Hello alumni!
This edition of the ‘Reflections’ newsletter highlights some of the recent research and scholarship underway at the School of Architecture...there is much here to share. Of course the faculty are dedicated to teaching in the studio and classroom, but most students and alumni are unaware that scholarly activity is a notable part of the daily work of a faculty member. Artistic endeavors, innovative teaching strategies, ‘big data’ and the influence of algorithms on design, and new thinking for estimating daylighting in buildings are just a few of the many topics faculty are investigating at the School of Architecture. We hope you enjoy learning about the exciting ways faculty are contributing new knowledge to the education of future architects and architectural engineers.

In addition to the curriculum tracks for Architecture and the three options in Architectural Engineering (Structures, MEP, and Construction Project Management), the School also offers two minors: Architectural Studies in History Theory, and Architectural Studies in Entrepreneurship and Architecture. This semester, we roll out our new Graduate Certificate in Integrative Design of the Building Envelope. It is available for both current students and professionals who wish to further their knowledge and abilities in a technical area of integrative building design. See inside for further info!

As always, keep in touch, and come by to see us next time you are in Stillwater!

Suzanne Bilbeisi, AIA

Faculty make a difference every day! From the top: Associate Professor John Phillips consults with Jameson Shaffer; Professor Tom Spector critiques Alex Holt; and Professor Moh works with the ARCH 1216 studio on 2D compositions.
Architects who harness their BIM models beyond documentation and visualization to make performance-optimizing design decisions stand to create fresh opportunities for providing value-added service. When we think of performance-based or performance-optimized design, the quantitative evaluation of energy performance is often the first thought that leaps to mind. While minimizing energy consumption is valuable, it is just the beginning of what can be modeled for improved building performance.

With the help of Assistant Professor Stan Carroll’s expertise in computational design, we have been experimenting in Arch 4216/Arch 5226 Comprehensive Design Studio with modeling and optimizing more qualitative aspects of building performance. In spring of 2016, for the client Oklahoma Shakespeare in the Park (OSP) Theatre Company, we employed the idea of user stories, imported from software design techniques, to document desired experiential qualities of a theatre. With Professor Carroll’s help we expressed them as an algorithm, and then used the algorithm to test and redesign students’ theatre seating layouts for optimal results.

Many user stories emphasized the artistic director’s desire for an “immersive” experience. The spatial requirements for achieving immersive intimacy, as defined in the user story success criteria, were that the viewing angle from any seat not exceed 15 degrees to the center of the stage, that the distance from the front of the stage to any seat not exceed 50’ and that an acceptable minimum distance above the seat in front of the theatre goer (the “C” distance) be achieved. Success at “immersivity” was defined as meeting all three criteria: minimum viewing angle, minimum distance from stage, and maximum head-height clearance. With the algorithm established, students modeled their seating layouts in Rhino, and then ran the test in the algorithm Stan Carroll created in Grasshopper. Seats that did not meet the success criteria were identified in the model with a white dot. The result was that after testing and redesign all students’ theatre designs eventually met the criteria.

The ability to demonstrate to a client the strengths and weaknesses of various layouts, and to experiment with revising layouts according to quantitatively-expressed criteria, as well as the ability to adjust the criteria themselves represents, we think, a proof of concept that the algorithmic expression of qualitative experiential criteria poses a strong potential for the future of performance-based design. Buoyed by the success of the theatre project, we continued the employ of user stories and algorithms in the Spring of 2017 to test the efficiency of student designs for a food pantry receiving, storage and distribution client.

