At Full-Scale | From Installation to Inhabitation

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Introduction

Software, technology, and industry are leading and shaping the architecture profession as never before. The University of Kentucky (then the College of Architecture, now the College of Design-School of Architecture), in response, established an all-digital design studio in 1999, to combine the strong tradition of handcrafting in the existing design program with those technologically sophisticated tools shaping the profession for the 21st century. The primary goal was to afford the students a greater flexibility in design, and eventually as future practitioners, develop innovative solutions for design efficiency, affordability, and sustainability.

The materials presented here reflect a sequence of comprehensive digital projects produced under my direction from 1999 through 2005. These projects varied in scale, site, context, and material and represented a broad spectrum of design execution, from experimental installations to permanent inhabitations. They offered students from architecture, historic preservation, interior design, business, agriculture, and engineering the chance to explore a variety of digital software media and, in a collaborative framework, address issues of design, fabrication, and assembly at full scale. Reflecting the realities of the profession today, these projects actively integrated advances in software into the design process, allowing students to move beyond basic representation and documentation of the design concept to an advanced analysis and understanding of fabrication concerns.

Evoking Imaginative Perceptions

Spring 1999 | The Body Wrap as Interpretative Envelope

> "It is taught me that form and content, the wrapping and what is wrapped in it are the same thing."
>
> — Walter Benjamin

Figure 1. Spring 1999, Body Wrap Installation at the Arts Place Gallery in downtown Lexington, Kentucky.

Before instituting a digital discourse as an upper-level studio, I taught first-year design. In my teaching, the projects ranged in scale from the desk to the classroom. In many of our in-house discussions and reviews, what became apparent was a disregard or lack of ability of the students to look critically at their own work, which often resulted in the avoidance of the detail when actually making their designs. It seemed that hot glue became the substitute for detailed joinery. However, I knew that at full-scale, students could not avoid this issue.
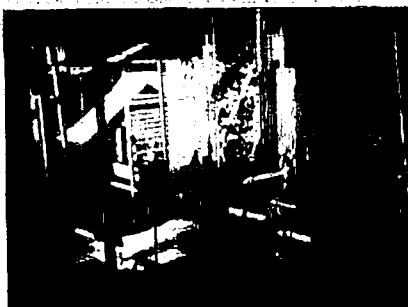
City&Region Altering virtual reality

LEXINGTON HERALD-LEADER

UK team creates a virtual new look

Figure 2. Fall 1999, Synthetic Landscapes Installation on the University of Kentucky campus prior to transport to Louisville, Kentucky for exhibition.

The installation project in the spring 1999 semester evolved *from a* series of 'interpretive paintings'. I asked the students to develop concepts that focused on what a portable and temporary architecture could be; and then, within the framework of the painting, I asked them to actualize their intentions. The resulting structures had efficiency in material, a flexibility of purpose, and a lightness in weight. The process of assemblage emerged from the constant oscillation between the scale of an idea and the connection and assembly of the detail.

The body wrap projects resulted in a series of transformations that occurred in four stages: inside the wrapping, within the thinness of the membrane, through the containment and interpretation of the human body, and the space around the wrap. Once completed, the students analyzed their portable structures in terms of the unique and often subtle differences between occupied and non-occupied space. The ensuing exhibition articulated these invisible conditions as a synthetic landscape of its own. Through this exercise, the students became conscious of the unseen or non-apparent effects that their construction had on their immediate surrounding context. In a very direct way, the project also developed a strategy for expressing of an "other" reading of the urban fabric.

Digital Design Studio

In the fall 1999 semester, in response to the growing trends in architecture pedagogy, to move toward digital integration, the School of Architecture offered its first all-digital studio. As the faculty placed in charge of this course, I was free to interpret the educational direction for the program. Theoretical and pedagogical articles of the time, were debating the merits of digital craft within the context of the traditional handcrafted studio. To me, the studio environment is neither static nor uniform; rather, it is a dynamic and constantly shifting venue for discourse that forces the faculty and the student, alike, to think, adjust, and innovate. My contextual assessment required a different question, "How was the computer going to challenge the paradigm of the traditional studio, move beyond the boundaries of the academic classroom, and ultimately inform practice and construction?" The debate over the loss of tactility in digital investigations continues today. In my studios, however, students meet this issue head-on. They simultaneously develop technological savvy—visualization, fabrication, and assembly, while continuing to augment their handcrafted strengths—hand drawing, freehand sketching, and shop modeling. This pedagogical initiative continues to develop, forging innovative relationships with local and national industry, while challenging the conventional notion and role of upper-level design studios.

