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becoming what is yet to be

2024
INTERNATIONAL
CONFERENCE

**ABSTRACT
BOOK**

2024 International Conference | Conferencia Internacional Inflections | Inflexiones

June 27-29, 2024 | Querétaro, Mexico

ABSTRACT BOOK

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Pedagogies For Innovating Passive Systems Using Evidence-based Design

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Space heating and cooling account for more than half of buildings' end-use energy consumption in the U.S. and similar patterns exist globally [1, 2]. The ongoing climate crises, the accelerating urban growth occurring primarily in hot and warm climates, and the global building floor area that is expected to double by 2060 [3] mean that the demand for space conditioning will continue to rise during peak use periods. Passive technologies for heat gain, heat dissipation, and heat regulation which are typically introduced by the architect into building designs, have been marginalized in favor of the standard mechanical systems typically introduced by the engineer and achieve ubiquitous levels of comfort regardless of climate conditions, geographic location, or culture. While there are several advantages to this, there is a renewed interest to innovate passive systems historically common in building design. Properly integrating such systems into new buildings and major renovations requires immediate attention and can have a significant impact on minimizing the energy demand and hence the overall impact of the built environment on the natural environment. To instill in future professionals the ability to advance and incorporate passive systems into design proposals, a sustainability course sequence focusing on evidence-based design and offered through the accredited Master of Architecture program was created. This paper reports on curriculum design and student outcomes from delivering the sequence three times over the past three years during the spring semester with 2021 focusing on innovations in passive cooling devices, 2022 focusing on innovations in passive heating and cooling devices, and 2023 focusing on innovations in opaque and translucent enclosure assemblies. Prior to the introduction of the sustainability course sequence, students' curricular opportunities related to sustainable design were limited to an introductory course at the sophomore level covering broad issues and strategies. In addition, having the Architecture program situated within the College of Engineering strengthened the demand for introducing design students to empirical evaluation methods, which was lacking in the curriculum as well. The sequence fills these gaps by stacking two courses, a lab, and a studio, into a semester-long sequence. Students in the lab were challenged to develop innovative and marketable building system prototypes whereas students concurrently taking the studio in addition to the lab were challenged to develop designs for a multi-family housing community that addresses broader sustainability issues while incorporating the systems developed in the lab course. Students learn to apply a comprehensive suite of digital and analog tools as they progress through the sequence. Areas of knowledge covered in the sequence include Computational Fluid Dynamics, Whole-System Mapping, Life Cycle Assessment, Entrepreneurial Mindset, Lean Canvas Model, and physical prototype construction and evaluation. A proprietary environmental test chamber was used to replicate climate conditions in hot regions and test passive cooling prototypes. Multiple years of student responses to an exit survey indicated a significant improvement in their knowledge of the digital tools introduced with modifications to the curriculum made on a yearly basis in response to the feedback they provided.

Innovative Material Hybrids: A Sustainable Paradigm Shift in Construction through LLM-Generated Synthetics

Catherine Graubard, University of Texas at Austin

This research addresses the critical challenges of carbon emissions and raw material scarcity in the construction sector, leveraging Large Language Models (LLM) from Berkeley's Materials Project and Google's GNoME databases. The primary objective is to develop a systematic workflow for searching and synthesizing materials that could substitute traditional construction materials. With the construction industry contributing significantly to global carbon emissions, this study emphasizes a methodical approach to reduce CO₂ emissions by substituting conventional materials with LLM-generated alternatives. The research methodology involves a sequential process of four key steps. The initial phase entails a thorough literature review, analyzing papers that reference Berkeley's Materials Project and Google's GNoME databases (1,2). This review informs the development of a robust workflow for searching and synthesizing materials. By identifying existing research utilizing these databases, the project ensures a comprehensive understanding of the materials landscape, enabling the creation of an effective search strategy. The workflow aims to streamline the synthesis of material recipes, laying the foundation for the subsequent stages of the research. Following the literature review, the research proceeds to the second step, where material features are systematically analyzed. This includes a detailed examination of the characteristics of LLM-generated materials and their suitability for construction applications. The goal is to cross-reference these features with those relevant at construction scales, ensuring that the synthesized materials not only meet sustainability criteria but also possess practical applicability. This meticulous analysis helps identify the most promising candidates for substitution in traditional construction practices. The third phase is dedicated to a specific case study, where the selected material recipes are employed to build a prototype. This real-world application aims to demonstrate the feasibility and effectiveness of the proposed LLM-generated materials in an authentic construction context. The case study involves collaboration with a laboratory for material testing, marking a pivotal step towards validating the project's contribution to sustainable construction practices. During this phase, a comprehensive comparison in embedded carbon will be conducted between the LLM-generated synthetic material and its typical construction counterpart. The outcomes of this analysis will inform future advancements in material testing and sustainable hybrid configurations. In the fourth and final phase, the research introduces the Stable Diffusion model, a text-to-image representation tool. This model generates realistic visualizations of the proposed synthetic material across various architectural scales, ranging from surface treatments to building elements. The phase aims to provide a visual representation of the material in different contexts, enhancing its versatility and applicability in architectural design. This research holds significance in addressing the issues of carbon emissions and material scarcity in construction. The study leverages LLM and open-source data from renowned databases, to develop a systematic approach to material synthesis. The workflow, informed by a thorough literature review, sets a precedent for future research in sustainable construction practices. As the project advances through each key step, it contributes insights to the academic community and offers tangible solutions for reducing the environmental impact of the construction industry. Keywords: synthetic materials, LLM, cross-scale design, embedded carbon

CFD Storm Runoff Simulation Methods for Climate-Adaptive Urban Surfaces

Kentaro Tsbaki, Tulane University

Extreme weather events are more common due to climate change. Strategic deployment of climate-adaptive urban surfaces will impact cities' resiliency by effectively managing stormwater and promoting permeable, bio-diverse green landscapes, reducing the heat island effect, and improving air quality, contributing to the citizens' general physical and social benefits. One of the critical attributes in enhancing the design is understanding the performance of its surface geometry relative to the characteristics of water flow at various scales explored in the research studio setting[i] (Figures 1 and 2). Computational fluid dynamic (CFD) simulation, widely used in science and engineering, can be adapted. The paper touches on the theory and the development of CFD and explores the modeling methodology appropriate for simulating the behavior of rainfall runoffs on complex ground surface geometry at the urban-landscape scale. In addition, it will speculate on how AI can enhance the process, easing access to sophisticated and powerful tools for designers. Based on the research and consultation with experts, Flow-3D Hydro[ii], the industry-leading CFD software, was chosen for the investigation. The simulation poses several challenges. First, CFD modeling must accommodate free surface conditions where fluid boundaries change over time, adding significant complexity[iii]. Second, much research has been conducted on the object, infrastructure, or territorial scales but none on the urban-landscape scale. The size of the simulation domain defined by boundary mesh in the setup notably impacts the computational intensity, resolution, and appropriateness of the outcome. Third, unlike rainfall, most applications introduce fluids into the domain that flow horizontally, perpendicular to the gravitational force. Surprisingly, no standard methods for rain modeling were available in the existing literature[iv]. Several basic boundary setups were tested in 2D shallow water[v] and 3D to assess the viable methods for the intended scale (Figure 3). VoF inflow on the X-Y boundary mesh plane along the Z-axis Droplet Source located within the boundary mesh Mass-momentum Source plane positioned above the ground surface geometry within the boundary mesh Surface geometry as Mass-momentum Source. Rain is introduced perpendicular to the ground surface geometry. Introduce fluid as particles. The ground surface geometry was extracted from the student design generated in the aforementioned research studio to test its applicability. Regardless of the setups, 3D simulations were resource-intensive. A relatively small amount of fluids introduced to a comparatively large swathe of the surface over time results in unstable, uninterpretable outcomes at the scale/resolution (Figure 4). The research indicates that methods 3 and 4, combined with the 2D shallow-water simulation, produced robust and promising results that can be analyzed and interpreted to inform the design direction (Figures 5). CFD is a powerful and resource-intense tool. Operating and extracting valuable results requires a sophisticated understanding of math, physics, and computational methods. Integration with AI may significantly lower the access threshold. The research is a small step toward democratizing its capacity to visualize a time-based complex phenomenon, useful in the design process. The goal is to address the urgent need for climate-adaptive urban surfaces to address the critical environmental issues of our time.

The Responsive Practice: Design and the New Economic Thinking in the 2010s

Frances Hsu, University of Tennessee Knoxville

The paper historicizes new heterogeneous hybrid models of design research-practice emerging across Northern Europe in the decade following the 2008 global financial crisis. It explores how voices contesting key aspects of mainstream economic thinking have mediated architecture, technology, media, and the sciences (including but not limited to geography, policy) in response to socio-environmental crisis. Cultural relations of autonomy/contingency, aesthetics, and control across the design disciplines, sociology and critical theory are foundational to evaluating the practices of a plural, heterogeneous landscape of actors intersecting design, the professions, and academia. New Economic Thinking (NET) purposefully challenges the social and environmental impact of libertarian economic systems. Stemming from Warren Buffet's Institute for New Economic Thinking, it is based on the principle that economics should serve society: "Mainstream economics has demonstrated blind spots that have impaired its effectiveness and credibility—and failed society at large." (1) NET ultimately leads to a call for democratically controlled accumulation, postulating capitalism as not just economics and finance but rather a system of power and culture (Moore) that will be further destabilized by huge transformations of the earth. Assessments speaking to a post-neoliberal era include *Towards a New Economic Approach* by the Organisation for Economic Co-operation and Development/OECD (2) and the *People's Green New Deal*. (3) The paper is part of a larger research project on taxonomies of alternative productive practice operating between design and government. The first iteration of the project focuses on organizations in the Nordic cultural and geographical region that purposefully challenge the impact of libertarian economic systems on how the built environment is produced. The second part focuses on selected local government of mid-size cities (so far including Lille, France, and Malmö, Sweden). The presentation outlines interdisciplinary research, experimental pilot projects, and consultancy services in the public sector that address a broad and diverse range of systemic changes implicated in the areas of green economies (circular, regenerative, ecological), feminist economics, solidarity and democratic economics, de-growth/post-growth, indigenous and local knowledge, land and ownership, and laws of the common good. Many of the initiatives begin before the design process starts and address outcomes beyond the project itself. Of interest is how the responsive practices help to clarify changes in architecture's understanding of its disciplinary conventions, approaches, and principles in the face of societal and planetary transformation.

Reclaiming the Community: Leveraging Architectural Processes to Gain a Seat at the Global Development Table

Yutaka Sho, Syracuse University

James Setzler, Independent Researcher

Architectural projects aiming to benefit the global South consist of various actors, including benefactors, beneficiaries, regulators, technocrats and so forth, in both the global South and the North, in what could be called the global development industry (GDI). The work of an architect in the GDI reflects the often-conflicting demands of many clients, including the Funder from the global North, Local Government in the global South, and the End Users. This paper asks: In the GDI structure that tends to neuter the local community's agencies, what is required for the End Users to reconstruct a community, and what is the new definition of "community"? And how could the architect support the End Users in this effort? The paper reveals the GDI's impacts on the End Users' built environment by analyzing a community center project that provides necessary services in rural Rwanda as a case study. For this over-sized and expensive facility funded by a global corporation, stakes were high for both the Funders and the Local Government. The paper analyzes the comprehensive architectural process of the community center, from fund raising, programming, planning and design, construction, maintenance, to future development. The analysis found the Funder's investment approach impacted the rural End Users' built environment, and the architects mediated, or failed to mediate, conflicting development ambitions and desires. The project structure shared similarities with typical construction projects in the global North in which the Funder specified the budget, schedule, and programs, which could be called program investments. Conversely, ecosystem investments that incorporate the complex interplay of partners, prioritizing End Users' existing needs and scaling local practices that have had positive impacts already, was also practiced. The Funder's investments in the project have been a combination of both the program and the ecosystem approaches, and the architectural project at once disenfranchised and empowered the small Rwandan community. The architect expected the GDI's powerful actors to overwhelm the End Users. On the contrary, the project found unexpected End User empowerment brought on by the local Owner who have asserted themselves in determining the project's future directions. The paper claims that, if the End Users were able to redefine and reconstruct the "community" because of an architectural project, then, restructuring of the GDI itself may be possible. The community center's new Owner is currently in the process of garnering capacities and a leverage to negotiate with powerful GDI actors. The Owners participated in building the center, and they were themselves the End Users. They proceeded to manage the facility prior to becoming the official Owner, and as such, directly witnessed the damages by the climate crises on the buildings and on the End Users' lives. The experiences gave them the irrefutable jurisdiction over the center's governance. Their ability to recognize, then use the leverage over the powerful GDI players makes them an effective community representative. The paper argues that the End Users' architectural experiences of building and managing the community center allowed them to reclaim their "community."

The Impact of Land Property System Changes on Rural Spatial Patterns in Shanghai - Evidences from Pudong District

Shan Zhou, Tongji University

Before the founding of the PRC, under the influence of the incremental formed waterway network structure and agricultural lifestyle, the rural spatial pattern of Shanghai Pudong formed a scattered village layout with Gaoquan houses as the main residential building prototype. However, after the founding of New China, the rural spatial patterns of Shanghai Pudong underwent drastic changes, closely related to the changes in the land property system. This study aims to sort out the several changes in the rural land system after the founding of New China, to understand the changes in Shanghai's rural spatial patterns and the mechanisms behind them. Land certificate archives, historical maps, and old photographs were collected in the Pudong countryside, and graphical analyses were carried out in light of the present situation. Details of policies, demographic changes, and villagers' construction behaviors are analyzed from the perspective of land ownership. It is found that with the changing needs of productivity development, the rural land system has gone through the stages of private ownership of homesteads, homesteads owned by production units, homesteads owned by farmers' collectives and of stricter land management, in turn, from the feudal land system before the founding of the PRC. These phases were accompanied by spatial pattern changes in rural dwellings, farmland layout, transport, and water conservancy systems, which led the Pudong villages of Shanghai to the appearance they have today, as can be vividly evidenced in the three cases of Qiaolangli Village, Tang-alley Village, and Chunxin Village. This study provides a basis for understanding the mechanism of morphological changes in the rural villages of Pudong, Shanghai from a historical perspective

Crafting Zimbabwe: Reimagining the Role of the Artisan in Design

Tania Ursomarzo, American University of Sharjah

This paper examines the potential of indigenous woven handcrafts in Zimbabwe and other parts of Africa to reimagine applications to contemporary design, contribute to cultural heritage, economic development, and the future of sustainable design and making through a community-based model of locally and globally connected satellite centers of artisans. The paper investigates an infrastructure that reimagines both the role of the contemporary artisan, and the social and economic system within which they operate in Zimbabwe. Central to Zimbabwean cultural heritage is a long standing and sophisticated arts and crafts economy which has been fostered by various local communities. The artisan, a respected member of Zimbabwean society, sustains cultural heritage through their practice of indigenous crafts which utilize natural, locally available, biodegradable, renewal materials. However, the value of traditional handcrafts as a unique and environmentally responsible form of making continues to be reduced to decorative objects rather than exploring its potential as a design and architectural material. Could the artisan that makes your rugs also construct your home? The paper positions the artisan as an independent artist, multi-label manufacturer, and fabricator that works at the scale of object and space. Further, the paper questions whether the application of indigenous craft to contemporary design can expand the repertoire of the artisan and create socio-economic opportunities while raising awareness about the importance of preserving and valuing traditional craftsmanship. Visits to and interviews with craftspeople and craft communities in Zimbabwe examine a people-centered approach to design and making, as well as demonstrate the challenges of sustaining indigenous handcrafts in a way that supports the culture and economy of Zimbabweans. Despite the large presence and practice of indigenous weaving in Zimbabwe compared to other parts of the world today, the skills of talented and knowledgeable craftspeople are not utilized beyond decorative objects destined for export to home furnishings stores. The paper argues that communities which educate and support each other in a variety of ways, transfer valuable knowledge and skills generating economic empowerment and cultural connection. Collaborations with Zimbabwean weavers explore the application of basket and mat weaving techniques to architectural design. Through documented experiential, auto-ethnographical research and creative production, the paper will investigate the use of design as a tool to elevate craft in a way that advances its techniques and expands its applications. By opening pathways and nodes that evolve woven handcrafts and permit community-based non-formal education and transmission of skills, the paper looks at a programmatic sustainability that is about building networks that support creative and economic growth in Zimbabwe preventing communities from being dependent upon the outside. Lastly, the paper analyses the potential of material collaborations between designers and artisans to reimagine the ways in which we live and create, making woven handcraft relevant to contemporary design, culture, and technology.

Bio-Retrofits: Increasing Resilience Through Living Materials and Building Circularity

Nina Wilson & Yutaka Sho, Syracuse University

BIO-RETROFITS is a decentralized mycelium design ecosystem that convenes 1) agricultural and construction skills and knowledge of New Americans, 2) existing flows of material and waste, and 3) low-income housing design criteria, toward the development of a contextually-adaptive model of practice that scales regenerative principles from the project to the design ecosystem. This research amplifies agricultural skills, augments existing economic engines, and establishes self-build housing retrofit opportunities in a New American farmer community in Central New York. By capturing existing agricultural waste flows (agriwaste) and transforming them into mycelium-based building components, the project creates material for retrofits of vacant commercial-industrial shell buildings into low-cost housing with minimal material imports. This work builds upon a multi-year interdisciplinary research effort to develop the potential for biocomposites in the built environment. A team of Rwanda- and US-based designers have been collaborating to construct full-scale structural and partition modules using a living design ecosystem rooted in the needs of a non-industrialized community. Biocomposites were made with mycelium, agriwaste, and non-recyclable plastics, the composition responding to the analysis of local waste flows and the absence of recycling infrastructure. The present work adapts this framework of process-to-product innovation and participatory construction to connect local skills, knowledge, materials, and laboratory research to an urban, industrialized context. Access to regional supply chains in an urban site will be balanced with minimization of life cycle carbon emissions, in service of the autonomy and agency of the New American community. This project articulates the potential for empowerment, beyond the artifacts of architecture, that the mycelium design ecosystem could bring to low-income, BIPOC, and otherwise vulnerable communities anticipated to bear the greatest impacts of climate change. The experiments in Rwanda bridge the global South and the global North in service of the ill-housed, reversing the typical North-South transmission of expertise. The framework will be adapted to invite the leadership of New American farmers who share indigenous agricultural and building knowledge but struggle to engage their areas of expertise with local economies. Partnership between New Americans and our student design and research team, including invited participation from practitioners, activists, policymakers, and scholars, presents the opportunity for replicable workforce development to include non-English speakers, elderly, and residents with disability. In parallel, mycelium has a potential to further the disciplinary commitment of architecture to innovate and challenge established design practices. Filamentous mycelium's high plasticity and programmability can enable optimized forms and scales, and sound, color, texture, temperature, and lighting effects that respond to project requirements. With the goal of independence, self-reliance, and resilience through accessible architectural processes, the project will demonstrate how biocomposites using local waste flows, coupled with complementary bodies of knowledge, can rebuild homes and economies. The work will culminate in a comparative study that evaluates the outcomes of the framework developed in Rwanda in the New York urban location, alongside including the physical artifacts of building, surveys with residents, and assessment of effectiveness and future potential viability for integration into a sustainable model for research and practice.

Future + Post-industrial City | Rise

Friday, June 28, 2024, 11:00am-12:30pm

Circular Design: A New Paradigm of Future Generations

Dillon Pranger, Illinois Institute of Technology

Through understanding architecture and construction as one of the largest contributors to both material depletion and waste production, it is clear, that a complete change of practices in our profession is necessary. While architecture is slowly coming to terms with understanding its role in greenhouse gas emissions and global warming through embodied energy and carbon calculations this is only a start. The built environment is responsible for approximately 30% of the annual global material consumption[1], and, at the current rates of mining, it is estimated that only a finite amount of raw materials such as sand, tin, zinc, copper, remain in the earth's crust. This reality means we will see the end of many of these materials within the next half century. To reverse this trend, we must extend our understanding of building resources beyond raw material extraction from the earth. Traditional models of practice based on linear paths of consumption (take, make, throw) will no longer suffice and we as the future generation of architects need to reconsider our role in changing this antiquated process. To do so, we must consider new sustainable ways of thinking within the field of architecture through the notion of the circular economy (take, make, repeat). The circular economy, as it is applied to the field of architecture, depends not only on reducing consumption and waste, but on rethinking multiple aspects of our profession's habits from where materials are sourced to how they are even initially designed and manufactured for future recovery. These issues extend themselves deeper into our profession through standardized construction methods, building code regulations, and municipal policies that have been developed in an era where the perception of resource abundance and little consideration for the built environment's ecological impact existed. This will not be the reality for future generations of architects. **Circular Design: A New Paradigm of Future Generations** A series of built and on-going case study projects by the author attempt to expose, challenge, and further unpack specific issues found in traditional methods of practice dealing with material, construction, and policy. While understanding there is no singular solution to solving these issues of climate change, material consumption, and waste production as they relate to the built environment, these projects present an alternative approach to architecture practice – one of material consciousness and environmental focus. Designed as a series of pavilions, each case study questions the permanence of architecture through visualizing the project in a constant state of indeterminacy. Typical details and construction methods are modified for ease of assembly and disassembly. At the end of each pavilion's lifespan, nothing is to be demolished and landfilled, but rather understood as a collection of existing and reusable materials. In doing so, each project provides future lifecycles for each of their material inventories through a closed-loop system. These propositions aim to upend traditional architectural methodologies by questioning the role of the future architect while challenging the discipline to address urgent material issues within the larger design process.

Making a Fuss: World Stories for the Future

Lori Smithey, University of Idaho

The scale and urgency of the social and ecological reckoning that looms over the present and future is so outsized that it can yoke the range of possible responses into a singular mandate for heroic action. Unfortunately, the pressing nature of the problems often masks the fact that these troubling conditions constitute our inheritance from previous heroic narratives in the name of other grand causes. This paper presents work from a vertical studio currently being taught that takes as its starting point a feminist storying methodology. The ambition of the studio is, in the spirit of Virginia Woolf, Isabelle Stengers, Vinciane Despret, and Donna Haraway, to make a fuss. Making a fuss involves infidelity to patriarchal genealogies and the pretense of human exceptionalism. Making a fuss stirs up unheard stories of relentless diversity, and, in opening up that terrain, makes room for new narratives of living. Our studio adopts these alternative techniques of storying-with-problems over the heroics of problem solving in order to think in new ways about our response-abilities. The paper will present the premise, process, and outcomes from this course. Students are working on sites that they have selected across the globe, including Mexico City, Awaji Island in Japan, and Salar de Uyuni in Bolivia. Their projects gather earth-world stories across species and across time in a speculative nature. The process involves developing four conditions: ground matters, visual languages found and imagined, narrative containers, and thickened thresholds. Underlying this collective endeavor, is an assertion that architecture's techniques and tools warrant reconsidering, or, said another way, that we cannot address contemporary and future problems with the tools that were instrumental to their making.

