ACSA 100th Annual Meeting

DIGITAL APTITUDES
+ other openings

PROJECT PROCEEDINGS

Mark Goulthorpe + Amy Murphy, Editors

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Architecture
Maker Space: a Place for Collaboration, Sharing, and Open Design

Open Design City in Berlin, Metrix Create Space in Seattle, Beijing Maxspace, and Co-creation Hub in Lagos are but a few of the collaborative design spaces associated with the current design revolution evolving out of the DIY and Maker movement. Maker spaces provide a place for co-working, bringing professionals from many disciplines together under one roof, while also giving communities access to tools formerly only available to industry such as laser cutters, 3D printers, and industrial sewing machines. People of all ages and walks of life are not only able to use these tools, but they can also take advantage of DIY classes and participate in collaborative projects which empower them to design and develop innovative technology and new products that meet their individual needs. This new model of personal manufacturing gives the individual greater influence over product design, and refines what ownership means in the age of digital reproduction. Maker spaces also promote working within an Open Design platform, fostering a free exchange of ideas between communities transcontinentally. This poster features studio work that investigates how architecture can engage with the concept of maker space. How can architects promote collaboration and innovation, while enriching the experience of sharing tools, space, and ideas? The location for the maker space is next to the historic brewery in Georgetown, Seattle’s oldest industrial neighborhood. Georgetown has evolved from a site for small workshops, to a center for large industry, and is now on the verge of redefining itself once again. The Georgetown Maker Lab is a visionary organization that foresees a return to the small workshop model of production, but this time those spaces will be equipped with digital tools, exchange ideas globally, and will be run by the community, for the community.

"Open Design City is more than a workshop, it is a collaboration space where new relationships and projects will be formed between its citizens. Open Design City is a space that encourages the sharing of tools, knowledge, ideas and skills. It is a space to explore the principles of Open Design."

– Open Design City Manifesto

"Cities of the 21st century are full of creative workers that produce not only with their heads but also with their hands. Innovation needs a place where it can be tested and an inspiring environment where it can flourish. Shouldn’t every city provide its citizens with fully interconnected and equipped spaces where they can network and get their stuff done?"

– Daniela Marzavan on "Why Every Creative City Needs a FabLab."

Architect

Project GRAFT: FMaker Space: a Place for Collaboration, Sharing, and Open Design

Elizabeth Golden, University of Washington
The Fibrous Structure Machine: a generative process towards form-finding

**Abstract**

The project discussed here was developed during a six-week research & design seminar at MIT, using only existing protocols (the project itself being four weeks). Based on the observation that nature produces intrinsic and formal configurations through weaving of only one material (fibre, thread), a machine was designed that would facilitate complex shapes using a variety of thread types.

**Procedure:** Nature-Biology

Invention of new Forms for evaluation

**Concept:** Fabricator machine

1. **Machine operation process**
   - The machine is fed with a ball of thread according to the desired outcome.
   - The winding thread is fed onto a bobbin to control the speed of the machine.
   - The machine operation process is controlled by adjusting the machine settings.

2. **Resulting Prototypes & Materials**
   - The resulting shapes are then used to create functional models.
   - The machine is capable of creating a wide range of shapes and forms.

**Unification of machine design & biology**

The project is imagined as an attempt to learn from the efficiency of biological systems; the authors would like to demonstrate that nature's approach to form-finding can be translated into a machine that can physically translate to the results of biological systems.

**Layers of fabrication**

- **Machine**
  - The machine is designed to replicate the biological process of fibre bundling and weaving.
  - The machine is capable of creating complex shapes and forms.

- **Fibre**
  - The fibres used in the machine are selected based on their properties.
  - The fibres used in the machine are capable of being manipulated to create complex shapes.

**Mechanical shape creation**

- **Type**
  - The machine can create different types of shapes based on the type of thread used.

- **Evaluation**
  - The machine is capable of creating shapes that can be evaluated for structural integrity.

- **Schematic representation of project**
  - The schematic representation of the project demonstrates the logical progression of the machine and its operation process.
FROM CONCEPT, TO IMPLEMENTATION, TO OUTREACH: THE NEXT SOLUTION FOR A MAXIMUM EFFICIENCY, SOLAR POWERED HOME

CONCEPT

SIX KEY IDEAS:
- Maximizing Transparency & View
- Leveraging the House's Latitude
- User Control of Light Flow & Ventilation
- Living Dining lys
- Space Adapts in Service of Function
- Drought-resistant, low sedum green roof trays correspond with the transparent portion of the space

IMPLEMENTATION

SMART FACADE:

The Living Light house makes extensive use of glazing for transparency, daylighting, and spatial connection. The system reverses itself in colder months. Two panes of glass create an airspace that is used in conjunction with the ventilation system. Streets of Southern landscapes feature wrangled greenhouses to provide shading and to keep interior shade from the building's interior. These design practices implemented by early within South. In addition to being well suited to the climate, these materials also provide aesthetic value.