For my studios, I often seek out funding to help alleviate any additional financial burden to the student, while at the same time expanding the reach of the design studio beyond the campus context. This personal decision—to seek out sponsorship continues to be the foundation of my studio philosophy.

Figure 3. Fall 1999, Synthetic Landscapes Installation at Founder's Square in Louisville, Kentucky. Architectures In-between Appearance and Reality.

Figure 4. Spring 2000, Spaces for Rave within the installation (Student design by Aaron Anderson).

This sourcing affords students an opportunity to study in ways that would otherwise be impractical or impossible. Students also have an opportunity to work with tools that we do not have in our program, allowing them to remain on the cutting-edge. The six-years of full-scale investigations shifted freely from research-based initiatives to philosophical ones. As follows are the chronologically listing,

the length of the studio exploration, and a brief description of those studios.

From Installation to Inhabitation Installation

Installation

Fall 1999 | Transcendence and Digital Media (A Fifteen-week design project) A digital installation that explored the perception of virtual environments on "A Day Devoted to Architecture, Place, and Space" Public art, at the scale of an urban park, resulted in a collaborative project between students and the community. The studio provided an innovative forum for creative interdisciplinary research in the arts. Students learned how to use new tools for artistic expression while focusing on the conceptual development and the production of individual and collaborative short-form animations. The synthesis between the production of digital images and the process of construction in turn heightened the perception of space. In doing so, the studio designed, fabricated, and constructed a light wall that measured 6' wide x 44' long x 12' high.

Spring 2000 | Virtual Raves in Synthetic Landscapes (A Fifteen-week design project) A digital installation that created a *virtual* architecture that blurred both the projections of the interior and the exterior to highlight the spatial and temporal differences between public and private space. In order to narrow the boundaries between the digital environment and the construction process, students worked closely with local plastic fabricators. The use of the synthetic material - plastic - seemed natural to our process. Not only were students successful in realizing their projects through digital representations, but also they were equally successful in narrowing the gap between their imagination and the constructed artifact.

Fall 2000 | The Space of an Idea: Ideas for Living (A Fifteen-week design project) a digital installation that sought to reveal the tension between the private experience and the public's perception of that space. To investigate new methods of architectural assemblage, the studio challenged students to transform the philosophical questions pertaining to digitalization into an operative condition that could adequately address the
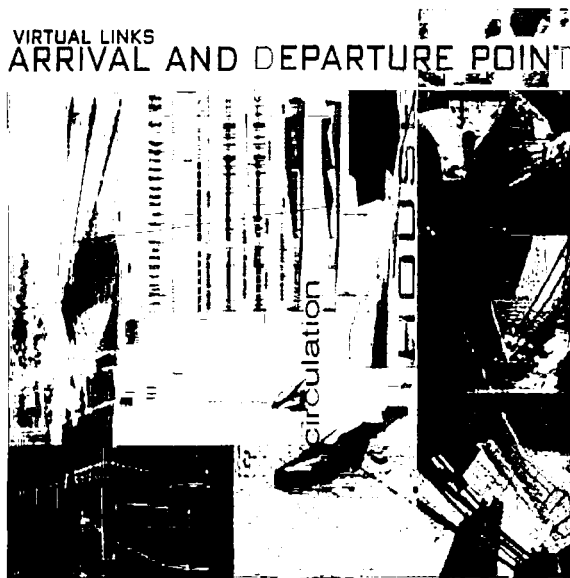
VIRTUAL LINKS
ARRIVAL AND DEPARTURE POINT

Figure 5. Spring 2001, Virtual Arrival and Departure Points within the Installation (Student design by Lisa Neidhardt).

issues of contemporary living spaces. How do we live as individuals? How do we live as a community? Within the context of the computer, is it possible to derive a new method of connecting object-space to landscape-space. The student's ideas generated a series of fabricated frames and projection surfaces that provided a suitable foundation for actualizable architecture.