Buffalo Connections for Future Health

Michael Everts, Montana State University

The reintroduction of North American Plains bison to the Fort Peck Assiniboine and Sioux tribal lands in eastern Montana initiated a process of ecological benefit and the opportunity for underserved communities to increase their capacity to improve the health of their lands, people, and culture. The return is a bison homecoming after an absence of 150 years. This work sparked community interest in ensuring this return enhanced the community's health and welfare. Surveys of 3,000 community households done by the Pte Group and the World Wildlife Fund in 2014 indicate a desire for greater access to herds.^[i] It is, therefore, critical to identify models of design that can create enhanced experiences with bison. Over the last six years, architecture students worked with the tribes to iterate on design approaches and the creation of spaces that could fulfill the tribes' aspirations. CNC technologies and crowd-sourcing strategies brought in a wide range of community members to become "makers" of cultural material, broadening and deepening connection to the effort. The process and eventual land installation designs that emerged initiated a trusted word-of-mouth network, multiplying the impact. The Buffalo Connections trail, (Pté Bahá Ocágu [Nakoda - Buffalo Hills] Wamákhakā?kaŋ?kaŋ [Dakota - All that move on the land]^[ii]) which weaves through the ancestral plains dedicated to the bison, was conceived to host interactive cultural installations. The concept of Story Poles—derivations of native 'talking sticks'—emerged as a strategy for the designs. The first installation is the "Woven Willow" (Ca'ógatija in Nakoda, Cohwan?iča in Dakota)^[iii] pole, designed for bison to rub against, structurally pliant under the enormous force, where its movable pieces (CNC cut blocks upcycled from Corian sink cut-outs) capture buffalo fur for collecting as a material for art and ceremonial uses. It fosters community connection in that all the pieces of the pole are CNC'd with artwork provided by students from all the reservation's high schools. The second installation, an artistic "Vision Tower," (Odu'wá ípa in Nakoda, Wowanyanke in Dakota),^[iv] allows the observational and performative experience of the returned native bison in their prairie landscape. Children can climb the tower and tell the story of what they see to the adults on the ground. Moreover, the Ash tree structure is CNC carved with the handprints of nearly 100 Indigenous community members. Collecting scanned native hands, translating to CNC files and routing into the Ash poles began as a summer class and, over several years, covered all the poles. Traditional approaches to cultural artifact creation often rely on individual artists for paintings, sculptures, and other object-oriented pieces. Also, signage is used to describe an area or artifact's significance. The design model for the land installations multiplies aspects of these approaches by using technology to increase the number of makers and the depth of ownership, extending the impact of the return of the bison.

Urban Resiliency in the De-Industrializing City: Networks of Care and Mutual Support in Southwest Detroit

Diana Anda, University of Michigan

Above all, this investigation and case study is a call to action. It is a call to action against systems that continue to limit funding through neo-liberal ways of running our cities. This continuing study highlights how this is true for Southwest Detroit; however, these complexities are also present in the larger context of US cities. This lack of investment in many areas has resulted in communities drowning in limited resources, capacities, and needs. As urban designers, how can we equitably work with Environmental Justice Communities of Concern (EJCOC) to advance urban resiliency through existing care networks and mutual help to advocate for more public resources and design agencies? In de-industrializing regions where years of financial austerity have weakened the collective institutions of social protection, what does it truly mean for a community to be resilient? While we refer to Detroit as a post-industrial city, residents in Southwest Detroit experience a very different reality as they live in close contact with a high concentration of heavily polluting industries and large-scale infrastructures. Despite this reality, Southwest Detroit remains one of Detroit's most stable, economically dynamic, and diverse communities. Why, you may ask? "In the absence of visionary and compassionate leadership, many Detroit citizens have taken matters into their own hands." (Lignon, 2017). Resiliency in Southwest Detroit has taken the shape of forced community action; what are the consequences of this responsibility? My journey was not linear. I placed myself in the middle of two timelines - an impossible space to position myself within conflicting time constraints. The academic context asked for deliverables and a "thesis" within the tight timeline of the fall semester. However, my position constantly returned to the pace of "moving at the speed of trust" (Brown, 2020). This journey exposed the cracks in our neo-liberal city systems, our academic systems, and the space still missing for work such as mine. Over the years, a dense ecosystem of local organizations, many of them led and sustained primarily by women, have taken the space as service providers in this absence of government support. This case study has attempted to work within these networks to center the voices of local stakeholders within our agency as designers. Working alongside two incredible organizations formed and led by Latina women, I had the honor of being a small part of this network and experiencing the mentorship and care of the community. However, did this add to their limited capacity and ask the community partners to give more than they have space for? Typically, this type of work is defaulted to other professions. My agency returns to the importance of urban designers working within the traditionally built cities and systems, in order to combat these challenges at a spatial, social, and environmental level. Working with communities makes our interventions and advocacy roles all the more deeply rooted in place. As seen in my humble workshop, this way of practicing urban design takes time and investment in local voices, and we've only just begun.

Revitalizing Postindustrial Urban Space: A Comparative Analysis of Mexico City and Cleveland

Brendan Ho & Paul Mosley, Kent State University

Rodrigo Pantoja-Calderon & Diana Garcia Cejudo, Tec Monterrey

Globally, post-industrial urban territories face many challenges spanning environmental degradation, urban fragmentation, and socioeconomic disparities across various scales. The transformation of industrial sites has engendered expansive urban voids as industrial activities migrate from city centers to the periphery. Furthermore, infrastructure limitations and regulations have further exacerbated this spatial restructuring. This is especially true in Mexico City and Cleveland, Ohio, despite their distinct geographical and cultural contexts. Both cities grapple with the social and economic aftermath of industrial decline, necessitating interventions in urban revitalization, nature-oriented design approaches, and resilient urban strategies. This paper emphasizes the scale and scope of architecture in addressing these urban voids, which have created a rift between marginalized communities and essential resources and services available in other parts of the city. Architectural education and the role of future professionals are central to enhancing the quality of life in these communities. Through a comparative analysis of key industrial sites in both cities, this study explores three primary questions: How does architectural form contribute to revitalizing post-industrial spaces? How can architecture leverage the transitory nature of urban voids to facilitate decarbonization in previously carbon-intensive zones? What are the similarities and differences between the deindustrialization and revitalization of these zones in the two cities? Post-industrial voids in both contexts offer opportunities for architectural intervention, including green infrastructure, inclusive urban development, and adaptive reuse. Redevelopment requires physical restructuring and reshaping the social fabric within affected communities. The study utilizes interviews, site visits, project analysis, and environmental data within the architectural design studio context to examine the multifaceted challenges and prospects in post-industrial urban environments. Given these complex challenges — such as scarcity, air pollution, and the urban heat island effect stemming from the over-extraction of groundwater — along with opportunities to decarbonize urban areas, improve energy efficiency, and adapt to climate-related challenges play a crucial role in addressing climate change in the post-industrial landscapes of Mexico City and Cleveland. This paper advocates for architectural education to cultivate a commitment among emerging architects toward devising innovative solutions that address the social imperatives of communities residing within and around urban voids. These endeavors are necessary for nurturing resilient and equitable urban futures. Furthermore, the exchange of pedagogical practices and collaborative learning between these cities holds the potential for cross-cultural knowledge and collective problem-solving. The convergence of teaching and collaborative endeavors across diverse urban landscapes serves as a platform for nurturing resilient and equitable urban futures that prioritize the well-being of all ecological communities.

Spatial Decoding: Beyond Measurement | Tilt

Friday, June 28, 2024, 3:00pm-4:30pm

Deciphering Urban Informality: A Methodological Framework Using Computer Vision and Machine Learning

Taraneh Meshkani, Kent State University

As the field of urban design and planning stands on the cusp of transformation, propelled by advancements in technology, this research anticipates the role of machine learning and computer vision in shaping the cities of tomorrow. Within the framework of the "INFLECTIONS" conference theme – becoming what is yet to be – this study positions these technologies as pivotal tools for redefining our understanding and approach to urban informality, with a focus on Lima, Peru. The research sets out to explore the intricate landscape of urban informality in Lima, Peru, employing a novel methodological framework that integrates computer vision and machine learning. Lima, characterized by its significant informal settlements, provides a compelling case study for investigating the spatial dynamics and growth patterns inherent in urban informality. The core question driving this study is how advanced technological tools can be utilized to not only understand but also predict and potentially guide the development within these informal urban spaces. The methodology involves a two-fold approach: firstly, the application of computer vision techniques to aerial and street-level imagery to systematically map and analyze the physical configurations of Lima's informal settlements and differentiate it from formal urban fabric. This process aims to extract quantifiable data on housing density, spatial distribution, and the morphology of informal structures. Secondly, machine learning algorithms will be applied to this dataset to model potential growth trajectories and identify emergent patterns within these communities. The predictive capacity of this model seeks to inform proactive urban planning and policy-making that is sensitive to the nuances of informal development. Given the exploratory nature of this research, the study is poised to raise several pertinent questions regarding the interplay between technological interventions and urban informality. Potential inquiries may include: How can the insights derived from computer vision and machine learning inform sustainable and inclusive urban planning strategies in informal settlements? What are the limitations of these technologies in capturing the socio-economic dynamics that underpin informality? And, how can participatory approaches be integrated into this technological framework to ensure that the voices and needs of the local communities are adequately represented? By analyzing the specific context of Lima's informal settlements, this study aims to contribute to a deeper understanding of urban informality and the potential of technology to address its challenges. This research not only adds to the academic discourse on spatial justice and urban resilience but also proposes a forward-looking approach to urban design that is informed by, and responsive to, the realities of informal urban development.

Twinning! - Explorations in Fidelity and Memory using Digital Twins

Farre Nixon, University of Tennessee-Knoxville

Motivated by myriad ominous and impending catastrophes including climate change, biodiversity loss, and food scarcity, several ambitious, top-down initiatives are underway to produce digital twins of the natural environment, with the goal of eventually twinning the entirety of planet Earth. [1, 2] The digital twin - a virtual representation of a physical or speculative entity - holds manifold potential. When linked to data sources that regularly update the proxy to reflect a physical entity's current status, digital twins can be used to further optimize processes, increase accuracy in scenario planning, and reduce uncertainty in decision making. Digital twins are quickly becoming an indispensable tool in the enterprise and industrial metaverse [3], however their applications to the natural environment are still incipient. [4] As stated within the European Commission's goals for the Destination Earth project, creating a digital twin of the Earth system powered by high-performance computing and artificial intelligence allows for stakeholders to better prepare for and "respond to major natural disasters, adapt to climate change and predict the socioeconomic impact". [1] However, these promises come true only when the digital twin is accurately modeled and consistently fed real-time, high-quality data. As noted by proponents and critics alike, the efficacy of digital twin technology is limited by a variety of factors such as the digital infrastructure that hosts the twin and its ability to handle increasingly complex and varied inputs. [5] Climate change data, notorious for its unpredictability and complexity, presents a challenge. [4] Furthermore, the fidelity, accuracy, and applicability of any output provided by a planetary-scale digital twin may come at the expense of our privacy. To completely instrumentalize the planet using top-down approaches is an enterprise that necessitates an exponential proliferation of invasive sensing technologies, both remote and embedded. [6] Data acquired through sensing are largely empirical and are increasingly parsed and processed through AI; while useful for scenario planning and forecasting, empirical data alone fail to capture and represent some of the more intrinsic dimensions of the human experience. These shortcomings, however, fall within the proficiencies of designers, positioning the design practitioner as a potential innovator for digital twin technology. This presentation contends for the production of digital twins at the human-scale through localized, grassroots efforts. Using projects conducted by graduate landscape architecture students within the framework of a design studio as an example, the author explores the following questions: (1) How might designers utilize existing skill sets to produce and steward human-scale digital twins through sustained engagement with communities? (2) How can human-scale digital twins archive and represent data beyond the empirical, such as the qualitative, lived, or phenomenological aspects of human experience? (3) What value might a low-fidelity, low-resolution digital twin yield as a representation of a real-world entity or platform for speculation? The presentation concludes with reflections on integrating digital twin technology into architectural pedagogy from both an aspirational and critical perspective.

Naturalized Architecture: Framing the Concept of Rewilding

Semere Abraha, University of Cincinnati

Rewilding is a vision of wilderness inhabited by both humans and non-humans equally. This paper examines the concept of rewilding in architectural discourse, highlighting the need for a paradigm shift from a human-centered to a non-anthropocentric future driven by climate change and a psycho-physiological imperative. It investigates the characteristics of rewilding through three lenses, including the temporality of aesthetics, human agency as a variable, and adaptivity of materials. First, it explores the temporality of aesthetics by surveying design theories such as metabolism, adaptable architecture, and emergent structures. Second, it examines the variability of human agency, ranging from participatory and open-ended approaches to self-organizing systems. Finally, it explores the adaptivity of materials varying from biomimetic materials to biotechnological materials. This research has found that self-organizing systems are suitable for setting the foundation of rewilding, and the micro-unit capable of self-assembly and dynamic growth will comprise microorganisms. It concludes that through rewilding, architectural form can negotiate human and non-human needs, natural processes, and unpredictable environmental and climate change challenges processed through additive manufacturing and computational algorithms.

Between Low-Tech and Post-Growth: The Revitalization of Hutong Residential Buildings

Ehsan Sheikholharam, Kennesaw State University

Can low-tech architectural tectonics and AI work together to offer alternative ecological practices? In his 2014 book, *The Age of Low Tech: Towards a Technologically Sustainable Civilization*, Philippe Bihouix highlights the paradigm of “degrowth” as a critical condition for securing the future of human animal on Earth.¹ While Bihouix centers his analysis on the finitude of material and energy resources, Arturo Escobar and Achille Mbembe situate unprecedented shifts in the condition of habitability of the Earth within larger cultural and political drifts in global politics of governmentality.² In *Designs for the Pluriverse*, Escobar speaks in a more urgent tone, calling not only for a reconfiguration of the relations of production, consumption, and distribution on a planetary scale, but more radically, for “a transition to an altogether different world.”³ Common to this line of scholarship is the critique of over-optimistic, profit-oriented technological solutions, that promise—in one way or another—schemes for “technocratic utopia[s].” While a romanticized return to the pre-industrial past may seem absurd, engaging with low-tech technologies and building techniques is not. Antoine Picon, for instance, has speculated on reconciling a post-humanist world with low-tech ecological architecture.⁴ This paper draws on the work of the Chinese architecture group, ZAO/standardarchitecture, on Beijing’s historic neighborhoods to retune successful elements of Hutong revitalization to other parts of the old city. I will draw on Kenneth Frampton aesthetic and tectonic analysis of Hutong Metabolism as well as Mohsen Mostafavi’s socio-political study of the context of these revitalization project to develop a set of parameters for an AI-powered mapping analysis.⁵ ZAO’s work suitably lends itself to this type of analysis because Zhang Ke’s praxis cuts through social justice and environmental justice. While I recognize that big data and AI are part of the problem of ecological crises more than a solution to it, this project aims to set up new relations between multilayered urban data, crumbling structures, distressed sites, marginalized communities, local materials, and low-tech practices.

Temporal Layers: The Interfacing of AI, Discrete Architecture, and Urban Evolution

Will Doss, Louisiana Tech University

From large wastelands of polluted landscapes to reimagining healthy city expansions, we are in a time where the design of architecture can address a multitude of issues simultaneously. In line with the conference theme of Inflections, this paper seeks to address the evolving discourse of architectural innovation, and the integration of artificial intelligence (AI) with discrete architectural methodologies to offer a novel approach to addressing contemporary design with the planet. This paper seeks to share past pedagogical explorations conducted within a 3rd year architecture studio that tasked students with developing multi-scalar solutions to pressing issues while leveraging discrete architecture for its potential in incremental growth and adaptability. Central to this exploration is the differentiated integration of AI, not as a monolithic tool, but as a partner in the design, growth, and systems control of architectural and urban solutions. Drawing inspiration from Alejandro Aravena's Incremental Housing Projects, and Alisa Andrasek and Jose Sanchez's Bloom project, which highlight the participatory approach of scalability, our studio investigates the potential of discrete architecture in design education to foster sustainable and adaptable environments on numerous scales. Unlike the top-down technologically driven visions of future cities, such as NEOM's The Line and other communities, our approach emphasizes the importance of incremental growth and developing frameworks for growth over time. Through the integration of AI, we explore the envisioning of these projects at scales from bus shelters to planetary systems that facilitate the adaptation and evolution of buildings and urban infrastructures in response to changing human needs and environmental conditions. Expanding on this foundation, the paper aims to articulate how the synthesis of AI and discrete architecture not only proposes a methodological shift in architectural design but also embodies a philosophical reorientation towards urban development. This reorientation recognizes the dynamic interplay between human aspirations and environmental imperatives, envisioning urban spaces as living organisms that grow and adapt over time. The emphasis on multi-scalar solutions reflects a commitment to addressing urban challenges holistically, from the micro-scale of individual buildings and infrastructures to the macro-scale of urban systems and ecological networks. The pedagogical approach adopted in our studios encourages students to think of architecture not as a static artifact but as a series of interlocking systems capable of evolution and adaptation. This paper presents a series of case studies from the studio, showcasing how students have applied discrete architectural principles and AI to address issues such as regenerative decarbonization, more-than-human cohabitation, and radical self-sufficiency. By prioritizing incremental growth and systems control through a bottom-up, participatory lens, these projects challenge prevailing dystopian narratives of future cities, offering a vision of urban development that is both technologically advanced and sympathetic to the environment. In conclusion, the exploration underscores the potential of combining discrete architecture with AI to create dynamic, adaptable urban environments that prioritize human well-being and ecological balance. This approach not only redefines the role of technology in urban development but also reaffirms the architect's responsibility in crafting spaces that are equitable, sustainable, and capable of evolving with their inhabitants.

Communities and Collectivities | Slant

Friday, June 28, 2024, 3:00pm-4:30pm

Navigating Community-Based Design Between Education and Practice D4C: A Lebanese Model for Integrated Learning

Karim Najjar, American University of Beirut

Sarah Rita Kattan, D4C, Design for Communities

The paper presents an innovative approach to bridging the gap between design education and community-based design practice in crisis territories through the lens of D4C (Design for Communities), an NGO based in Lebanon. D4C's mission is to empower a new generation of socially conscious architects and engineers to enhance the quality of life for marginalized communities in Lebanon and the region. Through a diverse portfolio of projects, D4C engages in interdisciplinary collaboration, educational initiatives, and real-life implementations. The paper begins with an introduction providing an overview of D4C's background, its mission, and the significance of bridging the gap between teaching and practice in crisis territories. It delves into the operational landscape of D4C, detailing the organization's partnerships with humanitarian agencies, local authorities, and educational institutions in Lebanon. The initial exploration further focuses on the specific skill sets required for architects in crisis territories such as Lebanon, discussing challenges and opportunities for emerging architects within such contexts. After the introduction, the paper introduces D4C's educational program, which was established and piloted in 2022. The program provides advanced training for fresh graduates and young professionals to prepare emerging architects for societal and environmental challenges within the country and region. The paper further examines its methodology, emphasizing a need-based design approach and strategies for navigating diverse interests within the design process. Additionally, it explores how D4C integrates its educational program into real projects, presenting case studies illustrating the application of methodology alongside an overview of project phases, thematic lectures, and exercises, ultimately improving the communication and life skills of the participants. The paper offers practical insights into D4C's approach through case study analysis, highlighting themes addressed in lectures and exercises. Reflections on D4C's approach to design education and community practice are provided, identifying key challenges and opportunities for improvement. Finally, the paper introduces its strategy to ensure financial sustainability in a hybrid setting of a collaborative design practice that provides a continuous education program, discussing opportunities and challenges that D4C is facing. The paper summarizes key findings and discusses implications for future initiatives in similar contexts.

Architectural Ethnography as Immersive Engagement and Communication in Architectural Practice

Lucas Hoops, Tec Monterrey

Architectural ethnography aims at understanding intersubjective and cultural forces on the built environment, and those who engage in its development. The 'ethnographic turn in architecture', as recently termed by Albena Yaneva, identifies a shift away from what was traditionally considered a practice steeped in quantitative data which led to understanding architecture as a fundamentally technical discipline, void of social and cultural diversity, and conforming to a universalized standard of building techniques and codes, toward an interest in the qualitative aspects of the practice that engage the realities of the social contexts in which the built environment is produced. This shift, particularly with practices based in Latin America, begins to show that previous pedagogical models come up short when dealing with situations that are considered underdeveloped, informal, or that resists colonization. Normative registers cannot account for phenomenological adaptations to localized circumstances. Yet, this does not mean architecture, as a modernizing practice, has nothing to offer within these contexts. As architects and authors such as Momoyo Kajima and Ray Lucas have recognized, immersive ethnographic inscription can provoke deep engagement with community and culture that can guide both professionals and students toward better situating any given project. In particular, the ability to register non-standardized approaches through architectural drawings, expand possibilities for understanding and communicating the primordial and itinerant nature of edification. In this paper I will discuss architectural practices, such as Derive Lab and La Cabina de la Curiosidad in the latin american context that apply ethnographic methods in their work. I will seek to review how their work applies situating and communicative tools for the communities they work with, or the public they seek to engage. To conclude this, I will present case studies where architectural ethnography was implemented in pedagogical settings in a Latin American university. Through active participation in fieldwork, students were encouraged to critically analyze the socio-cultural factors influencing architectural design and spatial organization. By implementing architectural ethnography, as educators we sought to foster empathy, cultural competence, and interdisciplinary collaboration among students. This paper highlights the communicative potential that emerges when combining ethnographic immersion with architectural registry. By developing a method and visual language that can engage diverse and localized situations, we can begin to re-inscribe architecture's potential to marginalized publics and future generations of professionals at the same time, equipping each with the approaches to develop knowledge and sensitivity to create inclusive and culturally responsive architecture.

Faculty Role Transformation as Means to Increase Social Impact in Community Engagement

Ignacio G. Osuna Eskenazi, Maria del Mar Varela Ferrer & Dámaso Orozco, Tec Monterrey

An increasing number of architecture schools have included community engagement in their programs as part of their social commitment. At the same time there is a concerted effort to tackle complex issues of the global agenda as part of the academic curriculum. As we move through a transition era it is pertinent to ask: What should the role of architecture schools be as we prepare future architects to engage civic participation? This document draws from 3 experiences ranging a period of 6 years (2018 – 2023). During that time frame the authors led groups of architecture students in community participatory design projects in Mexico focusing on the role of children, architecture and citizenship values development. It was through this process that an assessment of the ever increasing roles, duties and responsibilities for schools and faculty members was required. It became an opportunity to rethink the roles in participatory design in academic scenarios, as a new generation of students entered the architecture classrooms. The authors focused on the core strength of architecture schools: education. Using transition design methodology combined with participatory design that a new approach was attempted. The main focus was reducing the role of the architecture school as means to increase social impact and educational value. The process led to a simplification of processes and a better allocation of resources. Students exchanged roles with faculty members as they became responsible for their learning experience and the learning experience of the community participants mostly children. These experiences results show that it is possible to reduce the role of the school and faculty members and increase the educational value for students and the social benefits for a community. As well as long lasting hope that through architecture participatory design communities will have a strong citizenship base to impact as we transition towards the future. Keywords: Participatory design, Transition Design, Role of architecture schools, Children and architecture.

Common Games: Gameplay as a Framework for Participatory Pedagogy and Design

Jeffrey Liu, California Polytechnic State University

In response to the 1968 student protests across Europe, Giancarlo De Carlo called for a radical restructuring of architectural pedagogy and practice. Recognizing architecture's complicity in enacting the will of the powerful and wealthy, who possess the resources to fund large-scale building projects, De Carlo proposed a paradigm of participation in which architecture would be designed collectively by its users.¹ This model of participation necessitates not only an inclusive, user-driven process of architectural design, but also a horizontal structure of academic knowledge dissemination. The Common Games seminar proposes participatory design as an experimental framework for architectural pedagogy and practice that teaches students to address the urgent social and environmental issues of our contemporary cities through socially engaged forms of practice. As systemic spatial injustice cannot be addressed without true structural change, architecture must be reconceptualized as a practice of collective space-making that empowers marginalized communities to reconfigure the spatial politics of their environments. Moreover, architectural education must embody a non-hierarchical, collaborative form in which intellectual exchange between teachers and students take place on an equalized platform. To engage students in participatory design as an egalitarian organizational form, the Common Games seminar proposes the game as a framework for collective imagination: a medium for inventing future possibilities within the conditions of the real.² Architectural thinkers such as Aldo Van Eyck, Constant Nieuwenhuys, and Guy Debord imagined play as a creative act that enabled a user-shaped architecture.³ In recent years, board games have become increasingly prevalent vehicles for communal participation in architectural and urban design.⁴ As analog representations that map the territory and resources of an area and its spatial protocols into into abstracted fields of objects and simplified rules of play, board games invite cooperative speculation into possible futures within a defined set of conditions. Thus, the Common Games seminar prompts students to collaboratively design a board game that organizes a participatory solution to a pressing spatial problem. After choosing an architectural/urban issue that the game will address, students negotiate the design of the game through horizontal structures of consensus-based decision-making used by groups such as the Occupy Movement. Using this method of collaborative deliberation, students craft a game board representing a particular space along with pieces symbolizing physical objects, resources, and events, and refine rules for the game that replicate real conditions of spatial exchange. This course has taken two iterations thus far: in Spring 2023, students designed a climate-change board game in which players build resilient forms of urbanism to address the dual threat of flooding and wildfires in San Luis Obispo; in Fall 2023, students addressed the problem of vacant office spaces in Downtown San Francisco, creating a three-dimensional board game to infill an office tower's structural grid with housing, public space, and commercial retail. Ultimately, this presentation will discuss the game as both a pedagogical framework for participatory education and a design paradigm for socially equitable architecture, teaching students to practice communally engaged forms of design while rehearsing strategies of non-hierarchical negotiation throughout the design process.

