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Since 1993, we have experimented with Virtual Design Studios (VDS) as an on-going research project that investigates the combination of current computer-aided design (CAD), computer networks (Internet), and computer supported collaborative work (CSCW) techniques to bring together students at geographically distributed locations to work in a virtual atelier. In 1993 the theme of the first joint VDS project was in-fill housing for the traditional Chinese walled village of Kat Hing Wai in the New Territories north of Hong Kong, and our partners included MIT and Harvard in Boston (USA), UBC in Vancouver (Canada), and Washington University in St. Louis (USA). In 1994 we were joined by Cornell (USA) and Escola Tecnica Superior d'Arquitectura de Barcelona (Spain) to re-design Li Long housing in Shanghai, and 1995 added the Warsaw Institute of Technology (Poland) for the ACSA/Dupont competition to design a Center for Cultural and Religious Studies in Japan. The 1996 topic was an international competition to design a monument located in Hong Kong to commemorate the return of Hong Kong to Chinese sovereignty in 1997. Communication was via e-mail, the World Wide Web with limited attempts at VRML, and network video. Several teaching and research experiments conducted through these projects have demonstrated the viability and potential of using electronic, telecommunications, and video-conferencing technologies in collaborative design processes. Results of these VDS have been presented at conferences worldwide, explained in journal papers and published in Virtual Design Studio, edited by J. Wojtowicz, published by HKU Press.

In 1997, we conducted a VDS exercise involving three academic institutions, University of Hong Kong, Swiss Federal Institute of Technology in Zurich, and University of Washington in Seattle, whereby teachers and students, obviously on three different continents and in three different time zones, roughly eight hours apart, tried to "multiply time" (figures 1 and 2). Students were asked to design a house for a Chinese painter and a Swiss writer on a small island in Puget Sound near Seattle. In a short and intensive design charrette, students explored in five different phases various dualities associated with the given design problem. In each phase students were asked to select someone else's design, thus implicitly forming design teams. The structure and goals of that studio exercise, the methodologies applied, the resulting design processes, and the lessons learned are described in a paper presented at the ACADIA '98 Conference in Quebec City. This year, we are conducting another week-long VDS exercise ("Place2Wait") with the University of Weimar in Germany and the University of British Columbia in Vancouver, Canada. We are also planning a semester long virtual design studio with the National University of Singapore, which will be conducted in the spring of 1999, if everything proceeds as planned.

The Department is recognized internationally as a contributor to research in design methods, of which computer aided architectural design systems are an important part. It has demonstrated its potential for creative and innovative research in the field of design computing, by creating work that is widely cited and applied. The Department has pioneered with MIT and UBC the concept of geographically distributed computer supported collaborative design. Faculty and students at more than twenty schools worldwide, including MIT, Harvard, and ETH are using software applications developed as part of the research projects (figure 3).

There are four members of staff currently researching and teaching design computing (John Bradford, Branko Kolarevic, Thomas Kvan, Barry Will). Two of these staff members were until recently leading the international organizations in computer-aided design: Thomas Kvan was the founding President of the Association of Computer-Aided Architectural Design and Research in Asia (CAADRIA); Branko Kolarevic was the 1997-98 President of ACADIA - Association for Computer Aided Design in Architecture. In addition to these staff who are specifically involved in computer-aided design teaching and research, the department has several other staff involved in building analysis and simulation. They do research in the areas of fire safety, acoustics, building services and construction. Several consultancy projects were completed for the local building and construction industry and the local community. We have in recent years produced various models of buildings to investigate their behavior under different conditions. Examples of such projects are the investigations of the Garley Building, and feasibility studies for the Chi Lin Nunnery.

These are our main areas of interest related to the application of information technology in architecture:

Computer-Supported Collaborative Design (CSCD)
CAD/CAM in Building design and Construction
Virtual Reality in Architectural Design

Other areas of interest are:

Relations-Based Design Systems
Knowledge-Based Design Systems
Building management and operations
Data modeling in disaster analysis

The Department has extensive resources in computing to support its teaching and research, built over several years by the efforts of the staff. Started over ten years ago by John Bradford and Barry Will, the capabilities today include two state-of-the-art graphics labs, one for teaching (figure 4), and the other one for research and advanced visualization. Both labs have over 60 advanced workstations for computer graphics and a dedicated Silicon Graphics ONYX for research in virtual reality applications. There is also a service lab for input and output, to facilitate the use of numerous peripheral devices by students. These labs are available 24 hours a day, seven days a week. All hardware is interconnected via the departmental Local Area Network (LAN), and over 200GB of disk space is available on seven servers. Technical support is

provided by a team of in-house computer officers, lab assistants, and demonstrators.