LANDSCAPE:

perennial sedum

Drought-resistant, low sedum green roof trays correspond with the transparent portion of the house and help prevent sedum trays from compacting with the subsoil of the system.

MECHANICAL ROOM:

The mechanical room centralizes all of the mechanical, electrical, and plumbing systems.

MECHANICAL ROOM:

The mechanical room includes a high-efficiency heat pump, a solar power system, a water heat recovery system, and a high-efficiency mechanical ventilation system.

SOLAR ARRAY:

The living light house was designed to be a single entry to maximize efficiency, allowing for the house to be able to absorb the maximum amount of sunlight.

TRANSPORTATION:

The living light house was designed to be a single entry to maximize efficiency, allowing for the house to be able to absorb the maximum amount of sunlight.

IMPACT

TEAM:

- 200 students and faculty from nine different disciplines across campus.
- 9 teams and publications: the annual Living Light short.
- 127 articles and publications: the annual Living Light short.
- 8 partnerships with professional, political, and civic organizations, potential research partners, campus and student groups, donors, and sponsors.
- 50 presentations given to professional, political, and civic organizations, potential research partners, campus and student groups, donors, and sponsors.
- 75 students had the opportunity to work each year.
- 148 partners, including Living Light.
- 18,500 Visitors toured the Living Light House during public exhibitions and open house events in the house. On the tour, they learned the benefits of solar power, integrated systems, and more.

As Designed:

As Built:
Parametric Zoning - wringing jouissance from the regulation grid

The Marching Cubes is an algorithm for generating a polygonal mesh approximating isosurfaces from a 3D volumetric dataset. It employs computational intelligence to determine the presence of an isosurface at each grid point and then interpolates between the grid points to create a smooth surface. This method is widely used in computer graphics for rendering real-time visualizations of complex data sets.

The algorithm works by dividing the 3D space into a grid of cubes, and for each cube, it checks whether the isosurface passes through the cube. If it does, the cube is classified as being part of the isosurface. The algorithm then determines the vertices and edges of the polygon that represents the isosurface passing through the cube and adds them to the list of vertices and edges for the isosurface.

This process is repeated for all cubes in the grid, resulting in a set of polygons that approximate the isosurface. The Marching Cubes algorithm is particularly useful for visualizing medical imaging data, such as CT scans and MRI images, where it can help identify the boundaries of different tissues and organs.
THICK-IT
ADAM FURE, UNIVERSITY OF MICHIGAN

PROJECT DESCRIPTION

Thick-It is a piece of interior architecture created as a study in the intersection of digital fabrication and new construction methods. It is designed to function as an “object” in the office building on a college campus.

CONSTRUCTION

Thick-It is fabricated using computer-aided fabrication (CAF) methods, which enable the creation of complex, free-form structures. The project uses a CNC waterjet cutting system to cut the wood and steel components. The wood is arranged in a grid-like pattern, while the steel components are cut into a series of triangular shapes. The wood and steel are then connected using screws and bolts, creating a strong, rigid structure.

ARCHITECTURAL IMPLICATIONS

Thick-It is designed to be a modular system that can be adapted to different spaces and environments. It can be configured in a variety of ways to create different architectural forms, from simple geometric shapes to complex, free-form structures. The project also explores the possibilities of using digital fabrication techniques to create new architectural forms and materials.
PROJECT DESCRIPTION

Predominantly geometrically efficient, materialized, and built horizontally, the exhibition area is a free-form space, with a fully built-in fabricated steel wall. The walls are coated with an off-white, enameled, and personalized finish. The exhibition area is essentially a blank, unfinished, and hand-painted canvas for the visitor to interact with and determine its meaning.

The project utilizes a series of multiple material and spatial layers that interact with the existing structure in a representational manner. The primary materials used are naturally occurring, high-contrast, and highly visible materials that are rich in texture, color, and form. These materials are combined with a variety of synthetic and synthetic materials to create a rich, textured, and visually engaging environment.

Materials are manipulated in a series of spatial layers that form a landscape of craters, a series of spheres, a series of tubes, and a series of lines. These layers are manipulated to create a visual field of craters, a visual field of spheres, a visual field of tubes, and a visual field of lines. The manipulation of these layers creates a rich, textured, and visually engaging environment.

The spatial field of craters is created by a series of spheres that are manipulated to create a visual field of craters. The spatial field of spheres is created by a series of tubes that are manipulated to create a visual field of spheres. The spatial field of tubes is created by a series of lines that are manipulated to create a visual field of tubes.

The manipulation of these layers creates a rich, textured, and visually engaging environment. The project utilizes a series of multiple material and spatial layers that interact with the existing structure in a representational manner. The primary materials used are naturally occurring, high-contrast, and highly visible materials that are rich in texture, color, and form. These materials are combined with a variety of synthetic and synthetic materials to create a rich, textured, and visually engaging environment.