After the Awards: Exploring the Evolution of Post-Occupancy Evaluation in Academic Design-Build Projects

Michael Hughes, American University of Sharjah

Bruce Wrightsman, Laurentian University

Emily McGlohn, Auburn University

The processes and productions common to academic design-build programs have been well documented in books and popular media over the past twenty-five years. Through these texts we have come to know the paradigm in terms of the focus on full-scale making, collaborative learning and community engagement exemplified by the work at Yale Building Studio, Rural Studio and Studio 804. A review of the current literature on 'design-build' education reveals a bounty of images of students doing construction along with photos of the often-beautiful outcomes dominate the published material. (Hughes, et al, 2019) The same bias that privileges the initial act of construction and the completed, built project combined with end-of-project fatigue encourages participating faculty to equate the end of the project with the end of the build. Exhausted faculty lacking energy or institutional support typically truncate potential breadth of work rather than conducting a critical evaluation of both the process and the outcomes. As a result, it is rare for design-build faculty or programs to assess the outcomes in terms of the building performance and client experience common to post-occupancy evaluation. In *Territories of Educational Design Build: Toward an Evidence Based Discourse* Steven Vederber notes that design-build remains "outside the canonical mainstream" due to "insufficient critical inquiry." (Vederber, 2014). The fixation with building masks knowledge essential to the development of design-build as a legitimate academic discipline. "What...remains clear is that design-build activities continue to resist theorizing and critical discourse." (Erdman, et al, 2002). Complicating the matter, a lack of critical evaluation at the end of the project negatively impacts the beginning of the next project as design-build project leaders lack information necessary to articulate or refine the criteria to evaluate outcomes or define success. As a discipline design-build lacks the information necessary to determine if the projects succeeded either within or beyond the scope of the academic studio. The texts referenced above are over 20 years old. The fact that they remain accurate for most design-build projects and programs evidences the power of the resistance to both criticality and holistic institutional support. However, a close examination of current design-build programs reveals some evolution relative to the incorporation and integration of post-occupancy evaluation. This paper outlines some of the challenges imposed by administrative and institutional structures conspiring to limit post-facto evaluation while also identifying nascent efforts to include critical assessment as a fundamental part of design-build pedagogy. Specifically, the text highlights efforts at three schools where faculty are attempting to expand post-occupancy assessment either through innovative program structures or curricular changes that improve project and learning outcomes. Case studies reflecting on the role of POE in three celebrated, (published and/or award winning), design build efforts from three different universities exemplify challenges and opportunities latent in both formal and informal POE applications.

Intersectionalities + Environmental Visions | Rise

Friday, June 28, 2024, 3:00pm-4:30pm

Transversalidad de los Cuidados, Nuevas Espacialidades y Enseñanza del Diseño

Stefania Biondi, Tec Monterrey

Lorena Suárez, Universidad Autónoma de Querétaro

En la búsqueda de acciones que contribuyan a la reducción de desigualdades sociales, los cuidados se han posicionado como un concepto clave que permite cuestionar y replantear las relaciones de poder presentes en la forma en la que diseñamos, organizamos y habitamos los espacios. Los cuidados están presentes en todas las etapas del ciclo de vida, son un elemento transversal e inherente a la provisión cotidiana del bienestar social. Su estudio, desde la transdisciplina, reconoce su complejidad y la diversidad de dimensiones implicadas, que van desde aspectos afectivos, sociales y culturales, hasta económicos, políticos y espacio-temporales. A partir de lo anterior, la dimensión espacial se reconoce como un punto de inflexión en el que convergen conceptos, teorías y prácticas, que, a través de la enseñanza de la arquitectura, pueden facilitar la configuración y materialización de espacios de cuidados. Para lograrlo es necesario, plantear desde las prácticas educativas, una reconceptualización que desplace del centro de las decisiones la acumulación de bienes y capital, y en su lugar ubique a la sostenibilidad de la vida, entendida como una serie de procesos que permiten satisfacer necesidades humanas que incluyen elementos afectivos y materiales, al mismo tiempo que se reconoce la interdependencia con los entornos naturales. Bajo estas premisas se pretende replantear, en particular, la enseñanza del diseño de la vivienda, como una oportunidad para poner en relación sistémica disciplinas como la arquitectura, urbanismo, ecofeminismo, economía feminista y psicología ambiental, con las desiguales condiciones sociales derivadas del género, nivel socioeconómico y origen étnico. Aunque el tema del espacio doméstico está en el centro de la reflexión y la experimentación arquitectónica desde hace décadas - buscando sustraer la producción de vivienda a las reglas del mercado, para acercarla a las necesidades y deseos de quienes la habitan y a los procesos de autoproducción- poner al centro los cuidados, con todas sus implicaciones, requiere de nuevas consideraciones y pone nuevos retos para el diseño y su enseñanza. La condición particularmente femenina de deber conjuntar actividades de cuidado con actividades productivas en un mismo espacio nos lleva a revalorar tipologías habitacionales de usos mixtos presentes en la historia del habitar, perdidas con los cambios de las formas de producción que han afectado también la definición de roles: el hombre proveedor, la mujer cuidadora. Replanteamiento que cuestiona además la relación entre ámbito privado (femenino) y ámbito público (masculino), y demanda repensar el espacio fronterizo que se materializa en las fachadas, no como barrera entre los dos ámbitos, si no como interfase entre múltiples actividades simultáneas. El proceso de enseñanza demanda la sensibilización del alumnado, la formación de una diversa conciencia y la habilidad en el manejo de herramientas de diseño participativo que permitan dar voz e incluir, en la toma de decisión, a las personas habitantes. Así se ha trabajado en cursos de diseño participativo con enfoque de género, cuyos resultados representan casos interesantes para sustentar las teorías antes expuestas.

Demographic Mismatch and the Pursuit of Equity

Dennis Chiessa, University of Texas at Arlington

Pursuing equity in the built environment has become an increased focus for scholars and practitioners. Community-engaged projects that prioritize and center underserved communities are vehicles to carry out pedagogical goals to educate future architects while empowering local communities. Historically, academic programs in design schools have worked with disadvantaged communities to improve neighborhood conditions. The students and faculty leading such efforts are often from the white majority, while the communities they serve are of people of color. In Texas, Hispanics now make up the largest demographic group in the state. The demographic shift is evident in the student body of the Author's university where Latinx students make up over 50 percent of the design student enrollment. This paper examines five case study projects conducted through university and community partnerships in the Dallas-Fort Worth Metropolitan region, the fourth largest in the United States. An interdisciplinary group of faculty and students from Architecture and Landscape Architecture led each project. The students worked to develop a participatory design process that, once implemented, informed a community-centered development plan or project for each of the communities involved. The case studies include five historically underinvested neighborhoods or communities with some similarities and some significant differences. The first neighborhood is predominantly working-class Latinx (Mexican American), and students were tasked with developing an equity master plan next to an infrastructure and real estate development in Fort Worth, Texas. The second neighborhood is a transitioning neighborhood with a predominantly African American population but with a significant Latinx presence in which students were tasked with developing a community master plan for the historically underinvested community. The third neighborhood is predominantly African American and sits in the zip code with the lowest life expectancy in Texas at only 66 years of age. The research and design team designed a community development plan and several catalyst projects that addressed health equity. The fourth community is a rural municipality of 1,500 residents of predominantly white Anglo Americans with an under-resourced local government. Students were tasked with designing a new city hall after the previous one burned down. The fifth and final case study involves a freedmen's town (a community founded by formerly enslaved people) in Fort Worth, where the students developed ideas for a community museum and housing options to repopulate the area. The author compares the case studies based on four inferred categories that emerged through reflection on the process of each project: 1. Demographic composition of the design teams and the neighborhoods/communities where the work was performed; 2. Socioeconomic profile of each community; 3. Physical and environmental conditions of each community; and 4. Final deliverables, project outcomes, and dissemination of the work locally. The paper identifies critical advantages and difficulties students and faculty face as they engage with underserved, underinvested communities that are similar or different from their own. It adds to scholarship related to the white savior industrial complex through the reverse roles and perspectives of designers representing the global majority.

Concentración En Diseño Regenerativo: Justicia Climática A Través Del Diseño Regenerativo

Carlos Cobreros, Tec Monterrey

Ante una crisis socio ecológica y climática planetaria sin precedentes, es necesario un replanteamiento fundamental de la forma en que desarrollamos los territorios, las ciudades y las comunidades. Aunque la sostenibilidad promete no afectar a la humanidad futura, no contempla la posibilidad de coevolucionar con la naturaleza; ya no es suficiente. Es necesaria una transición hacia futuros en los que los sistemas ecosociales estén diseñados para equilibrar la actividad antropogénica y la integridad de los ecosistemas naturales. Con el siglo XXI surgen nuevos paradigmas, marcos de pensamiento y procesos de diseño y desarrollo regenerativo, basados en una metodología que apuesta por la actividad humana como fuente de salud y regeneración, y en estrategias basadas en la comprensión del funcionamiento interno de los sistemas vivos. En los últimos años, la institución universitaria a la que se pertenece, se ha estado transformando y ha planteado un nuevo modelo educativo, con el que se pretende activar y potencializar las capacidades de innovación. Dentro del área de especialización de la Escuela de Arquitectura, Arte y Diseño (EAAD), se diseñaron una serie de semestres para el 4to año con un formato de “Concentración”, lo que significa que es de dedicación exclusiva durante todo un semestre. Dentro de este formato la EAAD propone un nuevo programa interdisciplinario desde un enfoque regenerativo, la “Concentración en Diseño Regenerativo” (CDR). El Diseño Regenerativo (DR) se plantea como una transición desde una innovación transformadora, buscando una versión del diseño con aspiración positiva, biófilica y restauradora. El DR se plantea como una acción sistémica y ecológica, hacia una transformación donde nos sintamos parte de este planeta, parte de los sistemas vivos que lo constituyen, en co-evolución con ellos y con la vida. El DR trabaja para revertir la degeneración de los sistemas naturales y co-diseñar estructuras y sistemas humanos que puedan co-evolucionar con ellos. Con la CDR se propone un programa de experiencia vivencial e inmersiva trabajando mano a mano con la comunidad y en contextos reales, a partir de la aplicación de una metodología de entendimiento regenerativo del lugar (sistemas vivos, incluidos los sistemas humanos), de procesos participativos comunitarios y del uso de herramientas etnográficas. El diseño se plantea a partir de la singularidad del lugar, su esencia, su potencial y su vocación, con una propuesta de un conjunto de acciones, desde servicios, experiencias, arquitectura, hasta productos, que valoran la relación entre el sistema humano y el ecosistema vivo y natural. En sus dos últimas ediciones la CDR asume el reto de entender la figura de la Reserva de la Biosfera de Montaña como laboratorio territorial vivo de Diseño y Desarrollo Regenerativo para la resiliencia, adaptación y justicia climática para las comunidades más vulnerables, trabajándose en el contexto específico de la Reserva de la Biosfera Sierra Gorda en Querétaro, México. En este trabajo se presentan las bases y el marco metodológico de la Concentración en Diseño Regenerativo y la reflexión sobre los resultados y la experiencia de sus dos últimas ediciones.

Forces & Fascinations: Fostering First-Year Sensitivity to Site through Environmentally Activated Architectures

Samuel Maddox, Wentworth Institute of Technology

The cube project is a well-known trope of fundamental architectural design studios. Though it may offer freshmen a great opportunity for exploring architectural operations, their formal and spatial results, and the terminology necessary for communicating these discoveries, the classic cube project fails to engage with questions of society and the environment. These systemic concerns inextricably entangled with the built environment will undoubtedly play a critical role in the lifetime and future careers of our students. Issues of carbon intensity, climate change, and ecological stewardship (as well as concomitant concerns of social inequity) are all now foundational elements of early architectural education.¹ But that's a bit too much to ask of the humble, first-year cube project. Or is it? Over the past five year, the classic freshman cube project at [institution] has been iteratively adapted to train first-year students' focus on questions of performance in relationship to materials and form. How much weight can a paper cube hold? How slowly on fall through the air? Et cetera. During the first two months of the semester, students work toward a mastery of the physical forces at play—light, air, pressure—within and around their cubes, a clear analogy to building performance including passive systems and structural strategies.² This year, for the first time, the studio explored expanding this understanding of external forces and their interaction with the architectural object to climatically and ecologically rich sites. To that end, each studio received a unique imagined site, part of a larger fictional landscape threatened by climate change. Each site consisted of a particular landscape typology with a list of endangered and keystone species, a history of human impact to the environment, and site plan and digital model. Students then worked through iterative research and diagramming charrettes to elaborate on the ecological, climatic, and social narratives of their sites before translating their force-based cubes onto the site. Over the course of a month, students honed their designs to focus on “forces and fascinations,” specifically climatic forces like coastal flooding and landscape fascinations such as the presence (or absence) of migratory species, until their cubes became what the studio describes as “architectural interfaces” with the environment: Devices for registering, measuring, and recording systemic changes across the region. For example, one cube slowly transformed with fluctuations of salinity levels within a tidal estuary using carefully modulated buoys that shifted apertures on the façade to frame the horizon. Another employed human ritual vis-à-vis a system of pulleys and counterweights in order to deploy a roosting structure that welcomes migrating birds each year. Across the studio, projects varied from the meditative engagements with place and species to architectures of advocacy for imperiled ecosystems. All in all, the shift from a conventional [city name]-based site, usually one familiar to students, to one composed of flows and forces, flora and fauna, proved a powerful way to introduce the concept of site not only as a set of beautiful views for the user but more importantly as a dynamic system engaged with the building.

Material Enhancements: Leveraging AI | Tilt

Friday, June 28, 2024, 5:00pm-6:30pm

Real-Time Hygroscopic Wood Deformation Analysis via ML and Arduino Sensing

Ye Ma & Ehsan Baharlou, University of Virginia

This research introduces a computational framework for the real-time monitoring and analysis of hygroscopic deformation [1] of natural wood samples under relative humidity (RH) change. Previous methodologies have often overlooked the early deformation stages as wood sample treatment, thus neglecting the cumulative effects on samples. This approach leverages machine learning models with an Arduino-based humidified chamber, capturing of the real-time curvature changes of samples. The "Segment and track anything" [2] pre-trained model for real-time deformation radius readings from videos recording the Moisture Content (MC) [3] releasing phase in low-humidity environments. This method complements the cumulative deformation by conventional dry and wet methods, which merely consider monotonic increases or decreases in MC. The humidified chamber is based on Arduino-based control system. It detects and maintains precise humidity levels with temperature and RH sequence data during the humidifying process. The sequence data enriches the sample size for prediction and validation, and clarifies the relationship between environment RH and deformation curvature radius of samples, freeing the documentation of samples' states from the specific time steps under environmental restriction. The predictive performance on samples' deformation of machine learning models is also comparatively analyzed, including Convolutional Neural Networks (CNN) [4] and Long Short-Term Memory (LSTM) [5] networks. This method avoids the reliance on the Timoshenko equation for wood deformation under different RH conditions. The Timoshenko equation [6] is mainly based on the assumption of homogeneity and specific plate thickness range, falls short of capturing the complex properties of natural wood samples. This analysis directly correlates sample features, environmental control, and the dependent hygroscopic deformation curvature. Preliminary experiments demonstrate that this research provides continuous and precise deformation data, laying the groundwork for accurate predictive tools regarding wood's hygroscopic properties. The anticipated contribution is three-fold: it offers enhanced material control in digital fabrication, promotes environmentally adaptive wood usage in sustainable strategies, and advances material programming with natural wood's adaptive behavior to environmental conditions. Keywords: Hygroscopic Deformation, Machine Learning, Sensor Data Analysis, Digital Fabrication, Material Programming

Augmenting Mycelium-Integrated Bio-intelligent Systems for Soil Stabilization

Ipsita Datta & Ehsan Baharlou, University of Virginia

The growing environmental footprint of traditional construction materials compels the investigation of sustainable alternatives¹. This research investigates the potential of utilizing food and agricultural waste as substrates to enhance the growth of mycelium, a natural fungal network, for bio-structural soil stabilization. This innovative approach not only addresses waste management issues but also establishes the use of living materials in construction², harmonizing with the principles of a circular economy³ and regenerative design. The primary aim of this study is to evaluate the effectiveness of food and agricultural waste substrates in promoting mycelium growth for soil stabilization⁴, with an emphasis on applications within bio-intelligent living systems. Additionally, the research aims to design and test a scaled prototype to empirically verify the hypothesis. This involves injecting a substrate enriched with mycelium into soil and examining the resulting network patterns and their implications for soil stabilization. The methodological framework adopts a bifurcated approach: initially, the cultivation of mycelium on selected waste substrates⁵ under controlled laboratory conditions to identify optimal growth environments. Following this, a scaled prototype is constructed by strategically injecting the mycelium-infused substrate into soil samples. The formation of mycelial networks within the soil is meticulously documented using various analytical techniques, including microscopy and mechanical strength tests, to assess structural integrity and binding efficiency. The findings from this research are expected to significantly impact the field of intelligent circular construction, bio-integrated structural systems, and bio-intelligent living systems⁶. Demonstrating the utility of mycelium as a natural binder in soil stabilization underscores the potential for further exploration into construction materials derived from living organisms. The potential encapsulation of structural elements by mycelial networks suggests the feasibility of developing living, self-repairing structural frameworks⁷, embodying natural intelligence, and reducing the environmental impact of the construction⁸ industry while enhancing the resilience of built environments. Moreover, this study contributes to a broader understanding of material lifecycle management in construction, advocating for the repurposing of food and agricultural by-products. This not only aids in reducing waste but also aligns with the cradle-to-cradle philosophy⁹, transforming waste into a valuable resource for new production cycles. The integration of mycelium-based materials could revolutionize construction practices by introducing bio-intelligent living systems capable of adapting to environmental changes, thereby improving infrastructure resilience and longevity¹⁰. This research sets a precedent for interdisciplinary collaboration, merging mycology, environmental science, and architectural design to foster innovative solutions for modern construction challenges.

Wattle, Robot, and Daub: Looking Backwards to Move Towards a More Integrated Digital/Analog Construction Ecosystem

Neal Hitch & Erin Hunt, Texas Tech University

While promising and powerful, blind adoption of emerging technologies like automation, digital fabrication, and artificial intelligence runs the risk of repeating historical tendencies to prioritize the desires of the core (those who manage companies and adopt new technologies) at the expense of the periphery (those who labor, those who use, and those who are at risk of being displaced by new technologies).[1] Conversely, this paper explores the combination of emerging digital tools with historic construction techniques in order to innovate solutions that simultaneously preserve meaningful labor while also embracing autonomous design ecosystems, which have the potential to decouple manufacturing from industrial construction.[2] The paper specifically investigates the supplementation of historic wattle-and-daub construction with machine learning, autonomous building technologies, and bio-composite material systems to aid the construction of lightweight deployable structures—by doing so, tracing the collision, conversion, and ultimate trajectory of innovation and preservation in architectural design and practice. Whereas traditional wattle-and-daub is composed of woven stick walls (wattle) plastered with unstabilized earth (daub), our process instead implements digitally fabricated plywood, "wattle," shells and replaces earth daub with alternative materials consisting of bio-waste aggregates mixed with natural glues. The paper first describes the design and methods behind the process, developed by the authors, which leverages AI, computation, and automation to flat fabricate deployable wattle shells made of flexible plywood that are then hand-plastered with bio-composite daub mixtures made of organic materials and waste byproducts (coffee grounds, grape pomace, chopped-straw, and sawdust) using traditional tools/techniques. Next, the paper details the implementation of this technology for the design and construction of two pavilions built for Catbird Music Festival located on the historic site of the 1969 Woodstock festival in Bethel, New York. Finally, the paper lists the experiment's results after four months of observing the structures for weathering and deterioration over time. In conclusion, we discuss the viability of the system to push towards more socially and environmentally ethical—yet modern—construction economies by (1) implementing artificial intelligence during the concept and research phases of design, (2) leveraging robotics to automate tedious or dangerous aspects of construction, (3) preserving meaningful labor and culturally significant building practices, and (4) tapping into existing waste ecosystems to mine plaster aggregates and binders.

Hybrid Tectonics in Contemporary African Architecture: Bridging Indigenous Building techniques and Emerging Timber construction for Sustainable Futures

Reetumetsi Malefane, Nelson Mandela University

This paper examines Hybridized Construction systems through the exploration of the integration of indigenous building techniques with emerging timber construction technologies. The study uncovers architectural solutions that authentically represent local cultural while incorporating advanced construction technologies for sustainability and efficiency. The literature is based on Noble's concept of architectural hybridity, which advocates of a blend of diverse architectural elements (traditional and modern) to craft an architectural language that reflects South Africa's nuanced history. Noble's theoretical underpinnings provides a framework that encourages a hybrid architectural language that represents a richness of African cultural identity while addressing emerging timber construction as a pivotal ally in climate-mitigating architectural solutions. The study employs a multi-method approach, combining a literature review, a qualitative analysis and design-based methods. Through the introduction of indigenous building systems in the curriculum, architectural work of Kere Architects provides a framework for the integration of these dual tectonics. A practical 4-week detailing design project of a Biodiversity Centre was conducted by second-year architectural technology students experimenting with hybridized systems. The outcomes demonstrate innovative hybridized Architectural solutions that embody local cultural narratives through advanced, sustainable technical strategies. The research promotes a model for architectural education that nurtures local materiality and cultural heritage, while embracing emerging construction ingenuity.

Multifunctional Hygroscopic Climate Adaptive Facades

David Correa, Valarie Leung, Laurie Zeng & Juan Juan Yin, University of Waterloo

Architecture accounts for half of carbon emissions globally [1] when accounting for its carbon contribution during building construction, daily building operations and maintenance over their lifecycle. Improving its building carbon footprint through material selection and optimized mechanical systems is critical but it does not eliminate the long-term maintenance costs required to constantly replace failure prone electro-mechanical sensors and actuators. It also does not account for suboptimal operation of the building energy saving system due to intentional or unintentional errors in occupant operation – such as leaving windows open accidentally during the winter, not using window shades properly, etc. [2] The development of climate-adaptive facades driven by passive actuation within smart materials can provide solutions with a low carbon footprint with long term energy savings. [3] Autonomous passive actuation control can allow systems to have lower capital costs while being able to operate autonomously in environments where occupant access is limited or very difficult to predict – shading devices in hard-to-reach windows or in hard to access ventilation shafts. Plant structures are uniquely positioned to serve as biomimetic role models in relation to weather sensing adaptation and kinematic response. [4] Plants have a long history of showing excellent use of changes in temperature and humidity as stimulus for critical operation activities such as seed dispersion, water gathering, flower blooming or to prevent death due to excessive heat gains. In this paper, the Swamp Milkweed [5] has been studied as the biological role model for the development of an adaptive façade system that harnesses changes in environmental relative humidity as the drivers of actuation in a climate-adaptive façade mechanism for potential building applications. The paper presents the key shape-change actuation principles in the Swamp Milkweed that are subsequently abstracted into climate responsive actuators. A first set of preliminary experiments, which follows previous literature by the authors and others, [6] using fibreglass as constraint layer, and wood veneer of both maple and beech as the expansion layer. These tests are used to understand bilayer interaction, climate-response material calibration and amplitude of deformation. The next set of tests use a novel approach to fabricate the mechanism by creating a hybrid 3DP and wood veneer composite actuator. Birch veneer is laminated onto a functionally differentiated Thermoplastic Polyurethane (TPU) substrate. This approach was demonstrated to be highly effective at manipulating the amplitude of the bending radius while also improving moisture diffusion into the hygroscopic wood layer. The authors are not aware of any previous precedents to this fabrication approach at this scale. [7] Furthermore, an initial architectural design investigation is presented for a multifunctional façade that can create shelter when raining while also facilitating ventilation during the dry season. We hope that this research can contribute towards the development of precise climate-adaptive mechanisms within an expanded scope of advanced facades.