For architects to provide these sorts of qualitative analyses, they will need staff schooled in the basics of a program like Grasshopper and be able to model in Rhino. Here at OSU, competence in Rhino modeling is now taught beginning in the 2nd year studios and Computational Design in the Grasshopper program is an elective offered by Stan Carroll. The Architecture 4216 / 5226 studio faculty in 2016 and 2017 were Jeanne Homer, coordinator, Tom Spector, Jerry Stivers and Paolo Sanza. Stan Carroll created the algorithms in the Grasshopper program. This summer, the paper “User Stories and Algorithms as Programming and Design Tools” authored by Stan Carroll and Tom Spector will be presented at the National ASEE Conference in Salt Lake City.
ENTREPRENEURIAL/ARCHITECTURAL SOLUTIONS ABOUND
Associate Professor Nathan Richardson

Contemporary societies, technologies, and challenges plead for solutions to construction that are sophisticated and affordable, temporary and durable, readily crafted and beautiful. Through an association with the Riata Center for Entrepreneurship, Associate Professor Richardson is exploring architectural solutions to housing and commerce that arise from the challenges faced in many distinct parts of the world. The ongoing research includes three constructed prototypes.

An interdisciplinary team of students and professors designed and constructed the first project in Granada, Nicaragua. It is a multifunctional structure built for Opportunity International. The team built the structure in two days with little prior construction experience and only a few hand tools. The structure will house plants and butterflies that are part of Opportunity’s new entrepreneurial initiative with local artists and family businesses in Nicaragua.

The second structure is an ultra-low cost shelter for a wide range of applications in both developed and emerging economies. The first Dwell Smart prototype was built in Stillwater, Oklahoma on CEAT’s research property. Fifth year student Cameron Patterson and Professor Richardson designed the enclosure which was constructed in about one week, utilizing only a few hand tools. It is a prefabricated wood and steel system built out of very few lightweight and low-cost components.

Most recently, Professor Richardson’s Entrepreneurship class and a cadre of research assistants have designed and built a mobile retail store for student entrepreneurs. The nearly completed store will be located in the OSU Student Union. The robust and adaptable retail display is suitable for a broad range of retail applications. Officially known as B_X, the store is a white box in which student entrepreneurs will be able to setup and sell the products, testing their retail concepts in a fitting business incubator.

These and other solutions currently under development within the School of Architecture may prove to create value for contemporary society in surprising places. The projects were funded in part by the Riata Center for Entrepreneurship, Professor Suzanne Bilbeisi’s Centennial Professorship Chair, the Technology Business Development Program at OSU, and other research funding secured by Professor Richardson. Students Cameron Patterson, Jenni Lane, Austin McKiel, and Jonathan Choate contributed to the process of design, fabrication, and construction.

URBAN NETWORK ANALYSIS UNDER STUDY
Associate Professor Seung Ra

During the Spring 2017 semester, Associate Professor Seung Ra was an invited Visiting Scholar at Korea National University of Arts and Yonsei University in Seoul, Republic of Korea where he conducted research in urban network analysis at both institutions. His resulting paper “Parametric Pattern Prediction” was published and presented at The 2017 UIA World Architects Congress in Seoul. His research explored the implications of contemporary computational methods that allow designers to expand the spectrum of architectural research for urban policy through analysis. These computational analysis tools demonstrate how we are designing cities and how we might look to alternative influences. Based on scientific methods and emerging spatial tools, the research focused on urban pattern and formation, which was interpreted through analysis of simulation results. Based on these methods, his research analyzed frameworks for complex urban planning case studies of Asian cities. Seoul, the fifth largest city in the world, became the subject matter and a lab for case studies of pattern and formation, exploring implications for social, political, economic, and spatial aspects.

The research identified three areas for the future direction of urban design guidelines:

Density: Urban density directly translates diverse measurements in many different categories: population density, dwelling density, employment density, gross density, net density, and weighted density. The typical perception of high density as undesirable due to traffic, pollution and low quality of life can be changed based on studying these more specific categories. Thus, the integration between low and high density development with alternative zoning provides valuable clues to potential applications of these patterns to envision future development (Chakrabarti).
Networks as Spatial Configuration and Connectivity: Parametric algorithms are tools for searching out an optimum prediction to study city networks, both visible and invisible. Tangible patterns like streetscapes are living organisms; networks such as these and their adaptation are critical elements of survival. His research explored how computational tools can identify the network’s context, pedestrian and vehicular circulation, conservation of land, and evaluation of city grid plans.