In other words, each material creates its own pattern, but none of these patterns are visually readable. Instead, they are multiplied into a dispersed field. The length of each material is multiplied to create a dispersed field. The length of each material is multiplied to create a dispersed field. The length of each material is multiplied to create a dispersed field. The length of each material is multiplied to create a dispersed field. The length of each material is multiplied to create a dispersed field.

In addition, the project utilizes a series of multiple material and spatial layers that interact with the existing structure in a representational manner. The primary materials used are naturally occurring, high-contrast, and highly visible materials that are rich in texture, color, and form. These materials are combined with a variety of synthetic and synthetic materials to create a rich, textured, and visually engaging environment.

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These 4 projects entail architecture for Christian humanitarian missions, and all the challenges that go into designing and building minimal structures with low-budget and low-tech constraints in difficult landscapes in developing communities, particularly in the developing world. The buildings are not ornate, complex, or high-tech, and simple means of construction are used. These structures in Latin America have been completed almost entirely by volunteers—they are dual purpose, at once churches and community centers—and a medical clinic in West Africa (phase 1).

A discussion between the functional and the spiritual defines the concepts of these projects and hence the approach to work. The functional requires maximizing materials, energy, labor, and construction time. To create a natural and healthy physical environment, off-the-shelf products, sunlight, and passive ventilation techniques are used. The second, more theoretical discussion is engaged through words from the New Testament: “Where the Spirit of the Lord is, there is freedom.” This verse informs design decisions on every level of the project; from overall form to the design details.

The Biblical story in the Garden of Eden intended that humanity dwell in naked presence with God in perfect unity, enjoying freedom and “lightness”, free of shame or guilt. In contrast to the often heavy, dark structures that have dominantly church design, these buildings attempt to recreate the original condition of the openness and love embodied in the Trinity—a place to catch a glimpse of God. However, the projects acknowledge the difficulties in achieving this “lightness” due to restrictions of local building codes, climate, and resources imposed on the structures.

The goal of these projects is to consider design strategies applicable for future building projects that can be adapted to multiple global sites in the developing world, so that minimal resources can be maximized for substantial impact for building projects in developing communities.
Architecture

Humus House
Erik Hökby, Daniel Norell, Chalmers University of Technology, Gothenburg

Soil retention and plants
The plentiful outcroppings, creases and cavities of the outer wall will collect and retain organic matter, ultimately accumulating a layer of soil that can support growth of a variety of plant species.

Organization and circulation
Behind the protecting outer wall, each housing unit works according to a cellular logic where rooms are freely grouped around a courtyard. Rooms and smaller courtyards together form a network of indoor and outdoor spaces.

Thermal energy and moisture
Each pair of units is enveloped in an outer wall constructed from soil-filled earthbags made from geotextile. This outer wrapping cools and humidifies air in and around the house by storing thermal energy and moisture.

humus house
Housing prototype for Haiti 2010-2011
Project data
One family units grouped in pairs
Each unit is 100 sq m indoor area + private courtyards
Outer walls constructed from soil-filled earthbags (filled on site)
Inner rooms constructed from bamboo framing
Tensile roofs constructed from bamboo and translucent fabric
Model photographs - model 370 x 205 x 70 mm; scale 1:100; 3D-printed matter, flocking
Exploded axonomtric of building systems
Diagram of local material flows and networks
Rendered roof plan
Plan
Landscape and wall topography
Tensile roof subdivision

Supports local businesses
Supports local farming
Prevents erosion
Generates energy
Supports local farming

External view of living roof and structures

Diagram of local material flows and networks
The Structure of Scent

Olfactory Tectonics...

Heightened Sense of Awareness...
The contemporary city is littered with derelict sites: once active commercial or industrial zones, now void of human occupation, contain architectural remains left to atrophy. These ruins often exhibit a rich palimpsest of cultural and material history, ripe with latent potentialities to be revealed. How can these wastelands, remnants of the technological landscape, be reactivated, transforming artifacts of industrial obsolescence into cultural catalysts through minimal intervention?

In service of attempting to answer this question, the Roofless Gallery for [Con]temporary Art is a design/build project undertaken to reinhabit a specific abandoned artifact. A dry-cleaning facility lies in a state of ruin along a heavily traveled spine in Charlotte, the seam between two underserved urban neighborhoods. The roofless character of the building, a space defined only by walls as a result of neglect and weathering, creates an unintended but fortuitous Terrellian skyspace. The inherent boundaries of the urban context offer solace solely in the vertical dimension, providing the opportunity to transcend physical and societal limitations and reconnect with the boundless firmament. This artifact has the potential to reactivate the urban corridor: interventions into the structure will provide a means of reinvoking the site and engaging in a dialogue with the community.

Seen as a dualistic membrane, the building enclosure thus becomes paradoxical, alternately acting as a boundary that separates and indicates the distance between two spaces - between here and there, my world and your world, private and public, and also acting as the very mechanism by which those same worlds communicate and passage occurs between them.