Experiments for Urban Futures | Slant

Friday, June 28, 2024, 5:00pm-6:30pm

Just Enough: Deriving Phenomenographic Architecture From Inhabitation

Christopher Cleland, Toronto Metropolitan University

This research proposal acknowledges that the interpretation of architecture is never identical between multiple actors but uncovers ways to qualify them through their likeness. The problem of typifying program automatically excludes a substantial amount of possibility for the inhabitation of buildings.[1] An architectural phenomenography (the empirical study concerning how people perceive various aspects of phenomena) recognizes this variability along with inhabitation. Without sentencing itself to the impossible task of measuring the infinite and the unmeasurable experience, the proposed analytical method captures prominent architectural moments in the form of gestalts. Meaning is derived from lived experiences of buildings using curated data sets that are often reflective of the most memorable portions of architecture. Composite collages – inspired by the chronophotography of Eadweard Muybridge[2] – concentrate the variability of activity within the photographs and the children’s accounts of modern buildings. In a process of reconstructing space and activity sampled across time, gestalts appear that filter the data sets. Monocular depth estimation converts these photos into three-dimensional icons of activities and visual percepts, which can then be arranged in relation to one another. Digital relational landscapes convert and reassemble images and textual passages into perceptual representations of space and activity. Quantifying an infinite number of possibilities for activity into a few common gestalts gives agency back to those who live with architecture. This critiques the conventional allocentric predetermination of architecture, in favour of a multistable one that fosters a performative agency among inhabitants. It assumes that an element could simultaneously be a bookshelf, a ladder, a screen, and a luminaire, all until it is approached and interacted with. Principles of weak architecture – first introduced by Ignasi De Solà-Morales,[3] and similarly practiced by Kengo Kuma and Sou Fujimoto[4] – suggest an accepting of defeat and an ungrounding of architecture, in the form of indiscrete boundaries, indiscriminate programming, and malleable material vessels for inhabitation. The design research applies these principles within three fields of sense that are founded on the gestalts of the Schminke House. The culmination of this research assumes three alternative futures in the manner of Schminke: one future for physical play; one for learning and toys; and one for swimming and bathing. Material vessels extracted from the Schminke House were deployed to reimagine a building fabric that gently locates and contains the studied activities and their remnants. Architectural phenomenography innovatively projects an architecture that is just enough for inhabitation to choreograph the architectural construct. The notion of ‘just enough’ prescribes less of a determined architecture while giving agency back to performances of architecture. ‘Just enough’ becomes prevalent in how much control is posited by the creative minds of designers and by how much power the architecture has over its inhabitants. In the light of a phenomenographic architecture, where existing experience shapes futures and where inhabitants are manipulating architectural substance, a more resilient approach to buildings is discovered.

Infrastructure as Artifact: Small Solutions for Large Systems

Charles Jones, American University of Sharjah

For the past three centuries, technological innovation in infrastructure has rapidly changed the visible landscape of urban centers into a system of idealized geometric networks that convey resources and waste as efficiently as possible. The constant reconfiguration and excavation of the urban surface was a physical and symbolic representation of progress, a constant renewal of societal values. [i] Similarly, these urban systems accelerated layers of technical means that became embedded by a persistent social construction of governance over natural systems. Stormwater management has had one of the most significant impacts on the social terrain of city surfaces concerning its spatial and volumetric impact. Due to social pressures for increased sanitation and the maintenance of dryer spaces for circulation and gathering, stormwater's presence became problematic. As a result, this removal of stormwater from urban cores transitioned from the surface articulation of open gutters and ditches to a centralized subsurface condition embedded in the ground plane, mostly invisible from the site. This technologically dominant approach to shaping urban environments has reinforced the Promethean expectation of human's relationship to nature as dominant rather than symbiotic. [ii] As of 2018, the New Orleans Redevelopment Authority (NORA) has converted ten vacant lots into stormwater detention systems. These projects apply horizontal and vertical manipulations to the ground plane, allowing the sites to hold rainwater momentarily. While the primary goal is to reduce the strain on the city's centralized stormwater system by temporarily detaining water where it falls, there is an alternative, innovation taking place on one (Figure 01) of the ten projects which celebrates the rediscovery of a lost ecological identity in the region, the re-emergence of visible surface flooded conditions. These subtle sectional undulations once occupied the landscape throughout and around New Orleans, spanning pre- to post-colonial eras before disappearing around the turn of the 20th century. Unlike Heidegger's hammer [iii], whose form rigidly limits its function, the revealing quality of these surface-level detention systems, as socially constructed technological elements, allows them to be expressed beyond the limitations of efficiency and take on new symbolic meaning in the visible nature of their geometric forms. Therefore, they suggest an opportunity to investigate the transformative potential of design artifacts that balance the science of quantitative performance criteria with the qualitative art of aesthetic expression. Throughout a four-year research studio investigating the relationship between stormwater management infrastructure, public space, and precast systems, the water retention vessel project empowered students to challenge the dominant design constraints that seem to lock existing infrastructure innovation in place. [iv] (Figure 02) With a maximum physical volume parameter half the size of a standard New Orleans residential lot, students designed and fabricated vessels that consider the relationship between geometric surface attributes, like accessibility and permeability (Figure 03), and the spatial implications of visible, surface-level water detention. As a result, the projects demonstrate the expressive potential of design methodologies that utilize a limited range of large-scale infrastructure constraints by encoding them in surfaces of small-scale artifacts. [v] (Figure 04 & 05)

Next Havana: Architecture and Urbanism for a Post-Revolutionary Cuba

Gabriel Fuentes, Kean University

The Cuban Revolution's neglect of Havana simultaneously ruined and preserved its architectural/urban fabric. On one hand, Havana is crumbling, its 64-year lack of maintenance inscribed on its decayed surfaces and the voids where buildings once stood; on the other, its formal urban fabric, its scale, dimensions, proportions, contrasts, continuities, solid/void relationships, rhythms, public spaces, and landscapes remain intact. A free market Cuba, while inevitable, leaves the city vulnerable to unsustainable urban development. And while many anticipate preservation, restoration, and urban development—particularly of Havana's historic core—"business-as-usual" preservation practices resist rampant development primarily through narrow strategies of exclusion (where, what, how, and why not to build), museumizing Havana as "a city frozen in time." NEXT HAVANA seeks a third option at the intersection of this socialist/capitalist divide. Seeking a third option at the intersection of this socialist/capitalist divide, this paper describes 4 student projects from THE NEXT HAVANA STUDIO, a collaborative Graduate Complex Program Studio at (Withheld for blind review). Over the course of 16 weeks, students in THE NEXT HAVANA STUDIO collaboratively speculated architectural and urban futures for a post-revolutionary Cuba – strategizing ways of preserving Havana's architectural and urban fabric in the face of an emerging political, economic, and ecological shift that is opening, albeit gradually, Cuba to global market forces. And rather than subming to these forces, the work critically engages them toward socio-cultural ends. Some driving questions were: What kind of spatial politics do we deploy while retrofitting Havana? How will the social, political, and economic changes of an "open" Cuba impact Havana's urban fabric? What role does preservation play? For that matter, what does preservation really mean and by what criteria are sites included in the preservation frame? What relationships are there (or could there be) between preservation, tourism, infrastructure, education, housing, and public space? In the process, students established systematic research agendas to reveal opportunities for integrated "soft" and "hard" interventions (i.e. siting and programing), constructing ecologies across a range of disciplinary territories including (but not limited to): architecture, urban design, historic preservation / restoration, art, landscape urbanism, infrastructure, science + technology, economics, sustainability, urban policy, sociology, and cultural/political theory. An explicit goal of the studio was to disrupt normative modes of architectural practice, to expand and leverage "preservation" (as an idea, a discipline, and a practice) toward flexible and inclusive design strategies that frame precise architectural interventions at a range of temporal and geographic scales.

Land Art as an Agent for “Rewilding Architecture”

Charlott Greub, North Dakota State University

Land Art as an Agent for “rewilding architecture” delves into the transformative potential of Land Art as a form of counter-architecture, reequipping the land with its lost “natural” endowment. Focusing on two seminal works— Robert Smithson’s “Partially Buried Woodshed”, (1970) and Bouman Zago Architects’ “Property with Properties”, (2011)”—this abstract explores the concept of “rewilding” in architecture as a spatial reimagination or reformulation of a particular landscape that seeks to alter man-made structures with the “natural” landscape. Robert Smithson’s Partially Buried Woodshed (1970) presents the first example of “rewilding architecture”. Situated at Kent State University, the project is a provocative intervention that disrupts the landscape, inviting viewers to reconsider their relationship to the built environment. The abandoned woodshed was already in existence on the Kent State University campus in Ohio before Smithson piled earth on the structure until the center beam cracked. In thus de-composing the woodshed, Smithson reversed the very man-made act of building and the now “dysfunctional building” then recalls an earlier geo-economic and agrarian landscape that existed prior to the construction of the Kent State University campus. By partially de-composing a woodshed, Smithson subverts expectations and prompts critical reflection on the “nature” of the space and materiality, reimagining the land as a canvas for artistic expression and social commentary. “Property with Properties” presents the second case study and was an architectural design project proposal by the Los Angeles-based Bouman Zago Architects for the Rosena Ranch in Rialto in California and it was exhibited at the Metropolitan Museum of Modern Art (MOMA) in 2011. The title of the MOMA exhibition was “Foreclosed: Rehousing the American Dream.” In the case of Zago’s design proposal, we can see the connection between buildings as human habitats and the attempt through strategies of land art to “rewild” an unbuilt sector of a failed subdivision. This Zago design strategy sought to create community-enhancing easements and ecologically balanced corridors by “shifting” or reconfiguring houses, plots, and property lines. Using this community-centered strategy, the Zago design framework then safely lodges these homes within community-owned land banks. Bouman Zago Architects’ “Property with Properties”, (2011) represents a paradigm shift in architectural practice, emphasizing sustainability, community, and contextual integration. Despite their divergent approaches both projects share a conceptual terrain of displaced and replaced geographies that have escaped the ordered urban matrix to begin the process of “rewilding.” Land Art as an Agent for rewilding architecture seeks to inspire architects, educators, and practitioners to reconsider their approach to architectural practice and embrace the transformative potential of Land Art. By examining the counter architecture of Bouman Zago architects and Robert Smithson, participants can gain valuable insights into how architecture could serve as an absorptive receptacle for “natural” forces. This presentation aims to chart a path towards a sustainable, equitable, and culturally inspired future, where architecture serves as a catalyst for environmental stewardship and social change.

The Metaverse: A New Site for Architectural Practice

Mariam Tharwat, Faculty of Architecture KU Leuven, Sint-Lucas

Chris Perry & Carla Leitao, Rensselaer Polytechnic Institute

Commonly understood as the ‘spatial and immersive’ internet, the Metaverse has become a hackneyed term in technology and design. Nevertheless, its emergence as a three-dimensional interactive environment has presented an alternative platform for social and cultural exchange, thereby shaping the future of digitalization. For architecture, the Metaverse has become a tabula rasa for experimentation, in which the conventional constraints of gravity and geography are nonexistent. However, there is a lack of critical discourse as to how it will be designed and the types of architectural expertise that will be applied to its development, which raises interesting questions regarding architecture’s agency as a new space of design practice in the Metaverse. As a response to such questions, the research outlines a methodological approach developed in three parts: examining current architectural practices, comparing virtual architecture precedents, and implementing a final design project. Architectural projects in the Metaverse generally take the form of virtual buildings and landscapes, thereby replicating the design of the physical world. Further, the designers of such projects, commonly known as ‘virtual contractors,’¹ replicate traditional forms of architectural practice for the digital world. Voxel Architects, Metaverse Architects, and Meta's Horizon World are three such examples cited in this research. However, the research aims to move beyond a conception of the digital world as a simulation of its physical twin, focusing instead on the development of a new spatial paradigm for a different kind of virtual architecture. Similarly, new forms of architectural practice are being explored as a means of pooling the multi-disciplinary expertise necessary for such a paradigm shift. For context, the research examines historical precedents in architecture, alongside contemporary forms of experimental design thinking that underscore the importance of conceiving architecture as a generalist discipline capable of moving across disciplinary boundaries. In turn, the project that results from the research introduces a new interdisciplinary archetype as a means of rethinking architectural space in the Metaverse. Termed the “spatial pixel,” this archetype merges two-dimensional imagery with three-dimensional space. Although there are similar spatial archetypes such as ‘voxels’ and ‘polygons’ which are essentially 3D pixels, the difference is that the existing approaches continue to emulate physical reality in a virtual environment as a prosthetic extension. Meanwhile, the “spatial pixel” aims to venture beyond physical aesthetics into a new realm that is unrecognizable from traditional practices. Thus, such “pixelated space” reveals a new visual-spatial condition for further exploration and development by architects and designers in related fields. Ultimately, the purpose of the research and resultant project is to develop new and innovative ways of thinking about and producing architectural space in virtual reality. The lack of such innovation in the Metaverse invites such speculation. The architectural historian Reyner Banham focused much of his career encouraging architects to expand their scope and scale of design work into new technological realms. The Metaverse represents the most recent opportunity for such expansion, one rich with potential for the discipline and profession of architecture to establish new forms of practice in an increasingly digital age.

Pedagogy | Rise

Friday, June 28, 2024, 5:00pm-6:30pm

“I Want”: Agency And Accessibility In The Age Of Ai

Andrew Gipe-Lazaro & Luis Borunda, Virginia Tech

"I want access to public buildings and technologies"; "I WANT all stairs to have railings"; "I WANT there to be a talking pedestrian sign"; "I WANT curbs to be more noticeable"; "I WANT technology that is dedicated to the blind". Young, vision-impaired learners from across the world, participating in our team's human-centered research and participatory design initiatives, express an impassioned desire for agency and inclusive space making. Beginning with these statements, our work critically explores the intersection of AI and inclusive space-making, the methods employed by human-centered research and computational design, including machine learning and app development, and the potential contributions of these interventions to a more accessible future. This paper presents a two-part investigation into the role of advanced technological interventions and participatory design in shaping the future of architecture and design. Part 1 explores the outcomes of AI assistive device research centered on the voices of future professionals. This phase involved interviews and focus group discussions with blind and visually impaired individuals, designers, and computer scientists in an ongoing human subject research, leading to the creation of an AI-driven navigation app. Part 2 anticipates the deployment of working prototypes derived from these participatory design processes during [Affiliation Placeholder]'s annual Blind Design Workshop, in which more than a dozen young people with vision-impairment participate each spring. Its itinerary includes analog exercises in drawing and model-making (using material samples and wax sticks on Braille graph paper), guided tours of multi-sensory learning spaces across [Location Placeholder]'s campus, accessible training in the production of 3D-prints and embossed drawings, and mentorship from practicing design professionals of the vision-impaired community, culminating in a final presentation and group critique of accessible design proposals. The workshop is a unique career exploration experience in architecture for individuals with vision impairment, designed to empower them with the understanding that they can have agency in the space-making process by giving them a voice and teaching them to architect their ambitions for the future. The synergy of AI and architecture presents profound opportunities to propel young, vision-impaired individuals from passive observers to active participants in crafting inclusive environments. Our paper discusses how innovative approaches to research and learning can seed future generations with the goal of harnessing AI for social impact in design and substantiating their role as the vanguards of a more accessible world. The outcomes of this study hold the potential to shape pedagogical strategies and industry standards, contributing to a profound reimagining of inclusive design education and practice. Keywords: Human-Centered AI, disability, vision-impairment, activism, Inclusive Design, Assistive Technology, Architectural Education, Participatory Workshops.

From Pages to Perspectives: Unleashing Creativity in Architectural History Education through Graphic Novels

Pedram Ghelichi, The Chinese University of Hong Kong

In the realm of undergraduate architectural education, particularly in regions such as East Asia and South China, there appears to be a misbelief that the "West" represents the mainstream of architectural production in the 20th century. Consequently, "Modern History" courses are expected to reflect those events "as they happened." Despite numerous writings challenging this misconception, it still persists in architectural education. One of the key problematic implications is that students tend to assume history can be perceived objectively, turning them into passive recipients of historical information. In this context, where students' efforts in history courses often result in passive analysis and descriptions of past events, how can we challenge the status quo? Specifically, when the subject, narrator, or voice is frequently eliminated from historiography courses in pursuit of objectivity, how can we approach this differently? To explore these questions, we conducted an experiment with a new approach that is based on an essential yet often overlooked understanding of history: history, in general, and architectural history, in particular, is not a monolithic and linear narrative of the past, but rather a series of interconnected narratives from various perspectives. This position challenges the traditional practice of presenting architectural history through singular and linear narratives that trace a path from the past to the present and an idealized future. In other words, there isn't just one narrative but multiple histories that can be recounted in different forms. In light of this, the lectures and exercises in our course were designed to i) raise students' awareness of this issue, de-construct the pre-existing, solidified, and singular narratives of architectural history, and ii) reconstruct those narratives by incorporating unheard voices and overlooked perspectives in the form of altered narratives of architectural history. Building on this alternative approach, the students in the course employed the tools of historical imagination to reconstruct altered narratives and representations of architectural histories in the medium of graphic novels, supported by in-depth research and literature review. Graphic novels took various forms, including fiction (comic) books, newspapers, magazines, diaries, and exhibition booths. For instance, a student studying Buckminster Fuller's Manhattan Dome chose to adopt the role of a columnist for Time Magazine, conducting an imaginary interview and analysis of the overlooked dimensions of that utopian project. Through such endeavours, the students gained a deeper understanding of the complex historical, cultural, and social context surrounding each case study. Most importantly, they recognized the significance of voice and narrator in architectural historiography, transforming themselves from passive recipients into critical writers. This writing and the forthcoming presentation will delve into the theoretical foundations of this approach, as well as the unexpected and creative outcomes achieved by first-year architectural students.

Horror Theory: Landscapes Confronting the Unfathomable

Christianna Bennett, Rensselaer Polytechnic Institute

In popular culture, “horror” is defined by its ability to arouse feelings of fear and repulsion through a sense of dread. In this paper, I present an alternate definition of horror for use in the design disciplines. Rather than deploying horror tropes to arouse a sense of thrill and theatrics, this new theory of an “inescapable horror” attempts to use horror as a medium for soberly confronting reality. I discuss how world-making through fiction has played a controversial role in design disciplines by obscuring reality and deploying fiction to depict possible futures, often with a bend towards the positivistic. At the same time, fiction offers a possibility for disciplinary advancement in modes of contemporary cultural production. Specifically, I note how the popularity of the horror genre continues to grow with American audiences, demonstrating its compelling strengths as a mechanism deeply tied to our cultural consciousness. Next, I discuss how architecture has undermined horror as a generative device by engaging with the tropes of “pop horror,” or horror in the theatrical sense, rather than decoupling the horror-artifice of the theatrics to view reality as is. Landscape architecture has yet to explore the use of horror as a genre, and I argue that this inertia stems from a nostalgic and preservationist tendency that prevents present and future visioning from departing from past norms, which is highlighted in Susan Herrington’s “Stuck in Reverse” and writing on historical reenactment presented by J.B. Jackson. Finally, I detail one pedagogical framework that asks students to engage with horror as a generative device for constructing intricate, albeit complicated, messages about reality. Specifically, I work with students to unpack how fictions create landscapes (such as the paintings of the Hudson River School and American Romanticism movement). We explore how fictions are created through the expectations of what landscapes “should be” as opposed to what they “are,” especially in cases of conservationist and preservationist narratives. To do this, students confront the irreversible realities of the environmental crisis, grappling with the fact that while solutions may one day generate better futures, the damage has been done and it is the damage that we will continue to live with in this generation (i.e. there are no fixes for us). The purpose of these exercises is to unveil how fiction, specifically horror, can be used in architecture and landscape architecture as a timely form of cultural critique and how horror can be deployed as a generative tool in the design projects. In a move to conceptualize a new theory on horror, specifically for use in architectural discourse, I end with “Producing Horror: A Manifesto” which outlines ways in which the discipline might engage horror’s ability to captivate a wide audience and advance environmental literacy. The examples presented throughout the essay point towards a paradigm shift within the disciplines, where fiction is applied to bring architecture and landscape architecture forward in the public eye, as arts that engage with timely issues and tackle the demands of widespread contemporary cultural discourse.

Architecture Dreams

Andrew Douglas, University of Auckland

Of the many techniques for bringing architecture into being, in this paper we emphasise the relatively little considered practice of conversation. The presentation builds on research undertaken in the Masters of Architecture programme at the University of [name withdrawn for reviewing] in 2023. In this research, the key question addressed was how to imagine, from the perspective of a graduate about to enter into design practice, architecture differently. The position we assumed was that this difference could not be dreamed up in singular or solitary ways but must be discursively constructed. Moreover we proposed that this sharing ought to be multi-generational, in other words, historically inflected while being future-inclined. In the indigenous Māori tradition we sit adjacent to, such an idea accords with the practice of whakapapa, or the performing orally of significant genealogical and associational lineages that tie place and people together. Hence, as a cultural practice it sees the future in an anterior sense, carrying forward a backwardly drawn emphasis with deep historical and temporal ties. Moreover, the intensely multicultural nature of life here sensitised us to the way the quotidian itself is unavoidably declarative and performing of collective elsewheres and other times. For our part, we drew on generationally defined pedagogical ties of our School running back from Aotearoa New Zealand to Ireland, and in turn, Scotland where the then ground breaking work of biologist and early town planner Patrick Geddes established the conditions for imagining discursively and performatively rich conversations between those designing and those designed for. As a founding advocate for environmentally integrated life worlds, we were interested in the generative potency residing with local participants here well beyond regular architectural stakeholders. In this paper, we present a project whimsically titled Dandelion Minds, Stories That Make a Room. With it, we will suggest one way architecture can be better conceived for attaching itself to the world. The driving social conviction has been the need for conceiving inclusive arenas capable of resonating with multiple voices. Hence, the project imagines itself as a kind of room making—one drawing from Louis Kahn's exhibition titled *City/2* at the Philadelphia Museum of Art (1971-1972). Significantly, we have taken the position that the institutional furnishing of architectural learning has increasingly been given over to generic and formulaic modes of interaction, interaction increasingly restrictive of non-institutional voices. Building on the legacy of Geddes and its revision through previous teachers of architecture at the University of [name withdrawn for reviewing] we have emphasised the doubly-placed dynamic of community interaction—a here-there approach built around a series of micro-events that generate both residual artefacts and a deepened grasp and invention of place-rhythms from which architecture may better dream.

Melting: Can You See the Heat?