Synthesis as Urban Topological Analysis and Accessibility: This simulation proposes ecological remediation of existing urban areas and reexamines the current course of urban renewal strategies. Computational tools like Grasshopper and Urban Network Analysis Toolbox by CITY FORM LAB articulate the rule-based pattern-formation simulation to study the growth of the city and to analyze it by urban pattern formation.

The complexity of urban planning demands an asynchronous planning approach to accommodate various aspects and disciplines in current urban issues. Computational methods of analyzing and generating urban spaces could be the ultimate platform to bring diverse entities together and continue to evolve the spectrum of urban studies. Seung Ra’s research has continued to develop and has led to the creation of a new architecture elective course, ARCH 4100 Urban Network Analysis, as well as to new analytic tools that will be implemented in the ARCH 5117 urban design studio for the upcoming fall semester.


INTERDISCIPLINARY TEACHING & LEARNING AT OSU

Associate Professor Awilda Rodriguez and Assistant Professor of LA, Bo Zhang

Interdisciplinary teaching has been regarded a desirable pedagogical practice, since it transfers knowledge and techniques, encourages critical thinking, recognizes gaps and bias, and acknowledges ethical concerns (Baloche, Hynes, and Berger 1996; Newell, 2001; Repko, 2008). However, the limited number of cross-curriculum upper level design studios presented little chance to test these claims.

Professor Randy Seitsinger and Associate Professor Awilda Rodriguez Carrión from architecture and Assistant Professor Nick Nelson from the OSU landscape architecture program established a joint studio in 2012 in order to foster an in-depth and complex interdisciplinary design pedagogy. Since then, this joint studio has involved approximately 15 design professionals from four design disciplines on campus and as external jurors, developed about 55 design proposals for eight project sites in three countries, and has offered nearly 260 undergraduate students on campus with challenging and fulfilling learning experiences. Using the joint studios in 2016 and 2017 as a vehicle, this study aimed to gauge the successes of interdisciplinary studio teaching and learning. The main purpose of the interdisciplinary studio has been to expose students to the well-established professional framework of project-based multidisciplinary teamwork typical of workplace
scenarios. Among the successes of the studio has been the breakdown of the design monoculture that both architecture and landscape architecture students have experienced since the early stage of their academic career. During the brief collaboration, students come to quickly realize the need to shift their focus into a holistic approach to design and place-making. From a pedagogical standpoint, students learn the required design and critical thinking skills through lively exchanges among their groups, making of the student-to-student interaction a more critical path to success than the customary faculty-to-student interactions. Many areas of improvement for these collaborations still remain; one of the main hurdles has been the avoidance of accountability by some members in group work scenarios. When students present a lack of commitment, professors necessarily take on the roles of facilitators by pushing students to identify very specific tasks and assign individual responsibilities to avoid the ambiguity that comes from not only the lack of commitment but also the reluctance to overstep into others’ area of concern.

The study investigated six dimensions of interdisciplinarity teamwork: idea provoking, conflict resolution, technique learning, time management, work distribution, and work ethic improvement. Over the multi-years collaboration, key differences characterize how architecture and landscape architecture students approach the task of “idea-provoking.” For architecture students, as it may be expected, the initial proposals involve new structures that both act as a catalyst and embody their vision for urban transformation. Conversely, landscape architecture students initiate the design process from a more analytical base of surveying the natural and built features of the site and its surrounding from which they extract the challenges presented. The diverse approaches influenced each team’s design process as well as the final proposal.

Since the inception of the ARCH/LA collaborative studio, graduating students have expressed that the interdisciplinary approach, even though a brief experience, added significant value to their learning experience and overall education. A lesson learned from this inquiry was that future efforts need to measure the quality of the collaboration not only after the course has ended but should be measured at the beginning as well to manage student expectations and help students understand the necessary components of a successful collaborative environment.


