Computing smart geometry

SmartGeometry is an annual workshop with a reputation for being at the forefront of design technology. Started 11 years ago when parametric modeling was still in its infancy, the workshop initially focused on modeling geometry with parametric tools. As parametric modeling become more commonplace, SmartGeometry sought out other technology at the leading edge of the architecture industry. Fabrication has been a major theme for the past couple of years at SmartGeometry, but this too is slowly abating as robots and 3D printers become more commonplace.

This year’s SmartGeometry was held at the Chinese University of Hong Kong. Both HP and CASE were there. The theme of the event was “urban compaction.” During the workshop participants investigated how drones, gaming engines, location tracking systems, big data, and fabrication could be applied to the issues associated with growing urban density.

In total, 70 participants came from all over the world, many with an HP laptop in tow. There were also a range of HP Z420 Workstations and HP ZBooks powered by Intel® Core™ processors that were used to support activities at the conference.

The workshops weren’t traditional teacher-student classes, but rather a forum for collaborative research. The technology being explored was vast. There were drones scanning the thermal performance of buildings, indoor tracking systems monitoring the ways people collaborate, heart rate monitors, social media data-mining algorithms, 3D printers, and spherical projectors.

One group using an HP ZBook was the Resilient Networks team. They were attempting to understand how the failure of urban infrastructure cascades through a system. For example, when a building experiences a power cut, the action stops the pump supplying water to the cooling system, which takes the HVAC system offline, which causes the backup generator to fail. In this example, the backup generator was designed to accommodate a power failure, but it wasn’t designed to accommodate the cascade of failures that resulted from the power failure, namely the loss of the HVAC system.

It can be extremely difficult to anticipate how a failure will propagate through a network. But designers need to foresee these potentially disastrous cumulative failures if they are to design buildings and cities that remain resilient in the face of natural and man-made disasters. At the moment, most tools for understanding network failures are designed for mathematicians and computer scientists. These tools are fairly impenetrable for designers. The Resilient Networks group developed a specialized computer algorithm to let designers visualize a network failure. Using the tool, designers can see the affect of fortifying and creating interconnections between elements within a network.

The group ran the simulation on an HP ZBook. It’s a difficult simulation to run since the computational requirements increase exponentially as the number of elements in the system grows. Although the group was sitting beside a couple of desktop computers, they chose to run the simulation on the HP ZBook because, as one member said, “it’s actually performing much faster than the big beast of a desktop over there.” If nothing else, this is testament to the fact that a portable workstation can also be highly powerful provided it is properly configured.

The HP ZBook is perfect for the types of calculations the Resilient Networks group was doing. It has outstanding computational power for a mobile workstation, featuring the latest Intel® Core™ processors. These processors are hyper-threaded so they work even better on parallel tasks like traversing a network. The 32GB of RAM was more than enough to accommodate the memory needs of even the most complicated network produced. These networks could be saved onto the internal solid-state drive (SSD), which makes a noticeable improvement in performance. And since all of these components are housed within a notebook with long battery life, the Resilient Networks group could easily pick up the workstation and take it with them to the 3D printer or into design reviews in other parts of the university.

The workshops at SmartGeometry were followed by a two-day conference. A number of international speakers were flown over to discuss big data, advances in digital technology, and the latest design trends emerging from Asia.

The presentations were run on an HP ZBook 14 Mobile Workstation. This is HP’s super thin and lightweight ‘Ultrabook’ mobile workstation. While the computer weighs just 3.57 pounds, it has all the performance of an HP workstation. There was an Intel Core i7 processor, 16GB of RAM, and an SSD. This was more than enough performance to run the presentation, video conferencing software, and interactive parts of the presentation—plus record everything that was going on—simultaneously.

Of course, the HP ZBook 14 can also be used to perform CAD modeling while traveling—eliminating the need to carry a bulky computer. Find out more about the full line of HP ZBook Mobile Workstations at www.hp.com/go/zbook.

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ABOUT CASE
CASE exists where building and technology intersect. We combine our experience as architects, engineers, project managers, software developers, and educators with a passion for technology to improve the way buildings are designed, realized, and operated. CASE is a building information modeling (BIM) and integrated-practice consultancy. We provide strategic advising to building design professionals, contractors, and owners seeking to supplant traditional project delivery methods through technology-driven process innovation.

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