- Henry Plummer

"Realm of the Landing: Reciprocal Form and Spatial Dialectics at the Threshold"

This roofless structure has been envisioned as a temporary arts space that would encourage interaction between local artists and residents. The architectural intent is to provide partially protected but unconditioned space for episodic arts and music events, including lighting, display mechanisms, and weather protection for the artwork. Recognizing the rich spatial and tactile experience of the space as a result of the ambiguity between exterior and interior, students have explored ways to construct a canopy, or integument, of found materials that preserves the roofless nature of the building. This integument is kinetic; in its horizontal position, it offers mounting surfaces for artwork, lighting, and weather protection, while providing external lighting of event signage on the existing building shell. In its vertical position, the integument creates an illuminated fin, calling attention to passersby as it projects its role in the new life of the building. The project culminates in post-installation testing through an arts and music event, bringing together students, artists, and neighbors – the reactivation of a vestigial urban site through minimal architectural intervention.
MAKING MACHINES
Making Inspirations from Computational Systems

The “Making Machines” project is a study in emergent use of procedural modeling tools and software pipelines as a method for investigating, visualizing, and outputting design constructions. “Making Machines” relates to a selected few designers today who are more control over software to embed aesthetic, tectonic and process-based tendencies throughout the design cycle via the acquisition, translation, and design of data systems, and that these resulting information visualizations can be used to inform construction techniques. In this way, the designer’s process becomes holistic, with their mark embedded throughout the entire design process by crafting the very nature of the design pipeline. The primary goal of the project is to demonstrate the emergent gradient patterns from data that can then be introduced into the procedural model, driving the two-dimensional mappings that output sets of architectural surfaces at the scale of a building. Without a physical and tangible result however, the system would still be a hypothesis inhabiting a virtual environment.

Due to the complexity, scale and costs of blindly transitioning towards the physical articulation of a construction at the scale of a building, a “Proof-of-Concept” test is required to explore analog connections at a tangible scale. Three guidelines have shaped the development of the “Phase 03 PoC” design:

1) The ability to work with physical materials at a 1:1 scale.
2) The desire to continue testing the flexibility and adaptability of the existing procedural network.
3) The need to employ off-the-shelf parts and construction techniques as a method for establishing a delta.

The procedural network employed in Phase 01 was modified to use its own graphical outputs (mappings) towards the production of a lamp shade casting bed, allowing for the usage of real-world materials and techniques. This procedural network was designed to test and extend the computational network by building domestic objects and artifacts with the same techniques as those of their proposed architectural environments. The lamp shade casting bed, essentially a reconfigured analog of the digital mapping “machine,” will be tested to further validate the potential of using the analog casting bed as a method for capturing and outputting analog information via analog techniques.
This project aspires to develop a new housing prototype for post-Katrina New Orleans. It is based on the comparative research of vernacular housing types found in two unique urban contexts: New Orleans and Kyoto, Japan, the shotgun house and the Kyo Machi-ya. The striking contextual, cultural and technological parallels and contrasts found in the two cities are the potent source of inquiry and knowledge informing the design.

The main objective is to develop a mixed-use, multi-unit housing prototype appropriate for standard 30'x120' lot, creatively addressing the post Katrina social-cultural and performative issues in the hot, humid climate. The central hypothesis is that the design principles and features found in Kyo Machi-ya can effectively be translated into a housing design strategy in New Orleans. The project promotes a holistic approach to the sustainable housing design contrary to the current trend where a product oriented, techno-centric approach is the norm.

The Nola Machi-ya is a hybrid of Kyo Machi-ya and a shotgun house, an attempt to transpose, negotiate, and integrate the architectural considerations and features arising out of the two distinctive vernacular cultures, while addressing issues of context and time. Through a careful examination of the design process, the project demonstrates an example of performative design strategy for urban dwellings in the dynamic global context.

NOLA Machi-ya: a MULTI-use duplex prototype for New Orleans
SMALL
project GRAFT
focus on the future

grafting architecture and urban agriculture

Architecture education is unique in its position to imagine and create the future. As a result, many projects have focused on the idea of the graft, exploring the potential for using alternative building methods, materials, and construction techniques. The approach of Project GRAFT enables shifting agriculture from rural to urban, from horizontal to vertical, from exterior to interior. Grafting blurs distinctions in a city in the southeastern United States. The program specifically relates agriculture (within the city), and across processes (from ecosystem to conditioned architectural space). This work interconnects design across many scales (from human, to building, to technological advances have enabled new possibilities for architects and designers, culturally enriching. We do this by grafting eco-logics onto design logics.

Key principles of permaculture are applied to a full architectural, landscape, and production models as a means of synthesizing a new approach in urban design. We specifically analyze permaculture as a potential model for both food production and distribution, replacing them with continual, mutually beneficial, ecological systems. McDonough’s “waste equals food.” The goal is to limit outside inputs (fertilizer, the outputs of one process become inputs to another process, embodying the inputs becoming outputs, all inputs becoming outputs, permaculture as model.