EXPERIMENTS VS RULES-OF-THUMB IN DAYLIGHTING

Professor Khaled Mansy

In both practice and academia, it is understandable that designers rely on simple rules-of-thumb in making decisions regarding building performance during the early schematic design phase. This is especially true in sizing active and passive environmental control systems, including daylighting. Three daylighting rules-of-thumb are available to help designers define a starting point of their design, such as an approximate size of windows that allows effective utilization of daylight. Some designers (and students) rely only on these rules-of-thumb throughout the design process. In academia, because the scope of the majority of design studios is limited to schematic design, architecture students spend 85% of their time using no design-assisting tools other than these rules-of-thumb. This improper use of the heuristics instigated the need to test their accuracy and inform the users on the consequences of not using more precise design-assisting tools instead.

In order to examine the accuracy of each of the rules-of-thumb, with the help of undergraduate research scholar Jordan Taylor, Dr. Mansy built a series of scale models that fulfill the underlying assumptions of the rules-of-thumb to represent a range of height of windows and glass ratios, tested these models under the artificial sky dome, then assessed the performance of daylight in these models in terms of provided illumination level, depth of light penetration, and the need for electric light. Test results, and further data interpretation, yielded the following conclusions:

2.5 Rule: The 2.5 rule provides an accurate prediction of illuminance at locations at 51° NL in the Northern Hemisphere and 51° SL in the Southern Hemisphere. Consequently, at all locations in between, illumination levels at locations as deep as 2.5 h into the space will be higher or much higher than what is desired. In light of the fact that the 2.5 rule-of-thumb was first established about a century ago, it is not surprising that it is now outdated. In
fact, the recommended illuminance for visual tasks were subject to change several times over the past century, which consequently changed the definition of what constitutes a “sufficient illumination” and “effective penetration” of daylight.

**One-Tenth Rule:** The one tenth rule-of-thumb is far from being accurate. Applying the rule will result in much smaller windows than what is needed. Another source of inaccuracy is that the rule estimates the minimum Daylight Factor and not the average Daylight Factor which may be a better indication of illumination levels in the space.

**15/30 Rule:** The 15/30 rule-of-thumb underestimates illumination levels within the first 15 feet from the window, while overestimating them within the next 15 feet.

In conclusion, these rules-of-thumb may only reliably be used to define a very rough starting point in the design of daylighting systems during schematic design. In more advanced design studios, students need to rely on accurate analytical design-assisting tools, such as testing physical models similar to what is required in the School of Architecture ARCH 4216/4263 Comprehensive Design Studio.

**DORIS MILLER MEMORIAL PROJECT UNDER CONSTRUCTION**

Assistant Professor Stan Carroll

Explorative architectural approaches to complex geometries are being brought to fruition by Assistant Professor Stan Carroll, the lead designer for a public art project utilizing complex forms and non-traditional methods of project delivery for a project in Waco, Texas: the Doris Miller Memorial. Doris Miller was a Navy Hero who demonstrated remarkable bravery during the Battle of Pearl Harbor while serving on the battleship USS West Virginia. The project was commissioned through a public art design competition; Stan Carroll’s submission was selected for the Grand Prize among 26 entries; his solution proposed a plaza, water feature, figurative sculpture, bronze bas reliefs, and features a ship shaped stainless steel wall.

The main element of the work is the doubly curved wall which is 140 feet long, 17 feet tall, made of 0.109" thick stainless steel sheet metal. The wall curves horizontally in plan as well as curves vertically in section which exploits innate double curved geometric stiffness to withstand 100 mph wind speeds. The configuration of the sheet metal has no internal structure. All the structural stiffness is generated through a monocoque structural strategy. A monocoque structure uses a structural tactic in which the outer skin carries the major part of the stresses in lieu of exclusively dedicated internal structural members.