Jesus Melendez Vazquez & Marisela Lopez Rivera, Pontifical Catholic University of Puerto Rico

This paper makes the argument that in order to mobilize climate action in the cultural landscape of the Caribbean, particularly in Puerto Rico, it is necessary to critically examine the efficacy of its inherited systems of representation. The Caribbean region has been shaped as much by its own intricate environmental history as by the history of colonialism and transatlantic slave trade. In some ways, its intertwined histories have defined seamlessly the archipelagic landscape and its cultural imaginaries. For example, the assimilation of environmental catastrophes through imagery has been a theme of visual exploration, particularly promoted by artists in the 20th century (fig. 1). Artists such as Rafael Tufiño, a Puerto Rican painter, explored the theme of the hurricane in his famous engraving entitled "Temporal" (fig. 2). The engraving depicts the personification of the hurricane inflicting great damage on the helpless people below, along with a superimposed musical score commemorating the historical path of Hurricane San Felipe over Puerto Rico on September 13, 1928. In this case, the engraving effectively communicates the struggles and predicaments that Caribbean landscapes face with environmental events using local cultural tropes. In this context, the Caribbean faces a form of debilitating fragility when it comes to climate change and the imminent threat of environmental catastrophe that affects not only the Caribbean landscape, but also its ethnographic heritage and colonial imaginaries. Responding for better and faster means of communication in today's digital culture with the recent emergence of artificial intelligence, the essay examines the implications of Generative AI's means of production and its impact on traditional notions of discursive images as effective instruments of communication in the midst of the global boiling era (fig. 3). The essay coincides that the development of new methods and techniques are necessary for the understanding and implication of such instrument with the purpose to rendering them intelligible in the Caribbean imagination and architectural representation (fig. 4). Given the polemics around artificial intelligence and the significant social biases in datasets, the essay critically uses the existing limitations found in AI-diffusion models as a place of conflict to make intelligible the calamities of Caribbean environmental history and the repercussions of a failed modernity through the concepts of estrangement, defamiliarization, and the uncanny. The essay analyzes how discursive images powered by AI-diffusion models – such as Midjourney – can help support a post-colonial method, addressing colonial legacies and fostering climatic imaginaries for near-futures. Lastly, the research delineates why discursive images powered by artificial intelligence deviate themselves from the responsibilities associated with typical categories of visual representation as mere indexical formats of visual culture. The essay tests these premises in "Las Delicias," a post-colonial story that explores the strange event of a power outage caused by a solar flare that leads to the appearance of enchanted ice in the public plaza of Ponce, imbued with uncanny memories of the past as reminders of the immediate present (fig. 5).

Reparations in Public Space

Ifeoma Ebo, City College of New York

Community design is a practice that centers the designer as a facilitator rather than an expert and the process of facilitation as an act of service to the community (1). This practice of co-creation has the power to solve problems in the built environment in a way that centers community driven initiatives and empowerment. Community design practice is also an effective methodology for addressing climate and environmental justice in frontline and historically marginalized communities. For the past year my community design centered practice has been working in the multicultural community of the “Little Caribbean” in the Flatbush Neighborhood of central Brooklyn, New York. We have used community design practice as an approach to developing design strategies for memorializing the Flatbush African Burial Ground (FABG). The FABG is a recently landmarked, vacant and publicly owned site situated in a community dealing with issues at the intersection of climate and environmental justice – specifically extreme heat and food insecurity. Residents of Central Brooklyn experience intergenerational trauma from a legacy of environmental injustice; and many, particularly young people, experience climate grief along with the immediate health threats of climate change. Cultural preservation is a crucial component in combating climate change because it builds connections and resilience in affected communities. Heritage sites such as the FABG can serve as an important place for pilgrimage and public education on a shared local history. With this understanding of place, we are exploring how the intersection of art, history, and the design of public space can serve as a healing modality and as a way for my community to imagine collective futures. As a part of community engagement, we facilitated a series of community engaged design workshops that held space for Black people to collectively reimagine the FABG as a space for healing and repair. As a tool for co-design, we explored the use of Midjourney - a generative artificial intelligence program that generates images from natural language descriptions. The intention of using AI was to democratize the design process and support participants in having agency in the design process by using their words to visualize their dreams for the future of the FABG. The final outcome of the workshop was a collection of design and programmatic strategies for spaces of healing and redressing the impacts of environmental challenges in the community.

Space Redux: The Built World In•Practice

Shai Yeshayahu, Toronto Metropolitan University

Space Redux: The Built World In•Practice For centuries, philosophers and scientists aimed to decipher cognitive intelligence as a production system to define thought and behavior. In the twentieth century, advancements in cognitive sciences prompted scholars in cybernetics and artificial intelligence to associate cognitive intelligence with machines. In the proceeding years, intelligent machines gave rise to two views concerning human computational intelligence: one articulated by cyberneticist Heinz Von Foerster in 1973, asserting that human cognition is "a never-ending recursive process of computation," and the other expressed by paleontologist Ian Tattersall, who observed that: "We mentally dissect our exterior and interior worlds into a vocabulary of discrete symbols; and having done this, we can rearrange those symbols, according to rules, to imagine alternate versions of those worlds." Today, these perspectives are embedded in the premise that innate, indoctrinated, programmed, looped, or evolving intelligences transcend contextual boundaries. They reframed our understanding of cognitive intelligence, expanding our perception of the built environment and making it possible to conceptualize the existing context as a knowledge-base system made of patterns, symbols, and rules. Through this lens, Space Redux revisits the evolution of population growth, communication systems, material science, technological advancements, physical context, spatial configurations, perceptual tools, and digital knowledge from the Neolithic Age to the Second Digital Age (Fig.1). This exploration sheds light on how the built world functions as a production system in•practice. As inheritors of patterns, symbols, and rules, the analysis presented here posits a view of the built world widely determined by an interplay of knowledge stemming from atmospheric, biological, human, and programmed factors. Like a historiography of if-then scenarios, the paper concludes with three presupposed conditions of a built world propelled by technological progress (Fig.2). The origin of immersivity Spectrums bespectacled futures. These generational tales shed light on the foundational characteristics of our spaces, from the invention of the room, village, and city to the contemporary condition of the Digital Age. In so doing, Space Redux represents the Built World In•Practice, considering and letting you consider how to shape our digitalized world. Keywords: Immersivity, bespectacled, patterns, symbols, and rules.

Self-Referential Assemblies

Andrew Bako, Kent State University

Federico Fellini's 1963 cinematic masterpiece, "8 ½", provides a profound inquiry into the psyche of its protagonist, Guido, who is struggling with a creative impasse. The film entangles fiction and reality, offering glimpses into Guido's personal and professional dilemmas while reflecting on the art of filmmaking itself. By blending dreams, memories, and real events, "8 ½" captures the complex nature of creativity and the art of cinema. Expanding beyond cinema, Fellini's "8 ½" resonates within contemporary architectural discourse, particularly in the context of artificial intelligence (A.I.) and its profound impact towards our field. The film's introspective narrative explores the cyclical relationship between the creative process and final output, echoing the complexities of design labor in the post-digital age. Additionally, the blurring between reality and imagination mirrors the iterative and reflective practice in contemporary digital design, whereby creativity through self-evaluation becomes a primary form of labor. This paper addresses these themes by drawing parallels between the recursive narrative techniques in cinema, and in contemporary design processes that reference their own creation. This analogy is foundational for examining iterative design methods in the age of artificial intelligence (A.I.), where the distinction between original works and digital variations become uncertain, prompting the necessity for self-critique. This concept is explored in a series of physical artifacts titled "Self-Referential Assemblies" (Fig. 1-4), where each successive layer — structure, sub-structure, and skin — is informed by imagery of its predecessor. For example, the structural layer consists of a series of study models constructed from discarded materials, including scrap wood and nails. Photographs of these models are propagated through a process termed as "image breeding"; using A.I. to blend model photographs to generate a self-similar image library. This image library was utilized to train a generative adversarial network (GAN), producing morphing animations which were converted into 3D meshes utilizing medical slicing software. These meshes were digitally fabricated at a large scale through concrete casting and 3D-Printing, constituting the sub-structure and ornamental skin. Furthermore, this paper explores recursive design practices operating within an ecologically sustainable framework, where the by-products of fabrication are repurposed and integrated into subsequent phases of construction. This approach is exemplified by converting sacrificial cardboard formwork into ash, subsequently processed into a pigment. This pigment, symbolizing the lifecycle and transformation of materials, is later applied as decorative painted details derived from the original A.I.-generated image dataset. This approach not only advocates for a sustainable design ethos, but also resonates with the theme of self-referentiality by embodying a closed-loop material utilization system. This paper investigates the concept of self-referentiality and its application in architecture, highlighting the symbiotic relationship between creative expression and self-reflection. By drawing parallels between architecture and cinema, this research not only forges a unique interdisciplinary connection but also establishes a critical framework for design and fabrication methodologies in the age of artificial intelligence.

JazzSpace: A Cultural Design Studio Exploring AI-Integrated Community Creation

Kyle Spence, University of North Carolina at Charlotte

The JazzSpace design studio is an innovative pedagogical experiment that explores the intersection between cultural design paradigms and AI-integrated visualization methods. The studio aims to express identity through architecture by engaging students in an introspective journey examining their own cultural heritage and its relation to improvisational jazz music. The studio also challenges students to demystify clouded notions around AI inclusion in an academic ideation process by using AI-assisted tools to discover new expressions of their design decisions quickly. The studio is based on the premise that collaging in architecture, from Mies Van der Rohe's Resor drawing of 1939 to more contemporary image reconfiguration modalities, has become a hybridized conglomerate of sourced images[1]. The studio proposes redefining collaging as a rapidly-paced automated vision creation process, where AI-generated text-to-image content catalyzes design exploration rather than a final outcome. JazzSpace employs various AI-integrated tools, such as PromeAI, to assist students in generating and manipulating images based on textual descriptions of their design concepts. Students must interact with improvisational jazz songs from a spatial perspective, using them as a source of inspiration and a medium of communication. Jazz music's formal and cultural expression, which emerged from the African diaspora, offers a rich and diverse repertoire of rhythms, melodies, harmonies, and styles translatable into spatial qualities and forms[2]. The studio encourages students to listen to different jazz songs and identify the elements that resonate with their own cultural background and identity. The studio also prompts students to experiment with different modes of representation, such as sketching, modeling, and rendering, to capture the essence and mood of the jazz songs. The culminating studio project applies the cultural design paradigms and AI-integrated visualization methods to a real project site: a cultural community museum building as a new home for the Dr. Carter G. Woodson African American Museum in the Jordan Park neighborhood of St. Petersburg, Florida. The project addresses the need for culturally relevant intervention and the inclusion of community stakeholders in every facet of the design process. The project responds to an original RFP to expand the museum to a 5.5-acre property along 22nd Street South, known as The Deuces, the most historic and celebrated African-American corridor in St. Petersburg[3]. The project considers community context, cultural identity, code constraints, modularity, and flexibility in the varying sizes of gallery and exhibition spaces. The project also reflects the significance of cultural aesthetics in creating an architectural intervention that respects and celebrates the African-based cultural dynamic of the area. The project aims to create a cultural community-based history and art institution that offers aesthetics, education, entertainment, labor opportunities, and revitalization of respect for cultural history to visitors and locals alike[4]. The JazzSpace design studio is a unique and creative learning experience that leverages the power of AI-integrated tools and the beauty of jazz music to express identity through architecture. The studio demonstrates how cultural design paradigms and AI-integrated visualization methods can enhance the design process and the design outcome, resulting in a more meaningful and engaging architectural intervention.

Narratives and Representations| Slant

Saturday, June 29, 2024, 9:00am-10:30am

Beyond the Visible: Multi-Spectral Sensing and the Poetics of Urban Data

Galo Patricio Moncayo Asan & Zeynep Aksöz Balzar, University of Applied Arts

"Beyond the Visible: Multi-Spectral Sensing and the Poetics of Urban Data" embodies the essence of our research initiative, an endeavor that merges the realms of technology, art, and environmental science to redefine urban exploration. By crafting bespoke multi-spectral sensing devices, the project captures an array of data that unveils the intricate dance between visible and invisible elements in urban landscapes. This initiative challenges the conventional narrative of data as mere quantitative measures, proposing instead a transformative view where data becomes a rich medium for artistic expression and storytelling. The methodology is deeply rooted in the conviction that environmental and geometric data, when viewed through the prism of art, can activate profound emotional and intellectual revelations. This approach records the urban canvas, enabling the data collected by the project's devices to narrate the dynamic story of urban life. The project's devices, engineered for the project, serve not just as tools for scientific inquiry but as instruments that capture the symphony of urban existence, from a subtle breeze to the vibrant pulse of city streets. This perspective elevates the role of data from the mundane to the magnificent, inviting a reimagined engagement with urban spaces. Through "Vibrant Fields," data transcends its traditional confines, embodying a source of inspiration that beckons the observer to delve deeper into the narrative woven within urban environments. The project illuminates the complex interplay of natural and built elements, revealing the layers of history, culture, and ecology that define urban spaces. The implications of this artistic and technological fusion extend far beyond the aesthetic, touching on the realms of urban planning, architecture, and public policy. By offering a more nuanced understanding of urban environments, our research paves the way for development strategies that are not only sustainable but also resonate with the emotional and aesthetic dimensions of human experience. This approach advocates for a future where urban design is informed by a deep empathy for the environment and its inhabitants, fostering spaces that nurture the human spirit alongside ecological balance. In conclusion, "Beyond the Visible: Multi-Spectral Sensing and the Poetics of Urban Data" encapsulates a visionary project that stands at the confluence of art, science, and technology. "Vibrant Fields" offers a novel lens through which to perceive and interact with urban landscapes, championing a form of poetic documentation that enriches our understanding and appreciation of the cities we inhabit. By challenging us to see beyond the concrete and steel, the project invites us to explore the vibrant tapestry of life that thrives within the heart of urban ecosystems, urging us to envision and shape a future that reflects our collective dreams and aspirations for the urban spaces we call home.

To Be Swallowed by a Whale

Ayad Rahmani, Washington State University

Early in *Moby Dick*, Ishmael, the narrator of the story, attends a sermon. In it the pastor tells the story of Jonah, a biblical figure who disobeyed God and was punished. Central to his transgression was the belief that he could get away with murder. Not literally but in principle. He boards a boat to sail to escape but no sooner does he do so than he is driven crazy by a reminder of the moral order he had left behind. Inside his cabin and lying in bed, a lantern hangs overhead. Between the angle of his bed and the lamp, there is a slant, the first loyal to the dynamics of the sea, the second to that of gravity and the laws of the land. Try as he may to live by one and not the other, he couldn't, his anguish remaining crippling until a power much bigger than he swallows him whole and spits him out. How Jonah survived the whale is anyone's guess but survive he did. Architects are at a precarious moment in time, their services everyday threatened by a world increasingly dominated by tech companies whose products don't just scramble attention away from buildings but actively conspire to replace architects. De Graaf, the architecture critic, is livid, wondering at one point: "Why did Silicon Valley become so obsessed with devising "creative" spaces or developing code that replaces architects?" The answer lies in world domination, less out of nefarious intent and more that embedded in the DNA of the technology itself. Like the original Pac-Man video game from the 80s where the pie shaped character went around in a maze eating dots, not out of ill will but a script designed for that purpose, so is the case of the tech march; it too was designed to eat everything in its wake. Resisting it is unnecessary, not least because to do so would suggest that it possesses the emotional capacity to care and resist back. It does not, much like the whale that swallowed Jonah did not either, but simply gobbled him because he happened to be in his path. "Tech companies are becoming a dominant force in the world and are showing up more and more in our everyday lives, including sports," says a report by ExtraSlice published in 2017. The question of course is what might a tech merger look like and how might it affect architecture? Jonah was vomited by the whale after having spent some time in the whale's belly, now forgiven and capable of leading a fresh and innovative life. Something about the slime inside awakened in him an original clarity. Might architecture profit from the same? Might merging with tech companies restore in it a capacity long lost in the age of specialization, perhaps as uniquely suited to tackle some of the more difficult problems facing the world today? This paper will seek to answer those questions, examining, among other things, recent creative mergers, in architecture but outside as well.

Revealing Layers of Movement in Contemporary School Design

Jacklynn Niemiec, Drexel University

The circulation diagram conveys information about movement through space, often reducing it to one potential path. This approach forces assumptions about use, destination, and physical ability when applied to architectural circulation. The deterministic quality of paths also narrows the opportunity for alternatives. While the diversity of scenarios cannot exist within a single diagram, the diagram can evolve to become a tool for making the "complexities of diverse human occupation of built space" visible (Boys 2017). Reducing a diagram leads to clarity for some, namely the designer, but exclusion for occupants; "environments that are not universally usable are not value-neutral; on the contrary, they are value-implicit" (Hamraie 2013). Physical properties establish how circulation spaces are used and who can use them. The width of a staircase has life-safety implications and presents norms for social distance and comfortable passage. Subtle changes in dimension or slope can impact the speed at which someone moves, while the color or material wrapping a corridor can signify meaning about use or direction (Schittich 2013). The physical properties of circulation also include surfaces we touch and walk on. For instance, the experience of moving across a smooth concrete ramp differs significantly from one made of repeated wooden planks. Each criterion connects physical properties to the occupant experience and acknowledges the effect of various approaches. The range of potential impacts on occupant experience along a path is essential to consider. Elevated heat gain, occupancy agency, excessive social stimulation, and increased physical strain may significantly impact some often forgotten in the design of circulation spaces (Altenmüller-Lewis 2017, Gissen 2022). The research questions how to represent the simultaneity of these conditions in a graphic form and presents a method for examining circulation spaces through a more equitable lens. The H-B Woodlawn School in Arlington, Virginia, by BIG and Leo A Daly Architects is the selected case study for this research. The history of the school and buildings, its academic and social mission, and the design response by the architects contribute to this selection. This paper includes a review of the literature on factors related to circulation, including accessibility and spatial cognition. The history of the H-B Woodlawn School and the Eunice Kennedy Shriver Program outlines how movement within the school is fundamental to its daily use and inclusive mission. This review guided the design factors and relevance of mixed methods selected for assessing and documenting circulation spaces and suggested a deeper assessment of circulation spaces through a range of lenses for inclusion. A mixed methods approach coordinates data from digital models using VASA, depthmapX, interviews and site visits (Goldstein et al. 2023, Varoudis 2012). Digital models simulate a variety of paths in the building and align the following design factors: distance, elevation change, daylight, view to exterior, and social density. Diagrams revealing these layers, related design matrices, and a discussion of their impact on the school provide future consideration for the design of contemporary learning environments.

Touching Ground: The Impact of Survey Methodologies on Interpretive Planning in the Vedi River Valley, Armenia

Guillaume Othenin-Girard, The University of Hong Kong

This conference paper engages new architectural responses to the archaeological excavations of the Vedi Fortress which are situated in the south-eastern part of the Ararat flatland of Armenia. The paper explores the transformative role of survey drawing as a way to investigate topographical, architectural and archaeological ground conditions by combining two typologies of survey drawings: the 'Atlas' and the 'Federative Drawing'. In today's context, where most excavations recordings are done by drone, ground-penetrating radar, LiDAR scanner, and photogrammetry, drawing purely for the purpose of recording a site is redundant in archaeological fields. However, beyond the act of recording, the challenge is also to construct a field of possibilities for what is yet to come. I argue that architectural drawings and survey instruments are more than mere representation; they are propositional and bear the potential to maximise the breadth of participation throughout the stage of planning, designing and building a vision that considers the ground as a source of heritage in itself. The 'Atlas' made of multi-informational images[1] explores the narrative of history through the act of making and the material flows between humankind and the environment. By studying the various conditions and temporalities of grounds, the Atlas accounts for the actions carried in their depths: from geological forces to taskscapes[2] that reveal, as much as rewrite, the geomorphological clues of the terrain. The 'Federative Drawing,' a set of immersive and trans-scalar maps situate the archaeological excavations within a spatial continuity by bringing together radically disparate types of data. It is used collectively to question the ways in which grounds are described, managed, narrated, policed, symbolized, organized, divided or shared. Both survey instruments seek to bring to light the invisible linked to dominant imaginations on the territory and to reframe the act of drawing as a shared effort towards common spatialities. They speak of an architecture of attunement. An architecture that encompasses an archaeological approach of time, when design narratives emerge from the reading of the ground with the potential to reinforce higher cultural and social meanings. [1] Alessandro Zambelli, "The Undisciplined Drawing," *Buildings* (May 2013). [2] Tim Ingold, "The Temporality of Landscape," *World Archaeology* 25, no. 2 (October 1993).

(Re)construyendo Paradigmas: Profesión Para Crear Comunidad

Dario Luna, Tec Monterrey

Al hablar sobre habitabilidad, esta puede conceptualizarse como un conjunto de condiciones físicas y no físicas que fomentan la permanencia de las personas en sus territorios. Cualquier discusión sobre este tema debe considerar los problemas sociales y económicos para los estratos con ingresos mínimos para subsistir, que, difícilmente, podrían resolverse proponiendo alguna solución funcional ideal por el hecho de que dicho ideal queda fuera de su alcance. Esta problemática es fiel reflejo del quehacer del gremio arquitectónico, el cual, se ha empeñado en generar procesos arquitectónicos hegemónicos que reproducen lógicas coloniales mediante prototipos de vivienda que promueven la homogeneización y la industrialización del hábitat. Ante este dilema, la pregunta correcta a hacerse es, a partir de la activación académica ¿en qué medida los arquitectos podemos realizar procesos participativos de investigación y de entendimiento territorial para acompañar a los habitantes en la gestión, producción y defensa de sus territorios? En el contexto académico, resulta pertinente reflexionar sobre el potencial de la arquitectura como catalizador de cambio, siendo una disciplina que desencadena procesos de alto impacto mediante la participación activa del habitante y el intercambio de saberes. Al proyectar, debemos de establecer un diálogo social con el habitante mediante la producción y construcción social del hábitat, dejando atrás los estigmas, y dándole voz a los que han sido invisibilizados y son víctimas de problemáticas con carga histórica. Con base en lo anterior, se propone una metodología académica que implemente:

Conocimientos para crear comunidad Mecanismos de anticorrupción territorial El trabajo de la ciudad con dignidad Planeación territorial tejida de la mano de las personas Mecanismos de participación ciudadana deliberativa y de cultura de la legalidad Planes de manejo de reservas de recursos Diseño de procesos colaborativos para la Producción y Gestión Social del Hábitat Activación y contraloría social Justicia Socio Ambiental Rescate y preservación del patrimonio y de las técnicas tradicionales El trabajo de los arquitectos tiene un carácter complejo y multisistémico que influye en las dimensiones interrelacionadas con el habitar. La construcción social del hábitat es un constante ejercicio de denuncia, justicia social, democracia y defensa de los derechos humanos. Desde la práctica académica, debemos promover la construcción de una sociedad colaborativa, justa y solidaria partiendo por el diagnóstico participativo e investigación activa con el objetivo de detonar procesos colaborativos para desarrollar espacios apropiados y apropiables para las comunidades. En resumen, es pertinente proyectar desde una postura democrática de la arquitectura participativa y la producción social del hábitat, entendiendo que los individuos y sociedades son capaces de identificar sus necesidades, proponer soluciones y tomar las decisiones adecuadas para el desarrollo de sus territorios. En este proceso, el arquitecto debe desarticular la práctica hegemónica que se le ha adoctrinado en la academia para avocar por la defensa de la diversidad epistémica al fungir un rol de facilitador y mediador que acompañe a las comunidades en la defensa de sus territorios, usando herramientas como la reflexión crítica y la construcción del conocimiento colectivo.