The final sites and programs propose a grafted architecture and landscape intervention, replacing systems with continual, mutually beneficial, ecological systems. We see an opportunity for critical investigation to suggest specific approaches to the production and architectural design and realization. In the agricultural context, permaculture refers to stacked and interlinked ecological operations. Optimally, permaculture constructs loops and chains of systems, reducing burdens of inputs and outputs, and improving overall efficiencies. The outputs of permaculture systems are used as inputs to other systems, creating a self-sustaining ecological system. This work integrates permaculture’s principles of developing a hypothesis explored through a design proposal that creatively and critically investigates complex conditions of the present and past. As designers, we seek to project a possible future that is wholly sustainable and negatively impacts stemming from the design, might minimize negative environmental impacts stemming from the design, negatively. The underlying goal of Project GRAFT is to consider what strategies might minimize negative environmental impacts stemming from the design, negatively. The underlying goal of Project GRAFT is to consider what strategies might minimize negative environmental impacts stemming from the design, negatively. The underlying goal of Project GRAFT is to consider what strategies might minimize negative environmental impacts stemming from the design, negatively. The underlying goal of Project GRAFT is to consider what strategies might minimize negative environmental impacts stemming from the design, negatively. The underlying goal of Project GRAFT is to consider what strategies might minimize negative environmental impacts stemming from the design, negatively. 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The underlying goal of Project GRAFT is to consider what strategies might minimize negative environmental impacts stemming from the design, negatively. The underlying goal of Project GRAFT is to consider what strategies might minimize negative environmental impacts stemming from the design, negatively.
Lo-tech digital fabrication is the combination of digital technology and craftsmanship. This is our approach towards Architecture. The following projects from the past three years epitomize our philosophy and practice in varying ways.

SILK WALL demonstrates the introduction of lo-tech construction into the parametric design process. Parametric processes have been used here to superimpose the contours and definition of silk undulating in the wind – a sign of the building's past use. We combine parametric design with manual bricklaying. The cost of parametric design is minimized by the use of lo-tech fabrication process and the retention of craftsmen rather than robots to lay the parametric patterns.

The TEA HOUSE concept came from considering the extension of space as a geometric generator, creating the hyperboloid shape of the stairs. The concrete surface is formed through a process of digital iterations of the stair module, transferring a non-linear fabrication process into a linear fabrication. The unique space and light quality that ensue give the building a dramatic feeling. The traces of craftsmanship are left on the exposed concrete surface.

RIPPLE WALL is a digital translation of water; a natural conception. Adapting the digital software Realflow, we created five brick modules that were used in the construction of the wall. The dynamic effects produced by the simulated flow of water, formed the gradient effect which is achieved by the arrangement of the five modules.

These three projects show our experience in a tectonic reality. Architecture is a real and poetic existence.
Design
Digital materiality, a term coined by Italian and Swiss architects Fabio Gramazio and Matthias Kohler, describes materiality increasingly enriched with digital characteristics where data, material, programming and construction are interwoven (Gramazio and Kohler, 2008). The designs for these two curtains were created as an exploration into the rapid manufacture of interior building components that are not only made through the process of 3D printing but are all also responsive to the environment.

Unique, one of a kind building components, generated quickly and economically, from advanced 3 dimensional modeling software were explored. These 3D printed curtains were studied in conjunction with solar conditions throughout the day and year and offer an alternative to traditional curtains and blinds, one that is responsive to weather, to views and to interior programming.

The WAVE curtain is a passive solar curtain that is designed to admit the low winter sun into the building interior and restrict the direct summer sun. It is in order to reduce overheating through the use of cylindrical tubes that vary in width and depth along the length of the window. Because the cylindrical tubes are hollow one always has access to exterior views even when the sun is being blocked - unlike a typical shade or curtain.

The HEX curtain is designed to open and close automatically in response to natural daylighting conditions. Each row of the HEX curtain is composed of hexagonal shaped apertures that are covered by 2 operable shields. The shields have the ability to pivot open and closed. The shields are hinged at the bottom and threaded at the top. The top thread connects each shield to the one next to it. At the end of each row a rotary motor pulls the thread and slowly opens or closes the shields in tandem. The rotary motor is driven by an arduino microcontroller connected to a solar sensor so on a sunny summer day the shields remain closed and on a sunny winter day the shields are automatically opened to allow sun to enter the interior and warm the space.

The HEX curtain is constructed of laser sintered nylon and is 3D printed in 27” x 22” panels.
Ornament can be re-introduced as an ergon that allows strengthening empathy between subject and object and that allows solving problems of performance. Ornament becomes necessary again.

Ornament is a living entity that allows the transformation of static, permanent elements into a dynamic and performative space. By re-introducing ornamentation into contemporary design, the project "Ornate Screens" explores the potential of digital tools to explore new forms of ornamentation.