The complex nature of the structural approach as well as the intricate geometric configuration offered several challenges for the project’s resolution. The specialized configuration of the digital information produced by the designer is governed by the fabrication methods and particular materials anticipated. Normally, when using methods involving laser cut/bent sheet metal parts, the fabricator makes dimensional modifications to account for the bending effects of the material with the goal of achieving the designer’s intended finished dimensions. However, with the advent of parametric mass customization involving hundreds or even thousands of bespoke parts, the fabricator is not typically equipped to generate such geometrically complex data. Therefore, the designer provided the fabricator with precise digital data suitable for the specific material and fabrication methods. The wall contains over 1,500 unique parts fastened together with 10,000 bolts. The contractor for the $2 million project is currently building foundations, with complete construction anticipated for December of this year.
DESIGN WEEK 2018: Games, Lectures, Honors, Talents, and Pig

The annual Design Week began with a presentation of beautiful and thoughtful work by Paul Mankins, FAIA of Substance Architecture in Des Moines, Iowa, and a special event with Rena Cook, an Emeritus Professor of Theatre as the Women in Architecture speaker. Rena helped us harness our inner voice as well as our public voice! A new tradition of Pecha Kucha night featured several of our professors, allowing them to show us a different side of their interests. The Honors and Awards Ceremony was an event celebrating student success in competitions, and other special awards for the graduating class. The now established Talent Show yielded many musical acts, including the Stivers duo with Professor Stivers donning a kilt while playing his mandolin. The Talent Show winner was a band featuring second and first year students. Pig Roast was held on Friday evening, and featured an actual pig stuffed with more pork products. Every day studios competed against one another in physical challenges on the plaza - the third year class emerged triumphant by the end of the week. In the end, all were thoroughly exhausted but enjoyed the many school spirit events that help to create a sense of community at the School of Architecture.

SPRING STUDENT COMPETITION SUCCESS!

This spring, the Design/Build ARCH 3216 studio prepared team proposals for two independently sponsored studio competitions: the Rosa Parks Elementary School project titled “exercising brain and body: outdoor furniture (& toys) for 3-year old children”, and a Veteran’s Pavilion project for rural OK titled “healing soul and mind: an outdoor conversation pit for war veterans.” The winning scheme of outdoor play furniture is now under construction and will be delivered to the school playground in Tulsa by the end of the semester. The students worked under the direction of Associate Professor Paolo Sanza and Assistant Professor Stan Carroll, with help from David Horton in the Shop.

The ARCH 2216 Design Studio III was tasked with redesigning the CEAT campus within the OSU context, specifically the areas between Engineering South, the ATRC, and the new Endeavor Lab. Students prepared solutions under the topic headings of Site/Space/Structure/Skin and presented their results to the Heads of Mechanical Engineering and Electrical Engineering, who provided prizes for the selected proposals. The renovation of Engineering North is ongoing, with the renovation of Engineering South to begin next year. The Endeavor Lab, west of the Architecture Building, is nearing completion.

Getting Ready for the DISCOVER ARCHITECTURE PROGRAM

During the summer, the School of Architecture annually hosts the Discover Architecture program, which is designed for high school students who may be considering a career in the building arts. Since 2010, the program has included educational projects in Architecture, Landscape Architecture, Architectural Engineering, and Construction Management. Firm sponsorship is always welcome! Or help us recruit students! Contact Professor Bilbeisi for more information: Suzanne.Bilbeisi@okstate.edu

An Interdisciplinary Graduate Certificate in INTEGRATIVE DESIGN

Today’s clients demand an emphasis on building envelope performance, supported by research methodologies and hard data. Students preparing to enter the profession, either as Architect, Construction Manager, Civil Engineer, or Engineering Technologist, can benefit from directed study of new tools and technologies and their integration into design thinking strategies. A Graduate Certificate meets the needs of early and mid-career professionals who desire additional training/education in a specialty area. It can also be considered preparatory studies for new graduates preparing to apply to graduate school elsewhere. The certificate culminates in an independent study course, to be supervised by two Graduate faculty members within CEAT, where the student will apply the concepts learned in coursework to the process of solving a unique design challenge fundamental to the spirit of the area under study. An important feature of the certificate is its interdisciplinary nature – students are required to take three to six hours of this directed study outside their major area. The certificate is 12 hours, and can be completed in as little as two semesters; some coursework is planned to be delivered online. For more info, contact our Grad Coordinator Professor Tom Spector, Tom.Spector@okstate.edu.
FACULTY NEWS

