RDBMS), a customised MYSQL (Structured Query language) runs in the paging host server in UTown, providing multi-user access.

The web server solution was commissioned by Tec Revox, while the vast amount of coding was outsourced to Immodicus. One of the greatest challenges that Tec Revox faced was trying to contain such a high density network of up to 120 zones on a single page of the PC screen. Ultimately, the company succeeded and from this quick overview, the facility manager can then move his cursor over any particular zone before extracting the information out of the database.

Media Technology Systems (MTSi) COM-series 100V line amplifiers have been installed into each of the seven FCCs. Incorporating Class-D technology, the 2-, 4- and 8-channel amplifiers include switch mode power supplies for efficiency and the regulation of power supply rails, offering outputs of between 75W to 600W per channel, depending on the zone to which they have been assigned. All COM-series models allow networking, control and monitoring, including fault and load monitoring.

In addition the amplifier features a 100baseTx Ethernet port providing Telnet access to the amplifier control and monitoring capability, as well as a CobraNet port for audio transport. Automatic changeover relays on the output of all channels are provided where the N/O connection of the relay is available at the rear port of the amplifier. This enables any of the internal amplifier channels to act as a back-up in case of primary amplifier channel failure. As such, two out of every 10 amplifiers in the system have been installed for redundancy purposes.

Elsewhere, MTSi ION 8.8 1U interfaces are rack-mounted into each of the seven FCCs, offering eight analogue mic/line inputs and eight analogue line outputs. The ION 8.8 input section converts eight channels of analogue audio into a CobraNet audio stream. Each ION 8.8 provides 100MPS of embedded DSP processing for routing and processing, together with ducking, EQ filters, high pass/low pass filters and compressors on each channel.

'In the case of UTown, a wholly IT based solution was adopted and implemented by Tec Revox'

A cafeteria with a TOA HX-5 line array requires Nion NX processing

MediaMatrix nControl is an auxiliary processing system that provides expanded control processing and additional, extensive Python scripting capabilities for the Nion platform. With the nControl, users can monitor the operation and health of all devices on a network via SNMP. Devices with serial ports connect to the nControl either directly or through a supported network serial server for control and management. The nControl supports I/O cards that allow it to act as a media server, including audio recording and playback over CobraNet.

An FTP interface allows for transferring audio files across the network to the nControl for recording and playback without requiring a project to be deployed. Additional internal cards and network-connected devices are available to expand the GPIO and serial functionality, allowing for custom, application-specific system configuration. The GPIO expansion enables the use of TTL logic, switches, LEDs and other custom circuitry for additional control driven functions. Support for RS-232, EIA-485, and EIA-422 serial interfaces are available.

The Nion NX programmable digital audio processing platform remains in place connecting all seven FCCs. Each Nion NX processor comes with two module bays supporting up to 16 simultaneous analogue audio channels, whilst the integrated CobraNet port provides a further 64 audio channels. The facility manager can then remotely configure the Ethernet network on a PC in the main FCC via NWare software. The low-latency audio across all I/O ports has made Nion ideal in those zones where a large amount of audio processing is required. Such zones include the open spaces and cafeteria, which host live performances via fixed TOA HX-5 loudspeaker systems.

The web browser solution commissioned by Tec Revox has now been released as an IT server-based product (Media Technology Systems Zone), using a CobraNet infrastructure. The need for processing audio via a centralised console to individual DSP units appears to be over. Here the Cisco EtherNet switches have dramatically shortened the path from source to destination in the signal chain, when simple announcements and paging is required. Their ability to talk to all devices allows the facility manager to select a zone or multiples zones before notifying the server to transmit audio. The fibre network over which it operates is also redundant and two extra Cisco switches have been added to the network, in addition to the two that have been installed in each FCC. The resulting package is heading towards an airport, shopping mall or casino near you.

www.utown.nus.edu.sg

The main entrance of University Town off the Ayer Rajah Expressway