Faculty and students are advancing science and design in the college's new high-tech facility.

Building **Connections**

BY TED BOSCIA

The new Human Ecology Building is the crown jewel of the college, an 89,000-square-foot facility loaded with high-tech research laboratories; versatile classrooms; inspirational studios for drawing, design, and fabrication; a spacious gallery to display student and faculty works; and community spaces and seminar rooms to spark idea exchanges.

The building is also the new home for the Department of Fiber Science and Apparel Design (FSAD), with administrative offices clustered on the terrace level and faculty offices and labs on the three main floors. There are studios for every step of the apparel design and production process, as well as labs for the development of specialty textiles and biomaterials.

Of all the building's remarkable features, however, the first floor stands out the most to Kay Obendorf, senior associate dean of research and graduate education and the faculty lead for the college's facilities master plan. "The floor is extraordinary and fulfills a dream of integration across the departments in the college," she said.

Inside, scientists are examining nearly every aspect of human performance and health—from nanofibers for protective clothing to three-dimensional scans of body sizes and movements, from cognitive changes in older adults to safer building materials. In specialized temperature-controlled labs, students and faculty perform textile testing and studies in workplace ergonomics, and researchers from across the college can access a group of shared spaces for human-participant studies and focus groups.

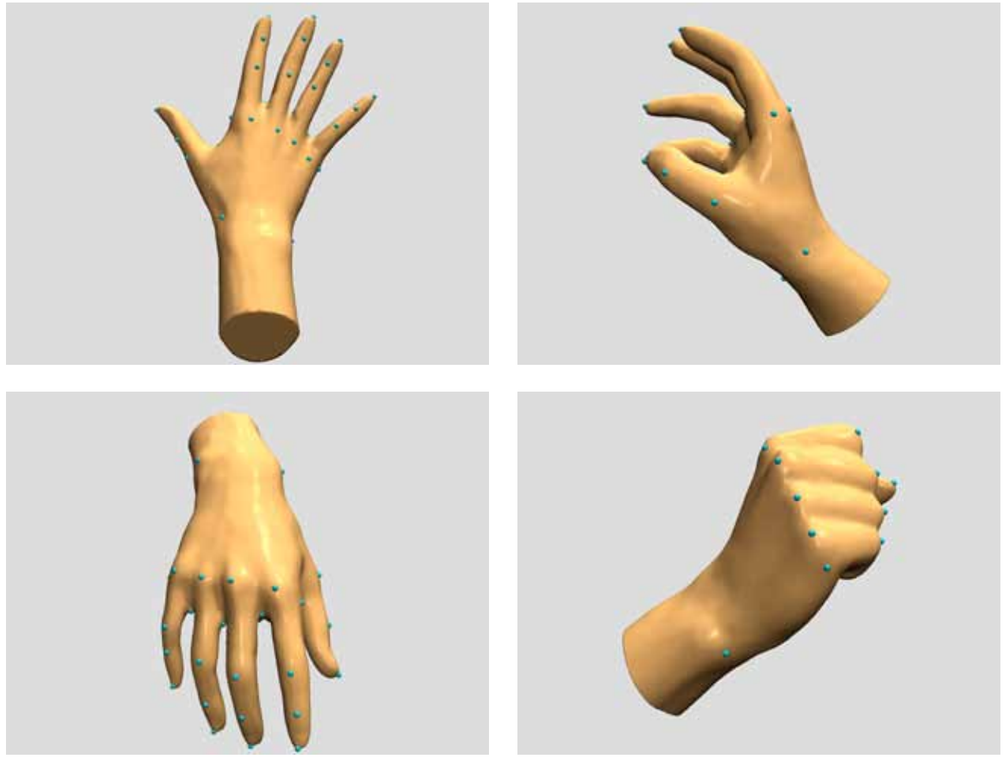
"There's a commingling of research units and faculty expertise that matches the character of Human Ecology, where we reach across disciplines to work on common issues," Obendorf said.

Simulating the human environment

The approach is perhaps best exemplified by a suite of research spaces, known collectively as the Simulation and Human Engineering Design (SHED) labs, shared by apparel designers Susan Ashdown and Huiju Park, ergonomics researcher Alan Hedge, and human-body biomechanics expert David Feathers. The quartet expects to blend their expertise and resources to explore questions at the intersection of ergonomics, clothing design, and human body movements.

Together, for instance, they can investigate stimuli affecting the health and comfort of office workers. In Hedge's climate-controlled lab, they'll study the effect of changes in temperature and humidity and use video scanners and modeling software to capture anthropometric data as participants carry out everyday tasks, such as typing and moving a computer mouse. With 3-D body and hand scanners, Ashdown strives to >>>

Human Ecology professors in the SHED Lab use an electro-mechanical anthropometer to obtain 3-D images of humans engaged in everyday tasks, such as using tablet devices, to better understand how such movements affect comfort, safety, productivity, and other factors.