In the project, the first focus is the design of a series of lights, fabricated through additive technologies. Each light is designed as a unique piece, with parameters that can be manipulated to create different variations. Mass production is replaced with mass customization, allowing for unique objects that can be designed and produced by the user.

The second focus is an installation of CNC-fabricated wood constructions, demonstrating how a pattern-based geometry can be optimized structurally through a set of iterations. The design process integrates not only geometry but also loads resulting from various sources.

Through these projects, the relationship between author and user is redefined, allowing for a more dynamic and interactive design process. Ornament becomes a key element in achieving structural performance and strengthening empathy between subject and object.
Detroit has a wealth of empty space through this intelligence and understanding of 10s. There is a global trend towards empty space in major cities, but Detroit is different because it is an urban landscape that is also a rural landscape. This is an opportunity to create urban infrastructure that is also rural infrastructure. We should take advantage of this and create a framework plan for Detroit that can be used to guide future development.

Urban Heat Index Reduction

\[ \text{Urban Heat Index} = \frac{\text{Temperature at Urban Location}}{\text{Temperature at Rural Location}} \]

\[ \text{Energy:} \quad 21,000 \text{ trees} \]

On a per tree basis, cooling load average, three mature trees can provide substantial benefits. For example, a large tree can provide shade and reduce the temperature by as much as 8°F. This can lead to significant energy savings for air conditioning and cooling costs.

Carbon Sequestration - Trees

We recommend planting the 1,100 acres with a mix of deciduous trees and conifers with an average of 21 trees/acre.

Productive Surfaces

(Aprox. 90 Acres)

Renewable Energy:

The Energy Farms Hub Framework Plan + Opportunities

Our transdisciplinary design research lab partners to prompt dialogue: We believe that a more urban, aggregated, and concentrated framework plan can provide a comprehensive solution for the needs of the city. Our work is based on a case study of Detroit, where we identified approximately 1,000 acres (20 hectares) of vacant land in three locations: Livernois, Vansil, and Woodbridge. These areas are characterized by high vacancy rates, low density, and limited infrastructure.

To define infrastructural networks for the economic and complex overlay required to support a city and its associated infrastructure, we studied a significant role in establishing a more desirable, ethical, and sustainable condition for urban growth and development. We are working to create a framework plan that can be used to guide future development in Detroit.

Vacancy: 20

DENSITY

In the context for our design interventions, we believe that design methodology is essential and representative in public dialogue that guides the future of the city.

Vacancy: 1,100

NATURE

ENERGY

Catalyst: We develop urban design interventions based on indigenous capacities and values which exist in the context of the city. These are based on the understanding that design can play a critical role in establishing a more desirable, ethical, and sustainable condition for urban growth and development.

Critical Mass: We develop urban design interventions based on indigenous capacities and assets which exist in the context of the city. These are based on the understanding that design can play a critical role in establishing a more desirable, ethical, and sustainable condition for urban growth and development.

Net Zero Energy Hub Urban Form

Our design methodology is essential and representative in public dialogue that guides the future of the city.
FOR US ART IS NOT AN END IN ITSELF… BUT IS AN OPPORTUNITY FOR THE TRUE PERCEPTION AND CRITICISM OF THE TIMES WE LIVE IN. DADA, YEAH-YEAH, C’EST MON DADA…1

The “Dada” Manifesto was a rejection to War, a rejection to prevailing standards, and the creation of “anti-art”. The cultural movement that began in Zurich in reaction to war included visual arts, literature, poetry, art manifestoes and art theory. It reached its peak in the 1920s and became a breaking ground for the contemporary arts. “Dada is the procedure to abstract art and source poetry, a starting point for performance art, a period to postmodernism, an influence on pop art, a celebration of what is, a desire to be understood for anarchic-political uses in the 1960s and the movement that lay the foundation for Surrealism”2.

Dadaism began as an anarchist reactionary movement; it was nihilistic and representational of the opposite. It rejected the traditional culture and aesthetics in search of new meanings that were intentionally meaning-less.

During the late 1950's Dada became influential in the surge of the Situationist International, the anarchist movement that taught psycho-geography as a means to understanding the environment’s “utility urbanism”.

By introducing [Dada]rchitecture as an element to a design studio or in an art installation or in an art piece with political implications in the studio, my goal is to challenge students with unexpected scenarios in order to achieve better creative outcomes. Through philosophical studies and contemporary arts, my pedagogy focuses on observation and critical thinking as tools for creativity. Teaching how to observe, to find that magic moment on a trash container, a neglected alley… an art piece.