Fall 2001 | Idea Factory (A Ten-week design project) A digital installation that used the concept of synectics to form an operative framework that would promote creativity. Synectics means the joining of different and apparently irrelevant elements into a unified whole. In this context, students interpreted the gravity-less space of the computer to explore design options for a conglomeration of business incubators known as the Idea Factory. A key concept that relates to synectics is the application of various trigger mechanisms to existing conditions that would allow the emergence of new thoughts, designs, and inventions. The students used this process as departure point to understand and develop office spaces and common "theater" spaces inside an abandoned commercial space in downtown Lexington.

Fall 2002 | Deep-Time Probe Wood Fabrication/Alabaster Stone Carving (A Three-week design project) A digital installation called the Deep-Time Probe, Investigations in Light-Architecture explored the use of an optically active-SETI experiment that centers on the thematic of time, vision, and movement through space. The design for the structure, the accompanying information wall, and the overall placement of the exhibit, structured the physical and psychological experience of the visitors including them as part of the spectacle.

(A Six-week design project) A manual-to-digital installation conducted, in one weekend, under the guidance of a nationally acclaimed stone sculptor, the students created a 3-dimensional alabaster artwork. Afterwards, each student digitized their sculpture, extracted the derivative point cloud data, and then modeled them using the Rhino modeling program. Within two weeks of faculty-led workshops, the students had produced visualizations, scaled stereolithographic models of their original stone piece, and developed a solid understanding of the software. Using the scaled models as an intermediary, the students then designed and fabricated full-scale wood bases in the school woodshop.

Inhabitation

Fall 2003 | Single-family, Affordable, Infill Development Strategies (A Fifteen-week design project) The intent of the project was to design a range of cost-effective, energy efficient, affordable houses that articulated the unique relationship between the urban east-end landscape, the community's history and culture, and construction techniques that are specific to the State of Kentucky. Students further developed these projects into a series of modifiable house plan alternatives that stemmed from strong community and neighborhood involvement in a series design charrettes. Students served as active member of professional design teams that included local practitioners, fabricators, code enforcement officials, and financial institutions. This project aligned with larger social initiatives tied to an ongoing Housing and Urban Development-Community Outreach Partnership Center (COPC) grant.