Pictured above are 3-D images of human hands scanned in the new Human Ecology Building. The blue landmarks indicate joint centers. Multiple scans of the same hand in different working positions can provide anthropometric data useful for collaborative SHED research team projects.

improve the fit and design of functional apparel, while Feathers studies how humans interact with products and environments. Park, one of the college's newest faculty members, uses a motion-sensor scanner to develop smart clothing. Their collaborations hold promise for better product design, enhanced office arrangements, and more comfortable and functional clothing.

"The chair you sit in, the clothes you wear, the built environment that surrounds you, and what happens as you move about the space—all of these are interrelated and have a great impact on human performance," said Ashdown, the Helen G. Canoyer Professor in Fiber Science and Apparel Design. "There are labs that investigate these factors in isolation, but this is the first place where you can study these four things all at once."

Hedge, professor of design and environmental analysis, and his students are monitoring the relationship between air quality and fatigue—an ideal opportunity to partner with fiber scientists Juan Hinestroza and Anil Netravali, both of whom are developing nanomaterials for air filters in buildings and clothing. A visiting professor is developing new gloves for astronauts in the Chinese space program.

"When these fields come together, there are many opportunities to study interactions among our bodies, our clothing, and our environments," said Feathers, assistant professor of design and environmental analysis. "We have different backgrounds, but the common ground is that we're working on improving how people live and work."

For fiber scientist Margaret Frey, the greatest benefit of the new building is that it helps turn conversations into collaborations. Frey uses electrospinning, a nanoscale process, to produce ultra-fine functional fibers with a range of uses for pest control in agriculture, biohazard sensing, and protective clothing. Her research depends on partnerships with faculty across campus, and she says the new building's visibility makes it easier to connect.

"If I'm crossing campus and run into someone from entomology, I can invite them that minute to come look at what we're doing in the lab," said Frey, associate professor of fiber science and apparel design. "In science, the real innovations are coming from these kinds of connections, not the lone researcher in the lab."

To date, Frey has partnered with faculty members from entomology, horticulture, biomedical engineering, and other fields on custom-designed polymers. In the new building's textiles testing lab, she and collaborators can run experiments with precise climate controls—a critical need because such natural fabrics as wool and cotton are susceptible to slight changes in temperature and humidity.

"Collaborations are so important because a problem that may seem very difficult to me often has an obvious solution to someone in another discipline who is looking at it from a different perspective," Frey added.

A window to the past—and present

For all its modern marvels, the new Human Ecology Building also holds some historic treasures.

Charlotte Jirousek, associate professor of fiber science and apparel design, curates the Cornell Costume and Textile Collection, with more than 9,000 garments dating from the 18th century to present day. Among the pieces: a beaded dress once worn by Martha Van Rensselaer, a colorful

Students Larissa Buttaro (left) and Sun Young Park (right) work with FSAD associate professor Margaret Frey on electrospinning equipment in Frey's functional fiber spinning lab.

Charlotte Jirousek, curator of the Cornell Costume and Textile Collection, shows off a traditional Romanian wedding dress, one of the collection's many treasures.

Romanian wedding ensemble, Eleanor Roosevelt's second inaugural ball gown, and extensive examples of contemporary couture.

Thirty of the most prized items have been collected in a special exhibit, "Student Choice: Selections by Students Past and Present from the Cornell Costume and Textile Collection," installed in the entry hall display cases during the fall semester. Five current students and ten alumni, some of whom now work on the curatorial staff at major art and fashion museums, assisted Jirousek with the display. "Their selections provide a wonderful overview of the rich variety that the collection has to offer," Jirousek said.

Previously, the collection was tucked away in Martha Van Rensselaer Hall, far from the FSAD teaching spaces. But the alumni display and the collection's prominent location in the new building will raise awareness of this valuable resource. Students and researchers use the collection to study cultural and historical aspects of textile and apparel design or to seek inspiration for their own creations.

"I expect that more students will find their way to us and take advantage of the resources we have to offer to designers as well as those interested in dress and material culture," Jirousek said.

For the first time in recent years, the college also has a gallery to present student and faculty works. The Jill Stuart Gallery, made possible by a generous gift from Stuart, a noted fashion designer, and her husband, Ron Curtis, has already hosted the annual Barbara L. Kuhlman Foundation's Fiber Arts and Wearable Arts Exhibition, which features original student "artwear." Its location, between the building's main entrance and the hallway that leads into the Human Ecology Commons, offers students "a prominent public setting to display their designs and to give the community an opportunity to appreciate and respond to their creations," according to Obendorf.