‘Building Change, together’ – Collaborating for Transformative Change in Irish Architectural Education

Emma Geoghegan, Technological University Dublin

This paper describes co-designed curriculum change initiatives over the last five years at (Irish) University leading to a government funded national Critical Skills and Curriculum Change project led by this university in partnership with the five other accredited Irish Schools of Architecture, practice and industry stakeholders and the national Professional Registration body. Launched in 2022 the project aims to collectively revise architectural education in Ireland to embed a contextualised approach to climate literacy and advanced technological knowledge and knowhow, underpinned by the UN Sustainable Development Goals. To achieve this the project has been structured around three key strands: 1) a dynamic critical needs analysis across all project partners, 2) an ‘Educating the Educator’ programme addressing both practical skills and pedagogical principles and 3) pilot projects in Architectural Design Studio modules acting as testbeds for a new curriculum. The project uses agile design processes to develop maximum exchange between citizens, local authorities, community groups, industry, and students with this methodology being adapted to generate local ecosystems of impact unique to each School of Architecture. This approach builds on the rich range of skills and research areas available across the six schools which are geographically spread across the island of Ireland. Thus, unique regional contexts and characters: from Atlantic-facing rural environments, special landscape designations, just transitions, farming, forestry, tourism, shrinking and expanding rural settlements, through to larger urban cities with significant building stock and heritage in need of creative adaptive re-use, have all influenced the approach to curricular change. Each school also brings with it an existing culture and set of values, influencing its own distinct priorities for curricular change. The critical needs analysis with stakeholders (students, lecturers, industry, professional body, local community) has been identifying the key skills & knowledge needs of each of the universities in order to deliver graduates with capabilities in meeting the challenges of the UN Sustainable Development Goals for 2030, national strategic objectives around Climate Action, Zero Carbon targets and Sustainable Housing models, new models of practice and construction delivery and paradigm shifting technologies such as AI. The design studio modules, which account for more than half the learning hours in each programme are the primary site of innovation. These modules are inherently suited to the introduction of new knowledge, and to the investigation of complex emerging social issues and real-world challenges. In parallel with this academic staff have been engaging in cross- institutional reflexive processes, knowledge sharing and dedicated upskilling to trial new pedagogical approaches. This unique national project recognises that a values-based approach to curriculum (re)design is necessary to ensure the future architects we are educating are equipped to confidently and creatively engage with changing societal, technological and ecological contexts.

Challenges of Public Education and Educational Architecture in Colombia

Gerald Gast, University of Oregon

The process of public education in the global South is challenged by recent changes in pedagogy, limited resources, inequities of wealth and limited access to architectural assistance. These challenges are particularly staggering in Colombia, which needs to build 2,000 new and expanded schools during the next twenty years. This proposed paper and conference presentation focuses on seven years of work in Colombia in partnership with the Pies Descalzos Fundación (Bare Feet Foundation) of Bogota, a relatively small foundation that builds schools in the most marginalized barrios of the country. The Foundation provides educational infrastructure through new and expanded school facilities, and educational program assistance not normally provided by public schools - nutrition, health services, family educational outreach, sports and psychological counseling. The Foundation's model emphasizes partnerships with local public schools to fortify and supplement existing programs, rather than to operate its own nonpublic schools. The challenges of public education in a changing world are articulated in a recent book by Tony Wagner and Ted Dintersmith, *Most Likely to Succeed: Preparing Our Kids for the Innovation Era* and a book by Wagner *"The Global Achievement Gap"*. Although these books do not deal directly with Architecture, they describe the pedagogy and educational reform needed to address the rapidly-changing global economic context. Changing pedagogies generate radical new thinking about school design at both the community and building scales. Many of the needed school facilities in Colombia are located in neglected neighborhoods of rapidly-growing cities which are impacted by migration from rural areas, including families who are internal refugees fleeing conflicts in their home communities. The lack of economic resources in the impacted rural communities make it difficult for these communities to access architectural services available in the urban centers of Colombia. During the seven-year period of work with the Pies Descalzos Foundation the architectural and urban design team developed a guide to contemporary school design, *"Diseno para Escuelas Colombianas / Designs for Colombian Schools"*, published in Spanish and English, and distributed to school authorities throughout the nation. The most important recipients were schools with limited or no access to architectural services or resources. The research and publication emphasize the role of changing pedagogical approaches, increased sustainability concerns and the influences of educational technology on school design. Graduate Architecture and planning students were involved in the research and formulation of the design guidelines during the tenure of the continuing collaboration with the Pies Descalzos Foundation. The exposure to diverse cultural, language, institutional and climate differences brought new challenges and valuable educational opportunities to the participating students.

Why Build? Contemporary Intentions Behind Design-Build Pedagogy

Danny Wills, Cal Poly San Luis Obispo

Fiona Smith-Calonico & Olivia Reichert, California Polytechnic State University

Design-build education within architecture schools is a compelling form for empowering students to engage meaningfully with the built environment. While NAAB does not require that design-build criteria be integrated into architectural curriculum, many architecture programs choose to embrace its possible lessons. The extensive presence of design-build curriculum, despite it not being an accreditation requirement, demonstrates a widespread affinity for this style of learning. Definitions of design-build education over-prioritize the final, built artifact as proof or qualification. This research aims for more inclusive definitions of design-build education, reaching beyond (while acknowledging) the lessons from long-running programs found in U.S. based universities, colleges, and schools. ‘Why Build?’ surveys which accredited architecture schools currently (or recently) have held academic programs that emphasize 1:1 scale thinking, collaborative hands-on making, and real-world methods. In the process, the research examines a series of contemporary thematic categories and the extent to which these programs integrate these themes into their curriculum. These themes include student empowerment, accessibility, response to context, labor, circular practice, and learning from failure, among many others. The themes were initially developed in an interdisciplinary architecture, landscape architecture and construction management seminar course, where students identified topics often missing in contemporary architecture pedagogy and practice. The research is composed of four phases, shaped by an exhaustive survey of all 144 NAAB accredited architecture programs in the United States. Phase 1 consisted of data collection of publicly available data. Both quantitative and qualitative data were assembled from school websites, social media posts, promotional videos, and a literary review of journals and conference proceedings to observe how each school presents itself to the public. For the next phase, a questionnaire was sent to all program leaders identified in Phase 1. Phase 2 digs deeper beyond the surface and asks a sequence of structural questions regarding class size, project funding, and studio modality. This provided a way to understand patterns and outliers in the general fabric of design-build education. A series of more analytic questions were also asked, to gauge the scope of responses to the developed contemporary themes. Phase 3 was marked by the evaluation of this new data. Each program, and their contexts, are unique. Instead of limiting each program to a success/failure binary, the analysis focuses on the ranges of each program’s intentionality and impacts. Graphics, word bubbles, and other forms of data visualization produced during this phase help guide and organize the findings. Phase 4 concludes these findings in this research paper, returning to the question of: why build? Shifting the conversation from built artifact to pedagogical intent, the paper explores narratives of design-build centered on contemporary purposes and values.

Democratizar Las Viviendas Mediante Diseño Variable y Construcción Impresa-3d

Rodrigo Garcia Alvarado & Hernan Barri, U.Bio-Bio

Pedro Soza & Mariela Gaete-Reyes, University of Chile

La producción de viviendas es una demanda global, que debe atender una gran variedad de población y de localizaciones, con recursos y plazos estrechos. Por lo que usualmente se ejecutan conjuntos habitacionales masivos y similares en distintas ubicaciones. Varios trabajos han promovido la participación y diversidad en el diseño residencial (Alexander, 1980; Habraken, 1974; Aravena, 2016), pero sin lograr estrategias generales. Algunas propuestas han sugerido sistemas de composición y fabricación digital para organizar variaciones del diseño y construcción habitacional (Duarte, 2005, Sass and Botha, 2006; Eid Mohamed et al, 2022). En particular, con impresión-3d para elaborar una vinculación continua del proceso de planificación y ejecución (Ashrafi et al, 2022; Goudswaard et al, 2023). Las tecnologías de diseño y construcción digital se han enfocado en la innovación y productividad, pero también ofrecen una oportunidad de integración social, considerando sus capacidades de comunicación y gestión diversificada. Este trabajo expone un sistema de diseño variable para viviendas impresas-3d, destinada a manejar la variedad de requerimientos de residentes y localidades, que implica una revisión de las prácticas tradicionales de proyecto y construcción, con la posibilidad de distribuir las decisiones de diseño entre los ejecutores e interesados. Debido a que establece un proceso generativo de adecuación, que permite una multiplicidad de participantes para realizar obras específicas. El sistema se basa en experiencias de diseño y construcción impresa-3d en distintos casos en Chile, país que presenta una gran diversidad poblacional y geográfica, con una pujante industria inmobiliaria y demandas habitacionales. A través del cual se han decantado procedimientos de configuración residencial y un flujo digital de tareas. Se ha elaborado un repertorio morfológico de viviendas adecuadas al territorio y a la construcción impresa-3d, basado en atributos parametrizados e integrado en modelación de información constructiva (BIM) que permite planificar la ejecución y generar los códigos de ejecución, incluyendo ajustes interactivos. Este sistema se ha probado con la elaboración de elementos constructivos, un módulo experimental techado y actualmente se ejecuta un prototipo completo de 30 m². El procedimiento permite generar modelos tridimensionales de presentación e inmersión virtual para exhibición a potenciales interesados. Se han realizado sesiones de visitas virtuales y en los prototipos experimentales se están efectuando consultas de apreciación para evaluar diferentes adecuaciones. La implementación desarrollada y las evaluaciones iniciales sugieren un relevante potencial para experimentar variaciones de diseño residencial basadas en condiciones o intereses particulares. De modo de ejecutar agrupaciones de viviendas o iniciativas masivas en diferentes localizaciones que permitan aplicar producción automatizada en diversidad de soluciones habitacionales, manteniendo una morfología similar. Estas estrategias deben ser aplicadas para asegurar su desarrollo constructivo y social, incluyendo probar procesos de participación igualitarias y sensibles con los interesados, y su seguimiento en el tiempo.

Denver Low-Rise: Reinventing Domestic Forms for Collective Living

Leyuan Li & José Ibarra, University of Colorado Denver

Denver has one of the nation's worst housing shortages in the United States, with the city having a deficit of approximately 70,000 units and its residents struggling with housing affordability, gentrification, and homelessness. These issues are exacerbated by the predominant single-family housing model that is favored in this and many other American cities. With less land for building houses and with soaring prices for rent and mortgages, low- and moderate-income households have been displaced, which has diminished housing equity by intensifying the existing social and racial segregation. Moreover, the insistence on the idealized single-family housing has championed the privatization of public spaces within its territory, such as swimming pools and gardens, attenuating the advantage of sharing spaces and resources among a more diverse constituency, such as child-free couples and multi-generational households. With less flexible arrangements, the current housing model fails to engage a wider variety of living demands, creating more barriers to expand the measures of affordability and collectivity celebrated by the real dwellers of contemporary cities. According to Denver's new 5-year housing plan, policies suggest new paths of expanding housing options by allowing more Accessory Dwelling Units (ADUs) and "Missing Middle" housing development in low-rise neighborhoods and low-medium scale residential areas. While ADUs favor individuals, "Missing Middle" housing has the potential to offer broader social benefits, including collective arrangements for living that bolster a sense of community and resilience, with an improved ability to age in place. Responding to these conditions, this research project asks: how could we update the existing framework of "Missing Middle" housing and create new typologies that engage the diverse constituents of growing American cities, and which allow them to celebrate the vibrancy of their communities? Thinking through new technologies and cultural shifts that inspire contemporary dwelling changes, what domestic forms—such as shared living rooms, collective kitchens, and communal laundry facilities—could be updated, reinvented, and collectivized to enable a common ground? By looking at current examples of "Missing Middle" housing types in Denver and contextualizing them in local and national policy, the project results in a number of reinvented new types of "Missing Middle" housing schemes that materially investigate equity, diversity, inclusion, accessibility, and quality. These new types all use the same lot in the city as a site for speculation, inviting proposals that foreground innovation while adhering to the needs and regulations of the city. Together, these types also make up a new paradigm of housing in Denver and other American cities in the twenty-first century, one for which collective arrangements become instrumental. Through different degrees of sharing spatial and social resources, these reinvented "Missing Middle" housing options seek to establish a common ground where the relationships between individual, collective, community, city, gender, race, and public health are socially defined and formally celebrated. This approach to collectivization will be further elaborated in the essay.

Transitory Skin: Temporal Layering of the American Home

Elias Kotzambasis , Miguel Guitart & Christopher Romano, University at Buffalo, SUNY

The North American balloon frame home has a unique material relationship with time that is not present in other housing typologies. This typology is in a constant state of flux, and is thus dynamic and temporary, constantly shedding and gaining new materials as the owner sees fit. The ephemeral qualities of materials used and the shifting of home owners cause most of the temporal qualities of the house components. As the skin of the home becomes weathered and outdated over time, the house skin must be updated in order to maintain its appearance and functionality. Within this condition of material change, a building cannot be understood as an object that is complete after its initial construction, but as a process by which adding and removing building materials takes place. The architect does not create a final product, but rather the first step in a process which will accrue many layers through the intervention of unforeseeable participants over time. After a building is constructed the remainder of its performance is carried out through the means of repair and renovation. Repair, not typically an area of construction that involves architects, leads to recovering malfunctioning parts of the home, allowing it to adapt and respond to the temporal properties of its materials and the participation of other agents who ultimately contribute to define the ongoing construction of the house.[i] This essay examines a participatory build exploration that approached architecture as the accumulation of temporal layers in skin building under a continuous process acted on by a series of participants throughout time.[ii] The retrofitting processes accrued layers over time, generating new patterns, thicknesses, and textures that were inherently imperfect and incomplete. The built experiment was constructed through a sequence of informally orchestrated interventions by a series of 32 actors who completed the retrofitting collecting process with reused and leftover materials over the course of six months. The intervention of the actors engaged in a collective process of transitory participation and material change into an “organism with its own continuing life.”[iii] The engagement between a community of participating students and the reused materials layered a series of collaged interventions that replicated the state of change in house continuous repair over time.[iv] In addition to the physical interventions, the study revealed the participation occurring on homes' skins through a series of photographs separated into three categories – looking, revealing, and concealing. The study revealed a flux of accumulation and concealing of the inner layers which were intrinsic to the transitory nature of the building skin. The built experiment revisited the discourse of architecture from the perspectives of material circulation, agent intervention, and material continuity, speculating on the way architecture is practiced as defined by the role of the maker over time, and embracing the inherently incomplete, participatory, and spontaneous nature of the material layering phenomena of skin building in the American home.

Density To Be: A Holistic Speculation of an Equitable City

Livia Catao Cartaxo Loureiro & Davi De Lima Vaz Xavier, Texas A&M University

According to the United Nations, by 2050, two-thirds of the world's population will live in cities. That prospect carries a series of consequences that affect how urban networks will be developed and, more importantly, where and how people will live. Addressing urban issues such as spatial segregation, density, and the right to the city becomes vital when thinking about housing in the 21st century. One of the tasks of a design studio is to prepare students to envision architecture as a discipline that can promote social, political, and material change. In an introductory design course, realizing the importance of observing the urban issues that coexist in the city and translating that into a connection between architecture and context becomes one of the primary learning outcomes. This paper discusses the speculation of housing density in a speculative urban context where the ground is the focus and the beginning of all the relationships in the city. The assignment represents the culmination of three exercises developed in a first-year design studio at [REDACTED]. Students considered the negative infill space of their site from a theoretical urban scenario. The initial assignment questions were: if existent density and context are the hard edges of this current urban scenario, how is the infill appropriated towards a healthy future for the city? How can this new density occupation be defined if the sky is the limit? How can cities grow on top of one another without neglecting each other or its inhabitants? The students investigated these issues while exploring foundation concepts such as organizing principles and operative design allied with housing theories focused on user autonomy and participation. These elements established the theoretical framework for their proposals. After going through design transformations reflecting concepts of scale, ground condition, operative design, density, and habitability, the students developed design responses to address the main hypotheses of the assignment. Lastly, their proposal schemes were blended with Midjourney image simulations in search of a representative vignette of what the cities of today can become. Introducing critical subjects of contemporaneity in the design studio pervades discussing and developing them through a holistic lens. Hence, the design speculations in the assignment represent the students' take on density and habitability applied to extreme future urban contexts, building on existing discourse by positioning a design response acknowledging futuristic urban scenarios that place housing at the core of the cities' transformation.

Urban Scale | Rise

Saturday, June 29, 2024, 11:00am-12:30pm

Memorials to Victims of Demolition

Scott Aker, University of Pennsylvania

Over the past decade, Philadelphia has grappled with significant urban challenges, underscored by 12 demolition collapses from 2013 to 2023 [Fig1]. This paper examines an introductory design studio's response to urban traumas, where students from diverse academic backgrounds—including business, medicine, and design—engage in their first studio in design education. Through the lens of demolition, the studio fosters critical thinking and a multidisciplinary dialogue on urban transformation, resulting in innovative memorial typology designs that integrate product, landscape, and architectural interventions for demolition victims. Informed by interdisciplinary backgrounds and collective research on Philadelphia's demolition challenges, the students' design concepts delved into themes of destruction and renewal, fostering a rich dialogue on urban commemoration. The visual narratives in [Fig2] expose the city's demolition crisis and current challenges, guiding the designs toward spatial justice and sustainable solutions. Situated in the historic North Mantua neighborhood, the memorials tackled the complexities of site selection by offering students the choice among urban infill, edge, or void conditions as their design backdrop, each serving as a unique platform for memorialization and urban renewal. "Urban Infill" projects sought to harmonize with existing buildings, paying homage to the locale's historical essence while contributing to its urban fabric. "Urban Edge" proposals aimed to reconceptualize neighborhood perimeters, frequently repurposing edifices slated for demolition. Meanwhile, "Corner Void" solutions revitalized underused areas into essential community hubs. A pivotal aspect of the studio's methodology was the partnership with local entities like 'Build As You Live Here,' which significantly shaped the students' approach to crafting functional and engaging commemoratives. This collaboration enriched their comprehension of the dynamic relationship between architectural design and the urban milieu, leading to the development of site plans and memorial concepts that respond thoughtfully to communal necessities. Students could select from one of three memorial typologies—product design, landscape architecture, or architectural design. This choice fostered an interdisciplinary and flexible approach, allowing students to weave their diverse interests into exploring the essence and potential of memorial design, thereby expanding the scope of commemorative architecture. An exemplary project within the landscape typology is "Healing Amongst Transition," depicted in [Fig3], which creatively transforms a sidewalk into a roundabout. This design functions as both a serene memorial space and a traffic-calming feature. Similarly, in architectural design, the "Daily-Caution" concept [Fig4] demonstrates how a structure can serve as a poignant reminder of loss while actively integrating into the community's daily life. These projects underscore the studio's commitment to spatial justice and sustainable urban development. The "Groundscape Reclaimed Rowhouse Stoop" project creatively repurposes stoops from demolished homes, rearranging them in a corner void site to create communal, reflective spaces [Fig5]. Exploring memorial design through themes of scalability, duality, and disruption, students crafted memorials that encapsulate urban trauma and renewal. This paper showcases how memorial designs foster reflection and dialogue, blending uniqueness with harmony to facilitate a community turning from trauma to engagement and narrative continuity. Highlighting memorials to demolition victims emphasizes the vital role of educational initiatives in equipping future architects to make significant contributions to urban memorialization.

Entre Habitares: Cuestionando el paradigma de Temozón Norte

Sarah Lavin, Tec Monterrey

“Is architecture relinquishing its potential to embody high-minded cultural and collective values? Is it working to support ideological and commercial brainwashing and exploitation rather than cultural and historical understanding?” -Pallasma (1999) ¿Qué busca fomentar la arquitectura? ¿para quién sirve? ¿cuál es el papel de futuras arquitectas en la profesión? Estas interrogantes han constituido un destello en la ruta crítica por encontrarnos como nuevas voces en el mundo profesional. En un escenario de perpetua evolución, donde se fomenta lo individual propiciando la segregación, los arquitectos emergentes desempeñan un papel crucial en la creación de valores colectivos. “Entre Habitares” se erige como un proyecto académico destinado a despojarse de las limitaciones impuestas en sí mismo, trascendiendo su dimensión meramente estética. Desafiando los cánones establecidos, busca explorar las raíces más esenciales de la disciplina, aspirando a la consecución de una eventual identidad profesional. El idílico Temozón Norte, un suburbio en Mérida, Yucatán, experimenta una inminente pérdida de identidad frente al despojo cultural, social y económico. Invadido por los valores de la ciudad genérica y la afluencia de nuevos individuos con diversas tradiciones y perspectivas, se evidencia la imperiosa necesidad de reflexionar colectivamente sobre un porvenir esperanzador. La carencia de una vida pública latente se manifiesta como una de las consecuencias preponderantes, motivando que la arquitectura asuma el papel de catalizador y transforme el concepto de habitar en un acto tangible. Este verbo encierra nuestra respuesta frente a la situación actual, resistiendo la homogeneización urbana y propiciando una reflexión íntima acerca de nuestras acciones cotidianas, gracias a un meticuloso reconocimiento del entorno que nos llevó a comprender que el acto de habitar y sus distritos matices se manifiesta siempre a través de las personas, sus vivencias personales y su identidad. A través de una reflexión profunda, buscamos ofrecer a Temozón un futuro que entrelace su rica historia y arraigadas costumbres locales, explorando nuevos horizontes. Nuestras convicciones se basan en la empatía, la colaboración y la evolución continua, generando así una modalidad de habitar más equitativa y sostenible. Como diseñadoras, nuestro papel consistió en reconocer y mediar entre dos estilos de vida que convergen inevitablemente, explorando nuevas fronteras para la convivencia en el tejido urbano. La arquitectura surgió como respuesta a todo el extenso análisis y directrices propias, a medida que fuimos entendiendo que tenemos un compromiso social por propiciar el bien común. Temozón Norte se erige como un precedente analítico, destacando la importancia de la contribución de la arquitectura y el diseño urbano a la construcción de lo colectivo, donde las personas quedan en el centro del habitar, manifestándose en gradientes desde lo individual, comunal y colectivo. Nuestro aprendizaje en Temozón ha sido constante y continuo, y a medida que nos adentramos más en él, vislumbramos la prueba viviente de futuros llenos de nuevas perspectivas que no se aterrorizan a explorar nuevos paradigmas y, por ende, el futuro de nuestra profesión.

Atlas de Ecologías Reparadoras Locales: Mapeo de Economías Circulares y Solidarias en Querétaro

Karla Mejia, Tec Monterrey

La ciudad de Querétaro ha experimentado un crecimiento desmesurado de su mancha urbana, representando un incremento anual del 2.9% (Banda, 2020), lo que ha desatado desafíos ambientales y económicos significativos. Se producen más de dos mil toneladas diarias de residuos (González, 2022), lo que expone la necesidad de replantear las prácticas actuales. El gobierno de Querétaro propuso un plan de acción para la gestión integral y economía circular de los residuos con la finalidad de aumentar la productividad de los materiales y mitigar los impactos ambientales. Teniendo en cuenta que, actualmente, el estado tiene un sistema de economía circular conformado por 114 empresas con 135 iniciativas, pero en su mayoría son grandes corporaciones, nacionales o multinacionales, lo cual no beneficia directamente a economías locales o usuarios comunes. Es importante destacar que una economía circular sin un enfoque en justicia social es mantener solamente un status quo ligeramente más sostenible. El "Atlas de ecologías reparadoras locales: Mapeo de Economías Circulares y Solidarias en Querétaro" es una investigación que busca visibilizar y promover las prácticas circulares y solidarias en la región. Esta se centra en ocho casos de estudio, enfocándose en el reuso, reparación y reciclaje de materiales. Se recolectó información por medio de una metodología mixta para crear un mapa colectivo que identifica las ecologías de reparación emergentes y muestra la red de conexiones que se tiene en Querétaro. La investigación tiene como objetivo visibilizar y promover acciones circulares desde el núcleo de la sociedad, incluye el esfuerzo de organizaciones comunitarias y transacciones cotidianas con una visión de economía solidaria. A su vez, propone inventariar y aprender de prácticas circulares mediante la recopilación de datos y experiencias. Se busca generar material que permita a investigadores desarrollar análisis adicionales y a los responsables políticos, tomar decisiones informadas con la difusión de distintos sitios de reparación y reuso en un mapa accesible al público. Las conclusiones destacan la incidencia del liderazgo femenino y el creciente interés local en las prácticas solidarias y circulares. En donde se observa el cambio que tienen las nuevas generaciones al adoptar acciones que impactan su entorno social y el de quienes llevan a cabo esas iniciativas actualmente. Se espera que este trabajo sea un instrumento para que futuros arquitectos y diseñadores puedan crear espacios pensando no solo en el usuario, sino en las necesidades de la comunidad a la que pertenecen hacia un futuro más solidario y económicamente justo. Los siguientes pasos incluyen continuar con los casos de estudio, conectar con otras iniciativas y co-diseñar procesos que puedan replicarse de manera gradual.