Figure 6. Fall 2001, Idea Factory (Business Incubator) installation for the Kentucky Science and Technology Corporation (KSTC).
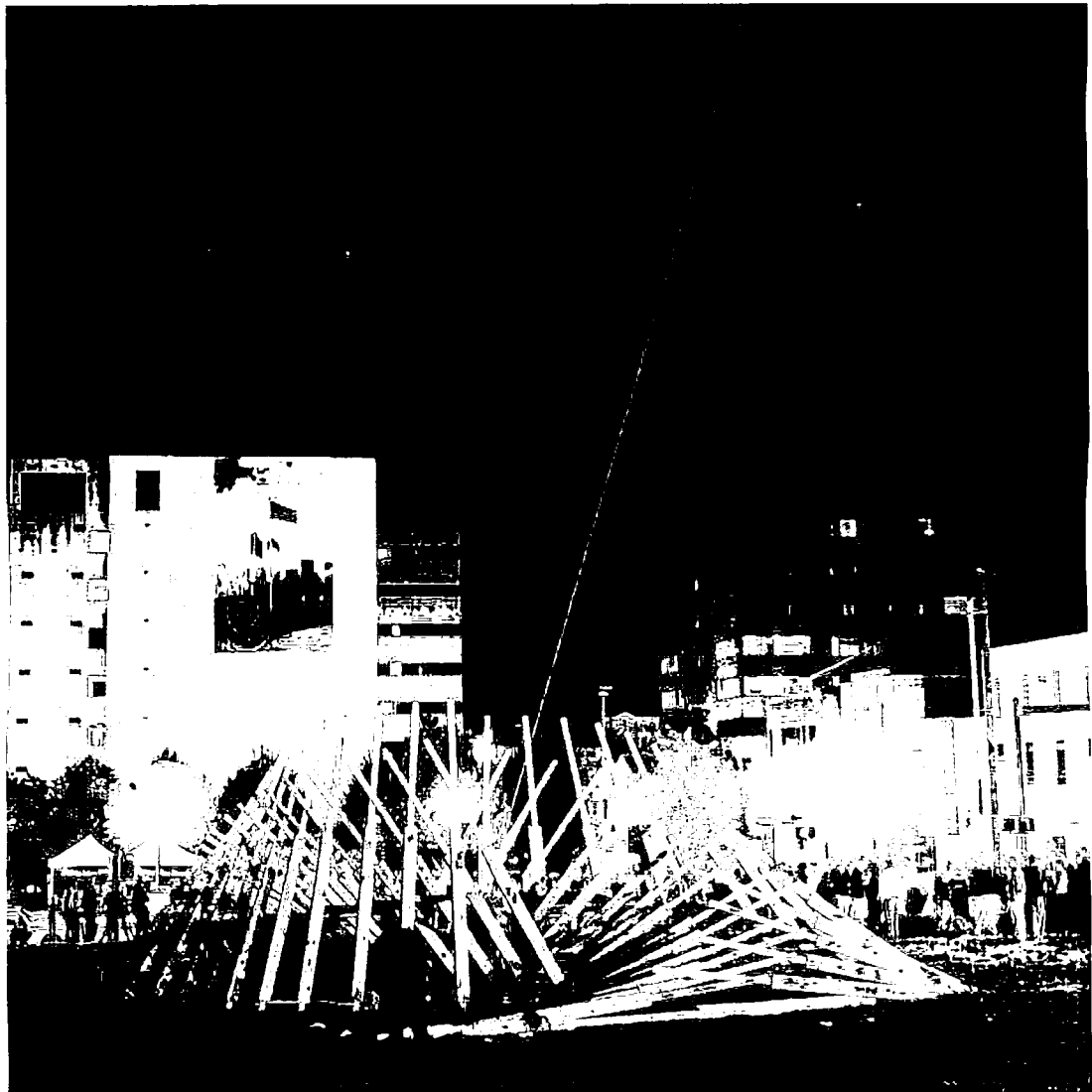