"There's a commingling of research units and faculty expertise that matches the character of Human Ecology, where we reach across disciplines to work on common issues. . . . the whole building is intentionally designed to foster these types of collaborations."

—Kay Obendorf

In fact, not just the Jill Stuart Gallery but the entire building is designed to invite the public to discover the research and creative activities occurring within. College planners worked with architecture firm Gruzen Samton to develop an open floor plan with glass walls and corridors lined with tackable surfaces to display sketches and research posters so that the building tells the story of Human Ecology's innovation and scholarship.

"The guiding architectural philosophy is to bring the research and teaching that occurs within the college up to the surface for all to see," said Kristine Mahoney, director of facilities and operations management for the college.

Tools for teaching and research

It's the middle of the semester and Paul Eshelman is still grinning about the wood and metal shop in the new building—more than 3,000 square feet packed with sophisticated tools and a large assembly room for students to construct furniture and other models from the pieces they design in the adjacent shop.

The new space has enhanced his collaborative design studio course, which he has co-taught with professor Gary Evans for numerous years. Evans's social science students team with Eshelman's design students to build research-based design interventions for a local Head Start, and by semester's end they will have manufactured furniture pieces that help promote cognitive, physical, and social development in children at the center's preschool.

"The shop setup is absolutely awesome—beyond a dream come true," said Eshelman, professor of design and environmental analysis. "The combination of a shop and assembly studio in one place significantly enhances learning

opportunities for students and the range of work they can do. When I'm here, they can fabricate parts for their models in the shop, and then assemble them on their own time, whenever is convenient."

Shop rules require faculty to supervise students using heavy equipment. Recently, Eshelman and other design faculty had been using Cornell's High Voltage Laboratory for class projects. But their access was limited because of its distance from campus, and it was shared among many departments.

The new shop, on the other hand, provides immediate access for students during and outside of class. It also contains tools for a wide range of projects: computer-driven routers; small saws for detailed work; a paint room; storage spaces; and sanders, drill presses, and lathes. And, for times when they're lacking inspiration, there is a panoramic window with views of Beebe Lake.

"It's rewarding to know that the college is making such a significant investment in design activities in the new building," Eshelman said.

Two floors above the wood and metal shop, on the terrace level, students and faculty are focused on a different product: clothing. Near the main entrance, students work in a drawing studio that is filled with abundant natural light, which helps them perceive color. Connected to the space are two more apparel studios with industrial equipment for patternmaking, draping, and fabrication. Across the corridor is a computer-aided-design (CAD) facility, and one floor above is a lab for applying surface designs to textiles.

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—Susan Ashdown

"It is seamless how the spaces flow from one area to the next," said Ashdown, who will teach in the apparel studio in the spring. In those spaces, student designers learn the latest methods for garment-making on modern equipment as well as traditional techniques. One studio includes a snap setter press from the 1930s alongside a bonding machine that uses sound waves to create threadless seams and textured patterns on fabric. Overhead lights and cameras allow instructors to record and project intricate fabric details to the entire class.

At the same time, the building contains multipurpose teaching spaces: a "wet lab" for courses in fiber science and nutrition where students handle substances that require proper ventilation and safety measures and a "dry lab" for courses without such special needs. Both are equipped with adjacent storage areas and modular furnishings, so faculty can easily adapt the room to their instructional needs.

DEA professor Paul Eshelman (center) works with students in the wood and metal shop in the new building.

In the new surface design laboratory, apparel design junior Matilda Ceesay applies beads to her creation for the Kuhlman Wearable Arts Exhibition.

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In the spring, Marla Lujan, assistant professor of nutritional sciences, will teach a course in the wet lab on human anatomy and physiology, where students work directly on microscopic anatomy, dissections, and clinical case studies. She is anticipating the ability to configure the space to match the class activities.

"Because students rotate through various teaching stations over each lab, we are looking forward to the flexibility that will be afforded to us by the space," she said. "In the past, we have been restricted by spaces that were not always conducive to small group interactions and break-out sessions."

Most of all, the design of the new Human Ecology Building integrates the college's teaching and research in ways that were not possible after the sudden loss of the Martha Van Rensselaer North building in 2001 due to structural deficiencies. Classes and experiments occur under the same roof and in close proximity to faculty offices, bringing research alive for undergraduate students.

In the dry lab, David Feathers is teaching Biomechanics and the Built Environment, his course on the effects on the body's musculoskeletal system as people move through their surroundings. When he wants to reinforce a theory from a lesson with a concrete example, "I can just stop class and walk them down the hall to my lab," he said.

"We have cutting-edge labs right next to our teaching spaces, meaning students get the benefit of hands-on experiential learning and more interactive courses," Feathers added. "It's all right there for the students." • • •

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