Local: Un Proyecto Colectivo Acerca de la Vida pública en el Suburbio

Marcelo Sanchez, Tec Monterrey

¿En qué posición política se puede situar el arquitecto frente a un entorno marcado por el cambio continuo? ¿Cómo contribuye la arquitectura a la legitimidad del interés común y su identidad? ¿Cómo puede la arquitectura acomodar y representar la dinámica de la vida pública? Estas interrogantes sirvieron como fundamento para un curso impartido a lo largo de dos semestres en 2023. El contenido del estudio se centró en dos temas primordiales tanto para la academia como para la práctica: la exploración y análisis del espacio público en el contexto suburbano de una ciudad latinoamericana de tamaño medio, así como en el rol de la arquitectura pública en la ciudad periférica. En una era de disminución de la participación del gobierno y creciente comodificación del estilo de vida, es necesario desarrollar nuevos métodos, tácticas y perspectivas a través de los cuales se puedan entender y diseñar los nuevos espacios públicos. En consecuencia, el espacio público debería ser uno especulativo, un laboratorio y un proceso abierto en lugar de seguir modelos preconcebidos y quizá obsoletos: ¿es posible que pueda ser flexible y capaz de acomodar diferentes formas de hacer ciudad, motivar la participación ciudadana e inducir creativas intensidades de usos? A través de este artículo, se pretende ilustrar esta experiencia académica a través del recuento de su estructura, medios, técnicas y resultados, en pos de subrayar una postura pedagógica que interprete el diseño como una herramienta que promueva la reflexión crítica y la discusión propositiva de las circunstancias y procesos que viven nuestras ciudades. De esta manera, se aspira lograr una clara comprensión acerca de la relación entre la forma de un ambiente construido y las relaciones sociales que lo activan. La contribución de este trabajo se basa en la postura de que la investigación no se trata solo de preparación, descripción y explicación, sino aún más importante, de especulación y proyección. En resumen, la investigación es una forma de diseño y el diseño una forma de investigación.

La Luz 1126: La Búsqueda por una Densidad Barrial

Leon Staines Diaz, Tec Monterrey

Marysol Uribe Pérez Coeto, Universidad Autónoma de Nuevo León

Las administraciones gubernamentales han transformado a Monterrey en una ciudad que demuestre el progreso a costa de su riqueza histórica y natural (Treviño et al, 2019). Por un lado se han entregado sus cerros y manantiales a la privatización, por otro, a la destrucción de su memoria para la transformación de un centro moderno (Sanchez, 2019). Esta forma de entender el territorio debe de cambiar, el poco respeto por el territorio ha generado una dinámica urbana generadora de problemas sociales y ecológicos. En 1985 vivían en el Centro de Monterrey 115,000 personas, hoy vivimos menos de 23,000. La búsqueda por una vida moderna ha desplazado a los habitantes a las periferias urbanas, dejando gran parte de la vivienda en el centro en abandono. Esto ha provocado que en la búsqueda por densificar se opte por la construcción de edificaciones en altura que de manera descontextualizada rompen por completo con la preexistencia, imponiendo ritmos y usos que destruyen los barrios (Kern, 2022, Muxi, 2018). El barrio de la Luz es un barrio histórico del centro de Monterrey que albergó a la clase trabajadora desde la década de 1930, donde el magisterio, los oficios, y los profesionistas formaron este barrio con sus dinámicas vecinales y arquitectura vernácula, dando cualidades únicas a la zona. Este barrio paso de ser tierra de cultivo, a formar las primeras ampliaciones de la ciudad, por aquí paso el tranvía, la muralla y el primer teatro al aire libre de la ciudad. Un barrio que por sus cualidades se quedó estancado en el tiempo, con sus rutinas, vendedores ambulantes y numerosas vecindades. Preservar esa escala es un tesoro que pocos logran distinguir, en una ciudad rápida y caótica en busca de modernidad, estas dinámicas calurosas del ser humano son valores intangibles y frágiles que si no son apreciadas terminarán por desaparecer. Este artículo aborda el análisis de un ejemplo arquitectónico de densidad adecuada que cambia el paradigma de la densidad en Monterrey. La Luz 1126 es un ensayo arquitectónico que responde a los retos de la vivienda en zonas consolidadas e históricas de la ciudad, alejándose de la mera generación de ganancias y enfocándose en un equilibrio entre lo comercial y las capacidades que un barrio tradicional debe de tener. Consta de cinco viviendas y una planta baja comercial que activa la fachada. El programa interno se distribuye a través de plataformas de concreto conteniendo los departamentos que se elevan en medios niveles, hasta coronar en dos terrazas que permiten apreciar la vista panorámica del Centro de Monterrey y sus montañas. El retranqueo reafirma el respeto a la escala y contexto histórico de las construcciones de la primera mitad del siglo XX que le rodean. A partir de un estudio de las dinámicas barriales, los autores exploran el impacto que tiene esta propuesta que escapa de la respuesta convencional del desarrollo inmobiliario de Monterrey. Concluimos que mientras la densificación de los centros urbanos es importante, se tiene que partir de la escala local para definir las características de intervención.

Materials and Applications | Slant

Saturday, June 29, 2024, 3:00pm-4:30pm

The Plantain Lily as a Biological Role Model to Create Hybrid 3DP Elastic Actuators in Passive Architectural Systems

Emilio Gonzales, Jarin Hoque, Priscilla Subramaniam & David Correa, University of Waterloo

The structural characteristics of plants have served as inspiration in the development of multiple engineering and architecture strategies used in the development of high-performance structures. Since plants lack a skeletal frame, they have developed creative means of support using hierarchical structural organizations of material units in combination with optimized shapes across their entire anatomy, from their roots and stems to their leaves and flowers. Designers have been successful at borrowing inspiration from the shape of birds, flowers and seeds for the development of technical solutions for the shape of trains, the wings of planes, the active systems in building façades, or the ubiquitous Velcro adhesive. However, there is much we are yet to learn from nature. One field in particular that remains understudied is the use of hierarchical structures within designed materials, particularly in relation to elastic systems. This research looks at the Plantain Lily (*Hosta ventricosa*) as the biological role model for the development of an elastic actuator with functionally graded bending stiffness for architectural applications. The research investigates how the venation patterns and densities of tissue within the plant's physiology maintain a large leaf surface area with a relatively slender petiole structure. This is used as a source of insight for the customization of the elastic membrane. Practical applications of the research looks towards a composition of materials with different structural properties whose material memory mimics hierarchical structures found in the Plantain Lily. A hybrid 3D printing process, using Thermoplastic Polyurethane (TPU) and an elastic fabric substrate, is used to develop a bio-inspired flap mechanism. TPU, which is an elastic and flexible 3D Printing filament, acts as the dense vascular bundles and is printed on stretched fabric substrate in an expanding linear pattern inspired by the venation lines of the Plantain Lily. The elastic fabric substrate is attached and arrayed on to a frame which creates the bio-inspired flap mechanism. This mechanism is manually controlled through a tension system, stretching the composite actuator and returning to its original form due to the TPU and fabric substrate's elastic properties. The kinematic potential of the system is demonstrated through the integration of the flap mechanism within an aperture system for passive ventilation in an architectural application. The findings in our study will contribute towards a better understanding of the role of 3D printing in the material development of bio-inspired elastic systems while offering insights into potential application of these systems in passive ventilation within climate adaptive architecture.

Pedological Pedagogy

Tyler Survant & Anna Leshnick, Montana State University

Despite widespread interest in sustainable construction, a knowledge gap in both formal, Western architectural practice and education still exists around earth as a building material. Pedology, from the Greek pedon for “soil,” is the science of soil formation, classification, and mapping. Introducing basic soil science into the academic architectural studio encourages students to approach construction materials literally, and to consider the technics and politics – rather than just the aesthetics – of earth as a building medium. Introducing these ideas into professional practice teaches architects about the continued relevance of indigenous building methods, including their potential to short circuit capitalist supply chains and reduce the embodied carbon of construction. Earthen buildings, such as those made from adobe, mud brick, or rammed earth, are found in traditional societies around the world, and an estimated third of the global population – primarily in Africa, Asia, and Central and South America – still reside in such structures today (Rael, 2009). As a natural resource with low embodied energy, unfired earth has far less environmental impact in construction than concrete or steel. The thermal mass of earthen walls passively stabilizes indoor temperatures and, especially in certain climates, further reduces emissions by eliminating or reducing active mechanical heating and cooling. Soil is widely available – the base material of the typical building site – and therefore easily sourced. It is also easy to build with, at least in parts of the world where a low-tech but labor-intensive process remains more economical than the use of industrially manufactured, off-the-shelf products. Our research into earthen building has both qualitative and quantitative aspects and centers on case studies from both teaching and professional practice that combine scholarly investigation with hands-on physical experimentation. In a recent studio at an American public university titled “Earth-Work,” which considered the intersection of labor and earth building materials, students dug up soil from wild clay deposits, constructed their own adobe and cob wall mockups, and studied a range of precedents, from historic mud structures to Ronald Rael and Virginia San Fratello’s 3D-printed adobe structures (Rael, 2018). We traveled to New Mexico to visit Taos Pueblo, a five-story adobe settlement and UNESCO World Heritage site built by Pueblo Indians, as well as the Dar Al Islam Education Center (1980), a mosque of modernist mudbrick vaults and domes by the Egyptian architect Hassan Fathy, who positioned mud brick as a regional alternative to industrial building materials (Fathy, 1973). Augmenting our teaching experience in the academic studio, the research also includes public engagement and work on rammed earth projects in Nepal, part of our professional practice as founders of a nonprofit design organization with projects in the US, India, and Nepal. A pedagogy engaged in building science and material history grapples with the environmental, social, and economic effects of material extraction and asks: as we transition away from fossil fuels and a globalized economy toward renewable energy and local resources, what are the possibilities for a more conscientious, post-carbon architecture?

2.5-Dimensional Robotic Biopolymer Design

Sara Codarin, Lawrence Technological University

The contribution discusses the project 2.5D Robotic Biopolymer Design, a study in robotic fabrication that resides at the intersection of digital design, automation, and craft. It delves into a sequence of one-off robotically fabricated 2.5-dimensional drawings crafted using a plant-based bio gel, a material that allows for manipulation in a space that straddles the boundary between two-dimensional and three-dimensional realms. This approach diverges from standard digital fabrication methods, where digital inputs are directly translated into physical outcomes without deviation. Instead, this project engages in a translation process that necessitates adjustments and negotiation in redefining design-to-fabrication techniques by employing a 6-axis tabletop robot integrated with an Arduino-enabled extruder. This method underscores a re-evaluation of how digital designs are realized physically, emphasizing the role of adaptability and innovation in the face of material and technological constraints. Linework drawings are generated in three-dimensional space and are based on parametric rules that draw inspiration from the natural world and subject-specific natural phenomena, including particle fields, water flow patterns, and biomechanic tangencies. These designs are conceptualized through fundamental geometric elements and ultimately implemented using biopolymers. Prior to the robot executing the design, the three-dimensional digital drawings are adjusted within a defined bounding box (x, y, 0.25 mm). Here, the x and y dimensions represent the target surface area, while the z value prescribes the maximum depth traversed by the extruder's nozzle in a 2.5-dimensional space, transforming precise digital designs into unique bio gel inprints. Formally, dense areas converge into a unified visual mass, while sparse patterns ensure that each line is preserved without compromising overall visual coherence. Adjustments to the robot's tool-center point allow for iterations in the drawings, with modifications at a tenth of a millimeter—comparable to the thickness of a sheet of paper—yielding visibly distinct outcomes. A previous version of this work was based on the generation of ink drawings. The 2.5-D Robotic Biopolymer Design iteration has evolved with the robotic toolpaths now employing an additive technique to form the material layer. The creation process does not conclude with the extrusion of the surface; rather, the final visual outcome becomes distinctly apparent once the moisture within the bio gel evaporates. Procedural artists like Sor Lewitt, Vera Molnar, and Bridget Riley were used as references to help build discipline toward a critical and diligent use of technology. The outcomes document the various attempts, iterations, failures, parameters, and circumstantial variables such as material moisture, robot speed, toolpath directionality, room temperature, and environmental humidity that play concurrently with the designers' whim. In the 2.5-D Robotic Biopolymer Design process, tension was discovered between the procedural aspect of the drawings and their visualization in the physical space that transcends technology itself. While the geometric control is manageable through input-output digital variables, the final appearance of the programmed paths remains uncertain and holds inherent ambiguity. Each drawing is the unique manifestation of non-repeatable digital and physical relationships that allow for diverging from the predictability of the outcomes and find space for debate.

Reconstituting Rubble

Andrew Griffin, Miguel Guitart & Christopher Romano, University at Buffalo, SUNY

Five hundred and thirty-four million tons of construction and demolition debris is generated each year in the United States. This debris is anonymously moved away, invisible to most, to distant landfills far removed from its origin to lie dormant at the presumed end of its life. The bulk of this material comes from buildings, but roads, bridges and urban landscapes all contribute to what is thrown away. This demolition is a necessary part of our current economic cycle; the permanence of the buildings we design is too often overstated. Architects are the purveyors of materials in buildings yet hesitate to involve themselves when they are demolished. This pile of remains presents an opportunity for architects to expand their scope into the afterlife of buildings. In a time where environmental issues plague industry, the idea of simply discarding material is no longer a reasonable long-term option. Perhaps the scope of architect's involvement should extend into a building's afterlife. This essay proposes an adjustment to the material flow of building debris after demolition. Advocating ways of transforming architectural rubble to develop building procedures that integrate waste-bound materials into new architecture. Drawing from new innovations and old technology, this study strives to layout building end-of-life processes to divert would be discarded material into new building assemblies. The research looks at demolition rubble as a continuous stream of usable material in need of transformation. While the research looks to pose a potential reuse for the material, the ambition of this project extends beyond environmental considerations to look at aspects such as the processes of labor involved and the textural qualities of rubble. As reuse practices are labor intensive it is important to acknowledge the human effort involved in this transformative process. The focus of the study investigates the uniqueness and irregularity of salvaged materials, highlighting their individuality and developing procedures of reconfiguring basic building rubble—bricks, concrete, and stone—into new arrangements reconstituting pieces of the past into new forms. The proposed process steps through demolishing, cataloging, refining, assembling, and reconstituting. The eventual result of this process examines the qualities of rubble, the roughness, the irregularity of its texture, shape and size, and proposes the structural and constructive reconfiguration of remains into a theoretical and practical approach. The study presents rubble as an opportunity, not as a burden, that architects can reconsider as a commodity that demands a proactive flow of energy and resources. This shift in perspective from waste to resource requires early intervention as material decisions are made. The process of reconstitution arranges this intervention and reveals how rubble can become a resource and remedy the issues laid out in this research.

Climates and Environments | Slant

Saturday, June 29, 2024, 3:00pm-4:30pm

Yet to BEE

Danelle Briscoe, University of Texas at Austin

In an era of climate and biodiversity crisis, it is increasingly crucial that architectural education cultivates just and inclusive multi-species futures. While all bee species face threats from numerous sides, most people in the United States are likely only aware of *Apis mellifera*—commonly called the western honeybee[i]. Furthermore, in the progressive and intensely developing City of XXXXXX, many are unaware of its official Bee City status; simply opting for its reputation as a “tech megapolis.”[ii] To confront these matters, a collaborative practice is not only desirable, but more so necessary. A Graduate Design Studio prompts the hybrid entanglement of humans, bees, and wider landscapes of potential cultivation.[iii] Collaborating with those municipal stakeholders that already steward our environment positioned the studio as a conservationist and educational undertaking. Joining forces with dedicated ecological advocates empowered students to expand disciplinary impacts as they created knowledge for the advancement of what the discipline considers as architecture. The approach offered an applied critical proposition to the pollinator crisis in contrast to the cultural and agricultural practice of hobbyist beekeeping that has trended to equate to environmentalism. Educational incentives encourage pollinator programs and in general a studio’s engagement with the ecological fragility of the bee population.

Upscaling of Climate Responsive Hygroscopic Louvers Based on Bio-inspired Principles of the Button Mushroom

Kailing Mai, Audrey Chen & Simone Darveau, University of Waterloo

This paper explores an innovative approach to architectural louver design by borrowing biomimetic principles from the hygroscopic actuation of the Button Mushroom (*Agaricus bisporus*) and combining them with previously developed research in large-scale wood bilayers^{1–3}. Wood is a hygroscopic material that adjusts its moisture content to the surrounding environment, leading to expansion in humid conditions and contraction in dry conditions⁴. While adaptive wood bilayer systems have previously been developed for responsive facade systems using small-scale wooden bilayers^{5–7}, this study investigates the upscaling of the bilayer principle, aiming to implement it as an adaptable larger louver system that responds to relative humidity at a seasonal scale. This innovative practice aims to pioneer a sustainable and inventive model by challenging conventional norms of traditional louver designs through its climate responsiveness and adaptability. The proposed system leverages the inherent expansive and contractive nature of American White Beech in equalizing its moisture content to its surrounding environment, laminating this active layer with a passive plywood layer induces controlled and reversible curling at a larger scale. CNC kerfing is used to create milled grooves in the louvers to control the material flexibility and moisture dissipation across the bilayer structure. The material programming of the louver is determined through the calibration of moisture content of the components during fabrication. The climate-responsive transformation of the louver is demonstrated by subjecting kerfed wood bilayer samples to fluctuation in ambient relative humidity; when subjected to an increase in relative humidity, the active layer expands against the passive layer, causing bending. Contrarily, when subjected to a decrease in relative humidity, the active layer contracts against the passive layer, causing a decrease in bending and a return to the initial rest-state shape. Unlike conventional kinetic facades that rely on electronic components, these explorations rooted in design technology point to new paradigms relating to sustainability, efficiency and improving users' experience. This research aims to provide an environmentally and socially conscious architectural solution that integrates biomimetic design and leverages material capacities to seamlessly integrate functionality and conscious design into the built environment, driving conversations toward future design practices.

CO2 Paradigm as a Driver to Deconstruct the Built Environment

Ivett Flores, TU Braunschweig

In the face of climate change, architects are challenged to explore alternative strategies to navigate the complex landscape of the CO2 paradigm. This paradigm, which calls for the deconstruction of the built environment's reliance on carbon emissions, necessitates a multidisciplinary approach that extends beyond architecture alone. Decarbonization emerges not only as a technological endeavor but also as a cultural and formal endeavor¹. This research delves into the spatial consequences of the CO2 paradigm, focusing on the impending "historical future transitions," as each architectural typology is a manifestation of the prevalent energy systems of its era. Sitting at the nexus of technical innovation and environmental humanities, this study offers a prospective approach. The trajectory of technical innovation predominantly employs scientific methodologies, material-driven solutions, and life cycle analyses. However, these technical approaches often fail to convey the inherent spatial implications of decarbonization. The process of decarbonization extends beyond the realm of a technical enigma; it engages with theoretical, historical, spatial, and formal inquiries that possess the transformative potential to reshape architecture in alternative ways and to deconstruct the built environment. Conversely, the environmental humanities lens reevaluates energy as a way of life and its profound influence on the metamorphosis of the built environment. While such analyses predominantly take a retrospective stance, examining historical shifts from colonialism to capitalism, they identify spatial concepts that emerged during the fossil era. This holistic perspective enriches our understanding of the intricate relationship between energy systems and spatial configurations, however, in the imperative transition, a prospective view is essential. To connect these intricate interconnections, the research adopts the Energy Method² as its analytical framework. Rooted in the principles of thermodynamics, this method provides a robust tool for evaluating the energy consumption of buildings and structures. By employing the Energy Method, this study aims to bridge the gap between technical assessments and spatial repercussions, shedding light on the transformative potential of decarbonization within the architectural realm. In summary, this research navigates the dynamic terrain of the CO2 paradigm, contemplating its spatial consequences in a world poised for "historical future transitions." By intertwining insights from technical innovation and environmental humanities, it aims to uncover the profound influence of decarbonization on architectural spatial configurations. As the built environment grapples with the urgency of climate change, this study contributes to a nuanced understanding of the multifaceted challenges and opportunities that lie ahead.

Aridly Abundant: Material Practices in Allegedly Scarce Environments

Faysal Tabbarah, American University of Sharjah

Historian Diana K. Davis describes environmental Orientalism as the systemic practices by imperial powers in the South West Asia and North Africa (SWANA) that aimed at othering the environment and constructing it as a failure in land management by indigenous populations to facilitate and justify imperial goals.¹ The effects of these practices on the contemporary built environment are many, but perhaps one of the most is the imagining and production of a built environment that is deeply disconnected from its environmental and cultural context through its integration with agnostic global supply chains that imagines aridity as a dangerous problem to be solved, devoid of historical context. To challenge these nefarious narratives, this paper provokes the following question: What architectural conditions can become possible when we reimagine arid landscapes as spaces of abundance? To do so, this paper explores the abundance of land-based practices, specifically dry-stack stone construction in the continually transforming hinterlands of the United Arab Emirates (UAE), with a particular focus on the Western Al Hajar Mountains on the east coast of the UAE, to understand how we might build in, with, and for aridity. Building in aridity suggests unpacking and re-situating historical building practices in arid landscapes. Building with aridity suggests that arid landscapes have an abundance of materials that can construct sustainable built environments, and building for aridity suggests that historically continuing arid landscapes can provide insight into confronting an incoming aridity in other areas in the world such as in southern Europe. This paper is structured in three parts. First, I will describe the biophysical condition of the Western Al Hajar Mountains and situate its ongoing built environment within a historical context. Second, I will describe a material system that amplifies the potential of discard stone and other stone that is typically not used within construction through the use of 3D scanning and 3D printing technologies to provoke a material system that is rooted in its environmental and cultural context. This section will culminate with the description of a spatial installation. Finally, I will show how this material system can be deployed in other regions that are confronting an incoming aridity, such as areas in Southern Europe that continue to announce seasons of drought.

Imaging an Aesthetic for Planetary Action: The US Department of the Interior as a Model for Architectural Practice

Andy Lee, University of Wisconsin-Milwaukee

This paper outlines the United States Department of the Interior as a historical, mediatic practice and model from which contemporary architecture pedagogy engages the aesthetics of planetary imagination. The past decade of architecture pedagogy has rightly begun to foreground climate change and its widespread cultural, political, and ecological effects as a fundamental consideration in the imagining of our built environments. Yet, much of the attempt at a fundamentally new disciplinary and aesthetic imagination for architecture under the climate crisis has been largely relegated to a deeply modernist framework of techno-fix and material outcome: an over-emphasis on the downstream effects of a climate crisis that have already accelerated beyond the scope of the project. A practice of a new – or renewed – planetary imagination for architecture remains elusive, especially within our curricula. While the largest branch of the US federal bureaucracy may seem to be an enormous disciplinary swelling, the paper specifically examines the Division of Motion Pictures in the US Department of the Interior's (DOI) Bureau of Mines and its imagining of a new planet through architectural means. The Division was specifically tasked throughout the latter half of the 20th century with producing a series of films of the US interior and screening them widely abroad as a part of the US's international civilian infrastructure-building missions in the Global South during the time. These films showcased infrastructures built in the US by the federal government throughout the first half of the 20th century, and the widespread transformations to American life and consumer culture as a result. Screened abroad, these films were an architectural measure through which the US government precisely imaged the dimensions of not just domestic infrastructures but of a planetary aesthetic under which a postwar world would be built and brought into a US-centric capitalist fold. In the films, a process of aisthesis unfolds, developing a global sensing of modernism through the films' technical imagery and documentation of infrastructures constructed by DOI. As such, these films became architectural forms from which local officials across the Global South imagined and subsequently constructed a radically new future decolonized from Western powers yet fundamentally tied to emerging global consumerism. While the paper problematizes the colonialist functions of the Division, the examination of the practices of conceptualization of a Cold War planetary aesthetic re-affirms the specifically architectural queries of form and representation in our own forms of radical planetary action today. As purveyors of developing a measured embodiment of space through visual media, architects already possess the means through which a planetary aesthetic can be imagined; the filmic methods of form-making and image-making conducted by the DOI make it clear. The paper is filtered through the newly introduced territorial scale studio in the undergraduate core architecture studio sequence at the [affiliation redacted], where students study the methods with which the DOI lays claim to and constructs the environment. Students ultimately reappropriate DOI tools for their own environmental imaginaries and constructions.