This academic year five adjunct faculty contributed to the educational objectives of the School: in the Fall, Kate Cofer (B Arch and B ArcE 04) and Eric Hoffman (B Arch 99) contributed to the ARCH 5117 Urban Design Studio, and in the Spring, Josh Moratto (B Arch 03) critiqued in the ARCH 2216 Design Studio III, while Bailey Brown (B Arch 16) assisted in the ARCH 1216 Design Studio I. Before the end of the academic year, the ongoing faculty search successfully secured two new hires for the school, Jay Yowell of OKC, and Keith Peiffer of Baltimore MD. More on these new additions later!

Professor Moh Bilbeisi was an invited keynote speaker at the international conference “Representation: Process and Practice Across Disciplines”, hosted by the American University of Sharjah, UAE, in February 2018. His lecture was titled “Towards an Expressive Visual Language.” Moh also delighted the academic attendees, leading a graphic workshop in watercolor techniques.

Associate Professor Ra, working with Sarah Ra and student Will Reynolds, prepared an entry this past Fall in the Yisabu Dokdo Memorial Park International Competition. The international competition asked designers to create a new memorial and monumental park in the city of Samcheok, South Korea, commemorating the legendary General Yisabu (512 A.D.). Faculty often participate in design competitions to ‘flex’ their design skills and engage in a contemporary dialog about architecture with a wider audience.

Under the faculty guidance of Dr. Mansy, the School of Architecture student CSI chapter was recognized by OSU with the first ever Energy Leadership Award for their efforts in creating a sustainable environment in the Donald W. Reynolds School of Architecture Building. A renewed emphasis on recycling (with new bins!), and better management of daylighting strategies contributed to this win! Congratulations!

Of course the big news this semester is Professor Steve O’Hara’s impending retirement at the end of this term. Steve has been a vocal and important fixture of the AE program since he began his studies here in 1978 (as a ‘Fink’!). His 30 year career on the faculty has taken him from the minute study of classical numerical analysis, through writing the ARE Guide for the structures exam, and then on to work on habitat designs for NASA. Please join us May 5th, at 4pm in the School of Architecture Gallery to celebrate Professor O’Hara’s accomplishments and accolades as an educator. All are welcome!

ALUMNI NEWS

We were saddened to learn of the passing of William (Billy) Ware in early 2018 after a long battle with cancer. Billy graduated with both the B Arch and B ArcE degrees in 1996; as a student he was a tireless and passionate ‘explorer’ of ideas. Upon graduation he worked in the Dallas area, and in 2002 formed his own successful company there, Ware Architecture Studio, where he specialized in custom residential design. He is survived by his devoted wife, Rebecca Morgan Ware (B ArcE 96) and three children. Billy’s nephew Harrison Naff graduated in Fall 2016 with a B Arch as well.

David Huey, AIA (M Arch 83) was recently named president of Dewberry Architects Inc, a national practice with more than 135 design professionals in multiple offices from coast to coast. David’s 32 years of practice with Dewberry in the Tulsa office has resulted in a portfolio of award-winning projects in the health care sector. Congratulations, Dave!

AND FINALLY...

Please let us know what is happening in your world! Alumni news is always welcome. And if you are able, please support the OSU School of Architecture with a gift via the OSU Foundation website: www.OSUGiving.com, and search ‘Architecture’. We have many funding initiatives - Scholarships, Study Abroad, and other programs that need support. Feel free to email Suzanne.Bilbeisi@okstate.edu with any questions! Thank you!!!