Figure 7. Fall 2002, The Deep-Time Probe, Investigation into Light Architecture. A full-scale installation and Optical SETI-digital laser protection event aligned with the Idea Festival. Sponsored by the Kentucky Science and Technology Corporation (KSTC).
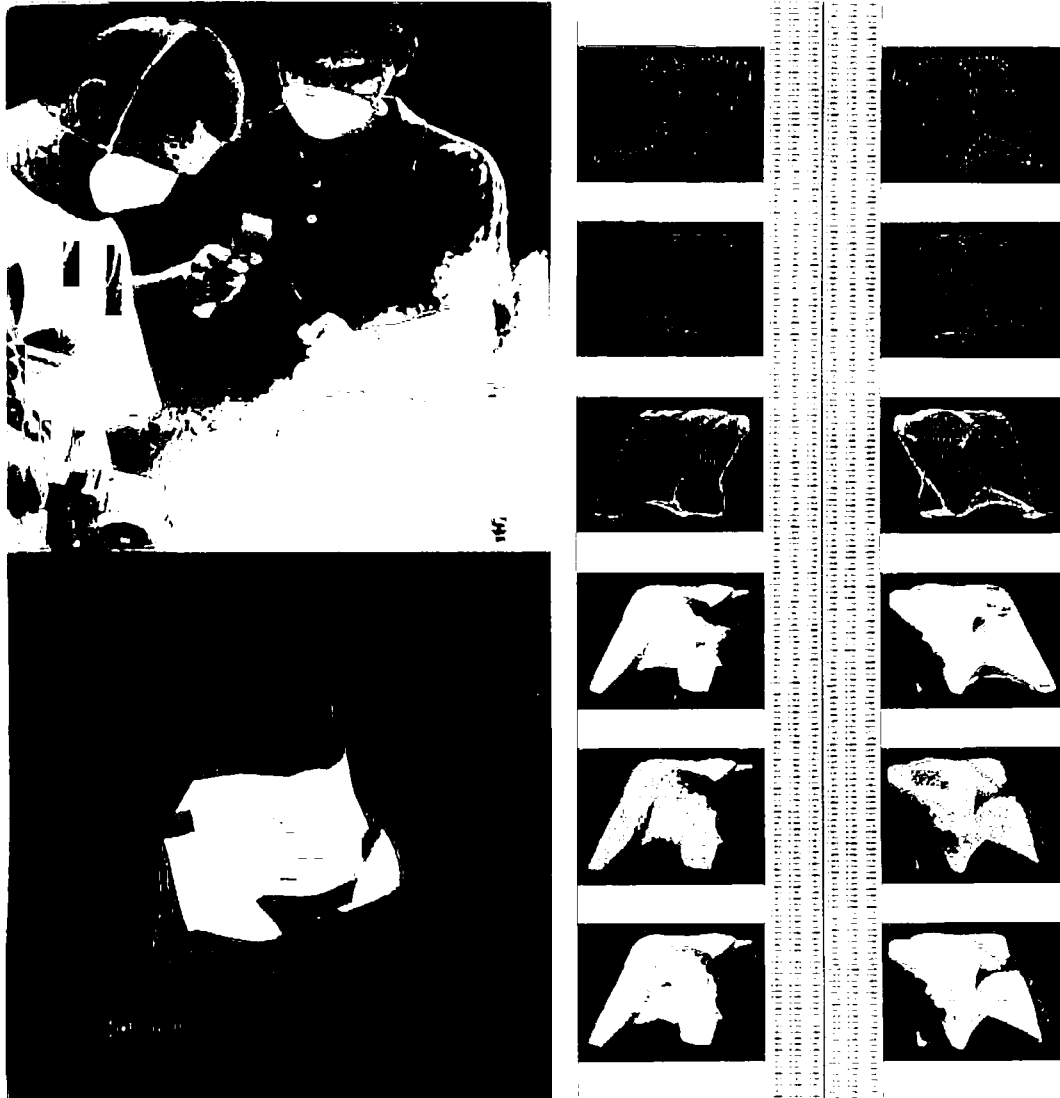
Figure 8. Fall 2002, Hand-carving Alabaster Workshop with digital re-creations used to translate the stone sculpture through point data collection into digital models. The final digital outcome was a sequence of stereolithographic models used as mock-ups for the design of full-scale structural bases for exhibition of the original stone part pieces.

Fall 2004 | DL-1 Resonance House®: Infill Designs for Historic Neighborhoods (A Fifteen-week design project) As the first design-build-fabricate-assemble experiment at our school, the intent of the studio was to design a framework from which to examine a "lived space" through digital-to-digital processes. Moving from digital models and physical stereo lithographic models to hand-fabrication and digital assembly allowed the students to move from creation to completion. As part of our holistic design process, the studio fabricated almost all components for the project. These elements include the wood flooring and staircase, the copper, and wood skins, the building's structural panels, and the two-story light vortex. The project develops simultaneously from the exterior and interior resulting in two courtyards that mediate the urban "front door" and the private "terrace." The students designed these areas through a series of two-dimensional axonometric drawings, three-dimensional physical and digital models, and four-dimensional time-based animations.