Co-creations with AI | Tilt

Saturday, June 29, 2024, 5:00pm-6:30pm

Re-cognition: Collaborative Sketching and Conceptualization with AI

Jason Logan, Dijana Handanovic & Andrew Kudless, University of Houston

The paper uses the essay *Diagrams*, written by Professor Douglas Graf in 1986, to frame an argument for the use of artificial intelligence (AI) as a collaborative sketching and conceptualization tool. In his essay, Douglas Graf argues for a loose, hybrid, and flexible form of diagrammatic practice as an alternative to what he called the “anxiety of origin,” and a concern for “the ‘proper’ manifestation of type” that characterized much of postmodern formal analysis. Rather than valuing recognition, Graf argues for the generative capacities of “re-cognition” through transformational diagrams. Graf supports his argument through a series of revisionist diagrams that remove a building “from the firm position of artifact to the more uncertain territory of artifice.” He goes on to write, “[a]s the object of analysis, the building is reduced to information, information is reduced to invention, and invention to interpretation.” The paper poses the question, is the diffusion model the new transformational diagram? It offers a brief history and explanation of AI diffusion models, drawing parallels between the diffusion process and Graf’s “loosening” of an architectural precedent in a diagrammatic practice. Like Graf’s notion of re-cognition – to come to know or understand again – the paper considers the “re-cognitive” potential of AI models. The paper focuses on the similarly loose, hybrid, and flexible nature of using text-to-image diffusion models to digitally sketch, transforming images from artifact to artifice by leveraging large datasets of information for invention and reinterpretation. The paper documents a process using text-to-image diffusion models, in coordination with artificial neural network (ANN) control structures like ControlNet, as a generative sketching and conceptualization technique (Fig. 1). Where many text-to-image models are difficult to control (Fig. 2), ControlNet allows designers to use a “conditioning image” – a sketch, a photo of a physical model, a depth map from a digital model, or other high-contrast images – to guide the diffusion model’s output. This collaborative sketching technique augments the text prompt process, allowing greater control over the images generated by the AI model. The paper considers the value of a digital workflow that, like a hand sketch, is immediate and unburdened by the specific inputs and accuracy required by other digital tools. While AI is undoubtedly a socio-technological inflection point, ushering in a new paradigm of human and non-human collaboration, we must remain critical of the tool’s output and the inherent biases of datasets that are pulled from the internet. Designers must also understand where language and image fail to account for the complexities that impact the development of an architectural project. As such, the paper concludes with a critical reflection on the outcomes and the biases of the AI tool as well as those brought on by the individual user.

HI | AI :A Pedagogical Experiment in Professional Practice

Margarita McGrath & Collin Caywood, Virginia Tech

In a one-two punch, artificial intelligence advanced rapidly on the heels of COVID-19, driven by leaps in machine learning. Creatives are nervous about impending job loss or happily planning for extra free time. Educators and employers are worried: How will graduates develop the discernment that comes from doing, making, and collaborating when so much of work culture and product creation is handled remotely or by generative AI systems? A 'tilt' within a Professional Practice class can provide students a unique opportunity to develop critical professional skills while gaining experience with AI technologies and insights into their potential and limitations. Often segregated in the curriculum and seen 'merely' as a graduation requirement, the Pro-Practice course can provide a safe space outside of studio where students can investigate AI within architecture. Through hands-on practice with communication and applications of automation tools, students come to recognize the intrinsic importance of 'HI' (Human Intelligences) and 'AI' (Artificial Intelligence) in shaping their professional trajectory. This shift jolts Pro-Practice from its status as a compulsory requirement into the vanguard, equipping graduates to navigate an AI-fueled technological inflection point poised to reshape their field. At our tilt, we bring together students and small practice practitioners who find themselves at the thrilling and terrifying intersection of human-centered capabilities and ever-advancing AI systems. Initially, human-centered skills—communication, active listening, empathy—are developed by having students interview users, clients, and practitioners to craft a Request for Proposals (RFP) for a campus building. In phase two's unconventional turn, students utilize generative AI to produce responses to their co-authored RFP. Leveraging AI, students fabricate projects, testimonials, resumes, and firm identities, creating fictional augmented profiles to position the small practices they interviewed in the first half of the semester to compete with larger national firms. Navigating conventional and automated approaches builds discernment about emerging technologies' appropriate applications. As an enhancement tool rather than human replacement, AI role-playing offers a distinctive opportunity to uncover the strengths and weaknesses of both. The course concludes with each team pitching its AI 'augmented' practice to college leadership, planning committee members, and the small practice practitioners in a mock interview. Following the jury awarding the commission to one of the teams, all reflect on insights gained. The method of crafting RFPs and exploring AI's capacity to generate responses presents a strategic response to the challenges posed by the rapid advancement of artificial intelligence. Through direct engagement with HI and AI systems to tackle real-world problems while in school, working alongside local design-focused practices, students and practitioners build discernment in navigating emerging tech as well as see AI as an enhancing, not replacing, tool for human intelligence. Experiential learning builds bridges across generational and operational divides while navigating shifting technological landscapes, readying the next generation of architects and current practitioners with skills to harness AI progressions in their field effectively. The Professional Practice course transforms into a think tank and incubator, encouraging a reflective environment where novel concepts for future labor ecosystems can be imagined.

From Heaven on Earth to Smart Cities: How Utopianism Shifted from Virtuous Cities to Digital Cities in the 21st Century

Cihan Yusufoglu, Virginia Tech

Utopias generally consist of an ideal society and an ideal city. While ideal societies are studied by a wide range of disciplines such as sociology, philosophy, theology, etc., ideal cities have intersected with architecture in utopian worlds since ancient times. In the early 20th century, the city plans of Le Corbusier, Frank L. Wright, Ebenezer Howard, etc., were called utopia including both ideal city and ideal society (Fishman 1982). In the late 20th century, the idea of a smart/digital city began to be associated with utopian thoughts. Yet, few studies have investigated the utopian characteristics of ideal cities and ideal societies promoted in new techno worlds. Utopian thinking is largely attributed to digital cities in various forms such as mobility, security, sustainability, and digitalization (Hall 2014; Townsend 2013). However, establishing a link between the smart city idea that emerged in the late 20th century and the utopian urban planning movement of the early 20th century is largely missed in studies. Moreover, ideal societies in utopian digital cities are under-investigated. In classic utopian thought, utopias are much more than technological marvels since utopias consist of ideal societies that differ from technical blueprints. This is what makes utopias unique and distinguishes them from other mere architectural, design, or artistic attempts. Whereas contemporary digital cities are aptly described and designed as "utopias" and visions of digital cities incorporate the best hopes for utopias related to health, efficiency, and the environment, the current usage of the term lacks a firm understanding of the social dimensions: Individualism, smartness, blasé attitude, and consumerism (Simmel 1950; Toffler 1971). This paper focuses on the shift of utopianism in the 20th century and analyzes how utopian architectural thinking changed from virtuous/hard-working machine cities to consumerist/smart digital cities through key texts in the literature.

Inflexiones Sobre Sibujos de Roberto Matta; -NLP- del Automatismo Surrealista a la Arquitectura Digital

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Inflexiones sugiere una condición inicial que sufre transformaciones. Este concepto lo podemos revisar en la trayectoria de Roberto Matta, formado como arquitecto en Santiago de Chile, trasladado a París para trabajar con Le Corbusier, donde conoce también a los surrealistas con Andre Breton e inicia una destacada producción artística. En esa inflexión, Matta realiza ilustraciones que cuestionan el racionalismo arquitectónico, aplicando la creación inconsciente propugnada por los surrealistas, que le llevan después a elaborar diversas fantasías pictóricas. Las nuevas tecnologías de diseño digital e inteligencia artificial permiten ahora escudriñar esta inflexión creativa desde el automatismo gráfico a la elaboración espacial. Este trabajo se desarrolla con una metodología cualitativa y prospectiva, utilizando imágenes de las propuestas producidas en el periodo comprendido entre 1936 a 1941 (en que Matta convive entre la arquitectura moderna y el surrealismo). Primero, mediante la interpretación geométrica y programación paramétrica para recrear espacialmente los ambientes dibujados, y luego la generación con procedimientos de aprendizaje automático de nuevas configuraciones. Para revisar la potencialidad arquitectónica y creativa de estas ilustraciones. Con las siguientes etapas: a) representación virtual de escenarios a través de restitución tridimensional, b) La redacción de instrucciones estructuradas -PROMTS- y el uso de imágenes de base para la generación de familias de información -Data Augmentation-. c) La creación de un -Dataset- para entrenar un modelo en la identificación y generación de modelos tridimensionales de bioformas surrealistas. Estas tres aproximaciones ofrecen una aproximación a las claves de la espacialidad sugerida por Matta. Los resultados de estas experimentaciones se enfocan en tres direcciones. La primera de ellas es la percepción virtual de los ambientes interpretados, que reconocen una superposición gráfica, pero también una consistencia espacial que permite desarrollar una experiencia. La cual se vincula a las declaraciones surrealistas, pero también integra presunciones sociales. En la segunda aproximación, las instrucciones estructuradas -PROMTS- para la generación automatizada revela un campo semántico y visual que amplía las formulaciones originales y revela el inconsciente cultural en su transición histórica, en este aspecto se revela un cambio de paradigma en la interfaz de comunicación con las máquinas, que se funda en el lenguaje escrito habilitado por los modelos -NLP- (Natural Language Processing). La tercera aproximación, pretende transcribir materialmente la generación tridimensional de los ambientes configurados automáticamente, con una red neuronal interactiva que recoja las imágenes de producción, estableciendo un diálogo entre la creación y la percepción espacial, para esto se hace necesaria la creación de un -Dataset- de formas sugeridas por los surrealistas, provenientes de las superficies litocronicas y las bioformas espaciales. Esta investigación permite revisar la inflexión entre la disciplina arquitectónica y el arte, con su libertad creativa e influencias culturales, pero también entre la época de las vanguardias y el poshumanismo actual. Recuperando aspectos inconscientes en la generación espacial, que subyacen en la racionalidad digital, para integrarlos en un panorama de creación arquitectónica sensible. Este proceso hiperdigital y tecnológico y la futura fabricación de estos elementos nos permitirá también evaluar estas formas complejas en el habitar actual y proyectarlos en la enseñanza arquitectónica.

Uso De Drones E IA En La Conservación Patrimonial Y La Educación Arquitectónica Para Crear Gemelos Digitales

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El avance tecnológico en las últimas décadas ha ofrecido herramientas revolucionarias para la conservación del patrimonio histórico, siendo particularmente significativa la incorporación de drones e inteligencia artificial (IA) en procesos de fotogrametría. Este estudio interdisciplinario se sitúa en la intersección de la tecnología emergente y la necesidad imperante de preservar nuestro legado cultural, explorando cómo la sinergia entre drones y IA puede transformar radicalmente tanto las prácticas de conservación del patrimonio como la pedagogía en la educación arquitectónica. Centrándose en la creación de gemelos digitales de inmuebles históricos, la investigación propone un modelo innovador para la documentación y conservación patrimonial, al tiempo que aboga por la integración de estos enfoques tecnológicos en el currículo de arquitectura para preparar a los futuros profesionales ante los desafíos del mañana. Mediante una metodología compuesta por levantamientos de fotogrametría con drones en varios sitios históricos y el posterior procesamiento de imágenes con algoritmos de IA, se generaron modelos 3D detallados de estas estructuras. Este enfoque no solo demostró ser más eficiente y preciso en comparación con las técnicas tradicionales, sino que también facilitó la identificación de áreas críticas necesitadas de conservación, ofreciendo una visión profunda y detallada que antes era difícil de alcanzar. Los resultados de este estudio subrayan la potencialidad de combinar drones e IA en la fotogrametría para no solo avanzar en la conservación del patrimonio, sino también para enriquecer la formación académica de los arquitectos. La implementación de estas tecnologías emergentes en la educación arquitectónica promueve un aprendizaje relevante y vanguardista, preparando a los estudiantes para abordar los retos futuros con herramientas innovadoras. Además, el acceso a gemelos digitales detallados abre nuevas posibilidades para la investigación y la educación, permitiendo a estudiantes y profesionales explorar y analizar patrimonios históricos desde nuevas perspectivas sin la necesidad de desplazamiento físico, democratizando así el acceso al conocimiento. Este trabajo contribuye significativamente al diálogo sobre "Inflexiones: convertirse en lo que aún está por ser" en el contexto de la educación arquitectónica, ilustrando cómo la adaptación a y la integración de tecnologías emergentes son cruciales para el futuro de la conservación del patrimonio y la práctica arquitectónica. Argumentamos que una educación que abarque estas tecnologías no solo es esencial para la preservación efectiva de nuestro legado cultural en un mundo en cambio, sino que también es fundamental para cultivar una generación futura de arquitectos innovadores, versátiles y conscientes de su papel en la protección y promoción del patrimonio cultural global. En conclusión, este estudio establece un marco para el uso avanzado de drones e IA en la fotogrametría aplicada al patrimonio histórico, enfatizando la importancia de estos enfoques en la formación de futuros arquitectos y en la práctica profesional, marcando así un punto de inflexión hacia métodos más inclusivos, sostenibles y eficaces en la conservación del patrimonio y la educación arquitectónica. Keywords: Drones, Inteligencia artificial, Fotogrametría, Educación arquitectónica, Gemelos digitales

Un/real Iceland: Alchemizing Digital Technology with Environment

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Dark ecology, posited by philosopher Timothy Morton, goes beyond other forms of ecology in that it recognizes the interconnectedness of all living and nonliving things, concedes the irreversible planetary impact of humans, assumes an inherent aesthetic dimension to all entities, and seeks to project hope instead of doom. Germane to the contemporary practice of architecture, dark ecology provides a framework for recalibrating the perceived relationships between nature, culture, and technology. In correlation, the tools of drone scanning, real-time reconstruction (photogrammetry (using RealityCapture) and radiance field rendering (using 3D Gaussian Splatting)), real-time creation (using Unreal Engine 5 (UE5)), and generative AI open new portals between the digital realm and the built environment. Further, these tools allow users to narrate experiences integrating temporal changes—seasons, diurnal cycles, weather(ing), (bodily) motion and interaction—not fully accessible through the conventional media of architectural design and representation. This paper will describe an ongoing pedagogical exploration of practice that alchemizes digital technology with environment. A recent advanced architecture studio at [School] that took on Iceland as the site of investigation will be the case study. Renowned for its sublime geological features, Iceland is in fact a hybrid technological landscape adjusting to a rapidly changing climate. Networks of pipes crawl over the topography as part of a robust geothermal energy infrastructure. Beautiful fields of blue Nootka lupine that were deliberately introduced in the 1970s to control erosion and regenerate depleted soil are nevertheless invasive and now rapidly colonizing native terrain. Efforts to reforest lands decimated by settlers hundreds of years ago are struggling to take hold. Meanwhile, heritage structures have mostly been abandoned and/or demolished as the country has urbanized (primarily around the Reykjavík Capital Region). International tourism is a key economic driver with visitors and accompanying development substantially increasing since the 2008 financial crisis. As of May 2022, Icelandair began offering direct flights from [Airport] to Keflavík International Airport (KEF). The studio was situated in this dynamic—students iterated two projects following from in-depth study of place and texts, and mitigated by digital technology. The first project combined digital archaeology with worldbuilding. Students forged digital twins of a select few extant Icelandic turf house complexes in order to become proficient with UE5 and acquainted with Icelandic history, context, and biogenic building methods. Following from limited information, students used generative AI to match and create textures in order to interpret and model each complex and surrounding landscape in detail. The second project reconstructed and then reimagined landscape. Students crafted atmospheric digital environments for the Patterson Airstrip, a ruin formerly part of the US Naval Air Station Keflavík (NASKEF) on the Reykjanes Peninsula. From drone footage the site was digitally reconstructed into a textured 3D model using photogrammetry and radiance field rendering. Following from this, and adhering to the K64 Keflavík Airport Area Strategic Masterplan and local plans, students proposed new arts and recreation programming for residents as well as accommodations for visiting artists. The decommissioned ammo bunkers on site—slated for adaptive reuse—became a stage for new stories.

A Posthuman Feminist Design Process

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This paper investigates the design process in architecture through the lens of posthuman feminist theory. In academic as well as professional studios, individual approaches to three aspects are key to transcending human-centric thinking and embracing a lucid and empathetic design process: The architect is one among several forces that come together to generate built environments. Among the various human and non-human agents¹, the role of the architect can longer be constructed in academic syllabi or approached in professional work as being superior². How can design operate within a flat ontology, with a focus of catalyzing certain changes rather than imposing spatial ideas? In our practices of representation, how the materials we use for drawings and models be thought of not just as the temporary media for ideas, but as agents in themselves³ with a character of their own? Can this consciousness towards materiality begin at the origin and then extend into the construction process? Between the analogous and digital tools that influence modes of thinking, how can a design process be cultivated that can be cognizant of the 'messy' entanglements⁴ of the real world which do not confirm to the neatness of the Cartesian grid? This paper will posit the framework for a new kind of design process, based ideas in contemporary philosophy in relation to innovative approaches taken by architects in the last three decades towards critical thinking as well as critical making at the grassroots level. It will trace the design processes of three architects, Anna Herringer, Tatiana Bilbao, and Laurie Baker, from the drawing board to the built environment and analyze the efficacy of their approaches through the lens of posthuman theory, eco-feminism, and vital materialist theory. Each of these practitioners have employed unique modes of representing and/or crafting their work, and the impact of these approaches is discernable in their built projects. The aim of this paper will be to distill specific ideas which can be applied to foundational and studio-based education in schools of architecture to encourage ways of thinking that are both critical and empathetic.

From Vulnerability to Resiliency: Learning to design for Future Environments through Awareness and Collaboration

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Coastal regions are facing an unprecedented challenge of environmental disasters, such as hurricanes, earthquakes, and floods, which have put the infrastructure and the people at risk (GAO 2021). These disasters have revealed the fragility and the unsustainability of the built environment and have highlighted the urgency of finding more robust and resilient solutions. Examples of these disasters are Hurricane Maria, which devastated Puerto Rico in 2017, Hurricane Katrina, which flooded New Orleans in 2005, and Hurricane Otis, which unexpectedly and catastrophically hit Acapulco in 2023. These events have shown the need for a new paradigm of design that considers the environmental and social context, human factors, and innovative forms of practice and technology (Lopez del Puerto et al. 2021). This paper presents the results of an interdisciplinary undergraduate program that aims to address this need by engaging students in solving complex infrastructure problems in a real-life setting. The paper explores the intersecting inflection points of environmental and social trends and innovative forms of learning, in the formation of the future designers of the built environment. The program is a collaboration between three campuses with different academic programs in engineering and architecture. The program uses project-based learning and case study methodology to foster the development of interdisciplinary research skills and design thinking (AIA, 2007; Elvin, 2007; Fruchter, 2004). The paper concludes with a reflection on how the program contributes to the preparation of a robust workforce that can respond to the future demands of the profession, by exposing students to new models of engagement and problem solving.

The Problem of the Map as the Problem of the Rock: Inflections in the Geospatial Perspective

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As Jorge Luis Borges famously outlined in his short story “On Exactitude in Science,” maps are in constant tension with the material world: the more precisely a map represents its territory, the more frayed and unwieldy it becomes (Borges 2011). The power of maps lies in their abstraction. Maps distill patterns, translating messy, complicated, entangled landscapes into a graphic tableau with the potential to unveil underlying relationships. Maps systematize, creating a coherent system from disparate locales, allowing us to—quite literally—trace how local effects can propagate through a system at multiple scales. Indeed, our understanding of anthropogenic change would not be possible without this geospatial perspective: its impacts only become legible through the visualization of vast arrays of geospatial data at scales incomprehensible to individual experience (Clancy 2020). And yet, this abstraction is also the greatest limitation of the map: by representing everything as a cohesive and coherent system, local differences and perspectives are erased or minimized, often reproducing the biases of the mapmaker in the lived world (Curley 2023, Pickles 2006, Rothstein 2018). By relying on a geospatial perspective alone, we risk missing opportunities to chart solutions that grow out of a situated engagement with locale environments and practices. This points to a critical disconnect between the ways we visualize the impacts of climate change, which operate at an unfathomably large scale (Morton 2021), and the localized actions we can take to address these impacts. Seeking inflections in the geospatial perspective, this presentation outlines pedagogy for an undergraduate architecture representation seminar aimed at reorienting the conventions of cartography to support a more embodied understanding of the world (Perez-Gomez 1987, Kanter 2023). In addition, it seeks a heightened attention to materials, things understood through embodied experience, as opposed to materiality, the culturally-produced framing of a thing (Ingold 2021). The point of departure for this pedagogy is the identification of a seemingly innocuous object in the world: a rock discovered in the local landscape. This rock, and the place where it was found, becomes the lens for a series of mapping exercises interrogating the rock and its place in the world. This approach requires a significant shift in perspective in relation to conventional geospatial mapping approaches. By emphasizing the cartography of the hyper-local territory where the rock was found (Figures 2-4) and of the surface of the rock itself, students are required to construct their own geospatial perspective from the ground up, excavating patterns through an intimate engagement with the site and object. This process culminates in the reconstruction and fabrication of a reimagined version of the rock (Figure 5), which explores the potential for recontextualization as a strategy for reimagining the possibilities of a place. Through these exercises, this pedagogy seeks to provide the next generation of designers with a set of tools to engage in a more critical approach to mapping, with the goal to provide strategies to create more tangible links between the maps we draw, the places we live, and the actions we can take.

El Paisaje para la Mitigación de la Isla de Calor Urbana: Enfoques Comparativos entre Santiago de Chile y Querétaro Mx.

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El efecto Isla de Calor Urbano (UHI) representa un desafío creciente para las ciudades latinoamericanas, exacerbado por el rápido crecimiento urbano y la pérdida de suelo permeable. Este estudio analiza cómo las estrategias de paisaje -entre ellas las Soluciones basadas en la Naturaleza (SbN)- pueden mitigar el UHI y fomentar la resiliencia urbana en climas secos, centrándose en una comparación de especulaciones académicas entre Santiago de Chile y Querétaro, México. La investigación se basa en una revisión de literatura científica, evaluando la aplicación de estrategias del paisaje -entre ellas las SbN- y su impacto en el UHI en contextos urbanos latinoamericanos. Para las especulaciones académicas, se partió de una metodología mixta (cualitativa y cuantitativa) que incluyó la recolección de datos de temperatura en diversos espacios urbanos y la evaluación de superficies concurridas para identificar áreas de intervención potencial y con mayor impacto. Los hallazgos destacan las similitudes y diferencias de las estrategias de arquitectura de paisaje implementadas en Santiago de Chile y Querétaro, México para mitigar el UHI a través de especulaciones académicas con beneficios ecosistémicos. Este estudio concluye con recomendaciones para la implementación efectiva de estrategias de paisaje en ciudades latinoamericanas, subrayando la importancia de considerar las particularidades climáticas y urbanas en el diseño de estrategias de mitigación del UHI. Así mismo, reconocemos que el intercambio de prácticas pedagógicas y el aprendizaje colaborativo entre estas ciudades encierra el potencial del conocimiento intercultural y la resolución colectiva de problemas. La convergencia de estos esfuerzos pedagógicos y de colaboración sirve de plataforma para alimentar futuros urbanos resilientes compartiendo practicas y aprendizabes hacia la construccion colectiva del conocimiento.