Following the premises of the artistic and philosophical movement of the beginning of the twentieth century, I encourage students to use the right side of the brain for seeing opposites, understanding that the creations of an architectural space could be found in familiar everyday objects in themes. In the unconscious, to be unexpected, in the contradictions, in the accident. Beginning with assignments including a series of surreal photo-collages, I teach the students, with an analytical-cubist perception, the value of the environment and the value of the objects contained within the space. Using critical codes, a “ready made”, the object is defined as a meaningful element of society. In this way, the students develop a program (trans-program, cross-program or dis-program). My goal is to develop a project that is a basic building as a creative concept.

The Design Studio is divided in four main topics:

+dweller/user: A first stage will include an investigation of the user (physical and meta-physical) and the creation of a narrative by understanding the dweller’s beliefs and activities.
++context=site: Mapping site, context, and objects.
++spatial sequences/movement: Space and motion are extruded and diagrammed.
+program=narrative: Interaction between the space and the dweller, space and context, space and object, and in consequence the development of a program (trans, cross, or dis-program).
+building: Development of a project, by integrating previous phases of design through ordering systems.

1 Hugo Ball, Dada First Manifesto, read in 1916 at Café Voltaire, by Hugo Ball and Emmy Hennings,
2  Marc Lowenthal, translator’s introduction to Francis Picabia’s I Am a Beautiful Monster: Poetry, Prose, And Provocation, Projects by Mathew Skinner and Clint Mc-Clain, "[dada]rchitecture..."
baltimore calling.

Embedding Natural Habitats within Transitional Spaces of the MTA System

This project for the Baltimore MTA stations is a part of a flexible approach to constructing an inclusive design and restoration strategy for the public realm. Baltimore Calling, offers an innovative light structure that integrates the aesthetic impact of VTS and existing elements, thus allowing the system as a whole to maintain balance.

origins

In the 12th century, the celebration of St. John midsummer, was a significant event. A two-storied structure was built to symbolize the royal coat of arms of 17th century colonizers of the area, and later became a symbol for the existing habitat of Baltimore. The structure was named after the royal coat of arms of the founders of Maryland.

opportunities

Built from lifeguard station, Baltimore Calling has been designed to provide an clean, open habitat for birds. The station is now used as a lifeguard station and a bird sanctuary. The structure is equipped with a feeding station for birds, providing a safe and secure environment for migratory birds. Additionally, the station is designed to be an educational and recreational space for people, where they can observe and learn about the importance of bird conservation.

connections

Baltimore Calling is a part of the city's larger initiatives to enhance the public realm and promote sustainability. The project aims to integrate the natural world and human activity within the urban context, encouraging the community to explore and appreciate the beauty of nature. The project also provides an opportunity for community members to connect with the environment and learn about the importance of biodiversity.

Baltimore Orioles (Icterus galbula)

The Baltimore Oriole is the state bird of Maryland and is known for its striking black, orange, and white plumage. The Baltimore Calling project aims to create a safe and secure environment for the Baltimore Orioles to thrive, promoting the overall health of the ecosystem. The project is part of a larger initiative to promote sustainability and biodiversity in the Baltimore area.

Hey Dad...I found another one over here!

Stocked construction site
Disaster
DISASTER... the studio responded to the humanitarian crisis of the displacement of approximately three million Darfurians from their homeland in the Sudan. The project to design a two-room schoolhouse for Darfuri refugees was accompanied with full-scale material studies. Students worked between full-scale material experiments and scale designs. Manual material work informed the design of the school building. A construction manual was produced that illustrated building materials, methods, and concepts of the building project to be used by the local Darfurians. The building was designed to serve as a teaching tool—building technologies were to be transferred to the people of Darfur including ways to build with rammed earth, compressed bricks, thatch, recycled metals, and welded metal frameworks.
SunShower SSIP House

The SunShower SSIP House was the winning entry in an invitational sustainable design competition sponsored by Cosentino. The program called for a disaster relief house that used light structural insulated panels (SSIPs) and provided a highly specific kit of materials and equipment that could be transported in a containerizable container.

The design of the house is a modular, energy-efficient home with small, functional spaces to serve a variety of purposes, providing shelter from the elements and minimizing energy and water use. The house is designed to be assembled offsite, allowing for quick deployment and easy transport to disaster sites. Lightweight SSIPs can be assembled without special equipment and the house is weather tight before any fasteners are applied. Innovative use of SSIPs in this project offers aesthetic panels that create the living space that is both insulated and insulated.

A key feature of the SunShower SSIP House is its ability to provide sustainable, cost-effective construction in the Lakeview area of New Orleans, a project that was completed in the Fall of 2011.
Ecology
The project was produced by the ecological urbanism studio, a performance-based urban design studio conducted in Spring of 2011 for the School of City and Regional Planning and School of Architecture at the Georgia Institute of Technology. It is a model of studio teaching that connects urban design and performance-based urban design to the current core curricula of the School of Architecture and School of City and Regional Planning. It is a collaboration between the School of Architecture and School of City and Regional Planning to develop an alternative solution to design and ecological urban design.