Case Study

"It is necessary for anyone who wants to arrive at a good composition and to adjust his

inventions, first to draw them in different ways [on paper] so as to see how it all goes together." Giorgio Vasari in "The Life of Titian"
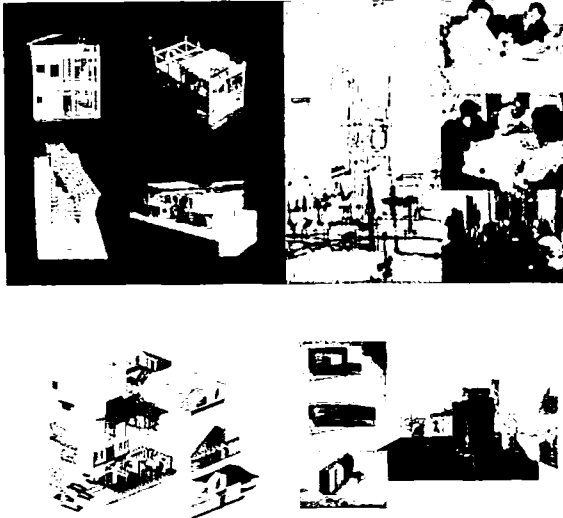

Figure 9. Fall 2003, COPC investigations looking at potential strategies for developing innovative, affordable, modular construction that would represent the cultural ideals of the East End Community of Lexington, Kentucky.

In analyzing the previous years' work, the project investigations define three bodies of work: the use and properties of materials, how digital technology challenges the conventional notions of space, and lastly, the occupation of that space. Collaborative design reviews internally and externally vetted the solutions to determine the feasibility and economics of a particular project. Individual investigations or team explorations often resulted in exhibitions that involved digital media experts and students ranging from engineering to architecture, and the fine arts. The capstone projects from those listed above include the Transcendence Light Wall (Louisville), the Rave Temporal Occupations of Industrial Ruins (I-75), and the Deep-Time Probe-Investigations in Light Architecture (Lexington). In these case studies, the projects respectively represented the first design/build experiment at the school, the first use of digital fabrication, and the first permanent installation of student-driven collaborative design work. The lessons learned from these investigations have helped enable a focused endeavor on subsequent "digital-to-digital" projects including the DL-1_Resonance House® in downtown Lexington. The necessity of full-scale investigations coupled

with industry support, multi-disciplinary collaboration, and corporate sponsorship has greatly enhanced the studio experience for my students. Not only do the students explore the use of materials in design, but they also understand how the visualization and the documentation of their projects has shifted away from what from what the project looks like to focus more closely on how their architecture is structured, assembled, and illuminated. These answers often challenge the selection of materials, the use of color, and the designation of light, shadow, and the reading of the space inside not only the work but also its affect on the immediate context. In doing so, the studio investigations from 1999 to 2005 have successfully built a definitive foundation for future projects.

Figure 10. Fall 2004-present, Digital-to-Digital fabrication studio project, DL-1_Resonance House®.

Conclusion

Much strength associated with this multi-disciplinary partnership has enabled a rethinking of the traditional teaching of design studio so that it can align with the pursuit of research, funding opportunities, and a deeper understanding of the market place that would not have otherwise have been possible.

Figure 11. (a) Synthetic Landscapes Studio, Publication Cover. (b) Spaces for Rave – Temporal Occupations of Capitalist Ruins (Student design by Aaron Anderson). (c) Plastic Fabrication (Courtesy Regal Plastics).

Further, this relationship has celebrated the dynamic relationship between visualization, representation, and fabrication-both by hand and digital making without compromising either one. It has given and will continue to give the students an invaluable, real world, learning experience that narrows the gap between the design drawing process and the methods of its actualization. It has allowed architecture, interior design, and historic preservation students to form sets of teams with a wide range of practitioners, industry-specialists, and researchers (inside and outside of academia) and it has afforded them access to technologies that we currently do not have within our program.

Over a six-year period, this all-digital design studio has developed from a pedagogical model for developing new ways of seeing and making architecture to a "proof-of-concept" experience that blends state-of-the-art visualization techniques with contemporary expectations of practice and construction. Creating these links between students, industry, and the profession has allowed the College of Design to provide leadership for practicing architects, to create a dialogue between industrial and design professionals, and to integrate design pedagogy with the technological applications that will shape the future of architecture practice. The resulting effect has been a series of virtual studies with real-world applications and an increased role for students in shaping a new reality for practice through advances in technology and industry.