The Teaching Lab is constantly being upgraded with the latest state-of-the-art technology. It is the main undergraduate instructional classroom and production facility, and currently has 25 Pentium II PCs with Windows NT 4.0 (Wintel) and 5 PowerMac computers running numerous graphics applications. All of these computers have at least 128MB of RAM, 17" monitors, large capacity hard disks, full-color and 3D accelerator cards with 8MB of dedicated memory for graphics processing. The Departmental Input and Output Lab has a smaller number of high-end Wintel and PowerMac computers. It is primarily an I/O facility with a large number of peripherals such as printers, plotters, digitizers, scanners, film recorders, and various media storage devices (Jazz, Zip, MO, and CD-Recordable). There is a wide range of software available for student use in these labs, such as 3D Studio VIZ, AutoCAD, ArchiCAD, Architrion, form•Z, Lightscape, Microsoft Office, Microstation, Pagemaker, Photoshop, and Landcadd.

The Departmental Research and Advanced Visualization Lab houses advanced graphics PCs, workstations, and peripherals for teaching, production, and research into many aspects of design computing. It contains reference materials, workspaces for postgraduate students and research assistants, and teaching and production facilities for MArch, MLA, MUD, MPhil and PhD students. Typical projects undertaken in this lab include 2-D and 3-D CAD including modeling, rendering, drafting, and animation, virtual reality, Virtual Design Studio including video conferencing, geographic and land information systems, multimedia development, digital audio and video production including QuickTime VR authoring. Principal hardware consists of 12 SGI Indigo2 XZ, Extreme, Indy, and O2 workstations, 1 SGI Onyx RE2 with Division and Virtual Research VR peripherals, 4 Intergraph TDZ-425 dual Pentium II PCs, 1 HP Vectra dual Pentium, 1 Apple G3 Mac, and 7 various Unix and NT servers. Software provided in this lab includes Adobe PageMaker and Photoshop, Apple QuickTime VR Authoring Studio, Autodesk AutoCAD and 3D Studio VIZ, BAGH Technologies Architrion, Corel CorelDraw, Division dVS and dVise, Environmental Systems Research Institute Arc/Info and ArcView, Graphisoft ArchiCAD, Lightscape Technologies, Inc. Lightscape, PCI Enterprises EASI/PACE, Silicon Graphics Alias Wavefront, InPerson, Open GL, Inventor, and Performer, and Softimage 3D.

Two years ago, the Department began to experiment with distributed computing, and installed an experimental computer network in design studios for access by students on their desks, using their own computers. We envisioned creating a computer supported, networked environment for teaching architectural design, which should improve learning opportunities, encourage teaching innovation, introduce new technology and methods in teaching and learning, and improve the environment for learning. It is expected that integrating advanced technology within design studios will allow faculty to experiment with new approaches to teaching design, new means of providing access to knowledge, and new ways of structuring the collaborative processes in design.

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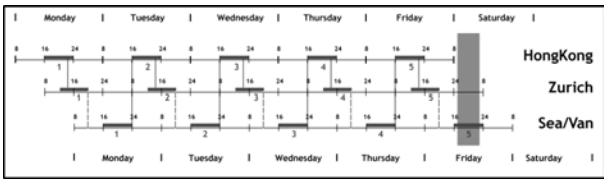

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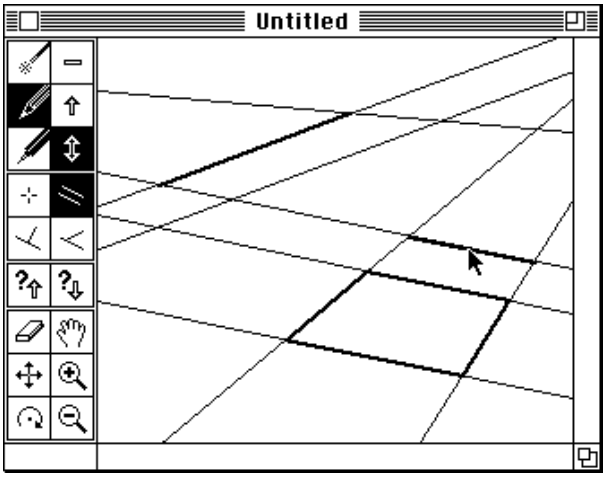

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