We aim to derive a set of concepts of low carbon urban design through the mapping of global urban settings to benchmark their performance metrics and criteria. The global benchmarking provides a basis for reassigning a hypothetical framework of designing a new ecological urban design district in the core of Chicago Loop. We propose a three-sector design that would require a change of the existing urban form and physical structure, energy carbon footprints and solar availability. Design strategies for various locations were then tested by proposing alternative solutions to density and ecological urban blocks.

Based on selected downtowns or midtown urban settings: from North American and Latin American cities, including Atlanta, Chicago, Miami, Monterrey, Mexico, and Shanghai, India, the analysis created for mapping of density, land use, solar collection, solar availability and energy-related carbon footprints for large to moderate-size urban scale.

The ecological urbanism studio addresses a broader question on how ecological metrics can be taken as organizational principles for creating architectural and urban design. This studio analyzed geometrical and material attributes of urban environment. We argue that the future low energy carbon urban form should be performance-based urban design.

**L LARGE**

**ATLANTA**

**CHICAGO**

**MACAU**

**MANHATTAN**

**SHANGHAI**

**TOKYO**

**VANCOUVER**

**M MEDIUM**

**BUILDING DENSITY**

**LAND USE**

**CARBON EMISSION**

**SOLAR RADIATION**

**S SMALL**

**ALSO**

**DESIGN STRATEGY**

**GRAPHICS**

**GLOBAL BENCHMARKING for LOW CARBON URBAN DESIGN**

Perry Yang & Georgia Institute of Technology

**EXISTING CONDITIONS**

**CHICAGO STREET TRANSFORMATION**

**CHICAGO**

MACAU

MANHATTAN

SHANGHAI

TOKYO

VANCOUVER

**Legends**

- **0 - 2.5 far**
- **2.5 - 5 far**
- **5 - 10 far**
- **10 - 20 far**
- **20+ far**

- **L** = Low Rise Residential
- **M** = Mid Rise Residential
- **H** = High Rise Residential

**CHICAGO MANHATTAN VANCOUVER**

**macroeconomic, material, and structural conditions of the low carbon urban form.**
Landscape
This design proposal combines three distinct network conditions: 1) softball league network, 2) road infrastructure network and 3) big-box retail network to create a network of public space. The city’s current retail centers do not encourage walking or cycling, and are a barrier to walkability and community. By reclaiming public space, the city can provide a network of softball fields that support district, regional and state games. The public/private partnership calls for the development of a series of flexible yet taut nets that are capable of supporting anywhere from 1-4 home teams per night. The public/private partnership proposes to create a series of public softball fields that support district, regional and state games. The public/private partnership calls for the development of a series of flexible yet taut nets that are capable of supporting anywhere from 1-4 home teams per night.

Average Driving Time = 17.5 minutes (10.25 miles)

There is a pressing need to transform certain megapolitan types such as shopping malls, parking lots, and office parks into landscaped built forms.

- Kenneth Frampton, Toward an Urban Landscape
The consequence of positioning single program mega-structures into urban centers in the 1970's has resulted in a glut of large-scale underutilized buildings scattered amongst vast parking areas. In the past, responses to these mega-structures have included demolition, inserting new program or adaptive reuse. We propose a radical reformation of the existing building components to create new public space.

**REDOX**: reuse. Our design reconsiders the embodied energy (intellectual, cultural, material, economic) of Gene Summers’ McCormick Place (1971), optimally situated on Chicago’s lakefront. Given the public position of McCormick Place (the base situated 40' off Chicago’s lakefront), we propose a spatial manifestation of the biological process redox (the portmanteau of reduction-oxidation). By subdividing the site laterally, two new surfaces for outdoor public space capitalize on the existing building’s embodied energy. We propose removing, launching, and floating the roof super-structure into Lake Michigan, creating a new destination for Chicagoans, the ISLAND. What remains becomes the INLAND, a new open public space that hosts seasonal public amenities. This proposal expands 800,000 SF of underutilized megastructure into 1.6 million SF of public space.

**REDOX** oxidation

This destination barge (the ISLAND), created by floating the existing roof super-structure into Lake Michigan, adds 18 acres of new waterfront to the city, while the submerged web of structural steel transforms into a freshwater reef. An algae farm of shallow rink-like ponds increases the quality of declining algae species native to Lake Michigan while a recreational platform to the north provides lake-style swimming, diving, and ice hockey. The ISLAND also serves as a station/pier for the Chicago line and as a new destination along the waterfront. A new “ceiling” created by stringing lights and shading devices from the remaining columns reemphasizes the spatial and scalar parameters of the original volume without the omnipresent roof.

**REDOX** reduction

The 800,000 SF plinth becomes the INLAND, a large, flexible open space with 360-degree views (not found anywhere else on Chicago’s waterfront at this scale). The southern portion, a labyrinth of bioreactors, offers maximum solar exposure to enhance algae production as well as filtered light to the laboratory below. The maze of ramps penetrating the INLAND mat allow for multiple entrances to this laboratory, and to the open-air amphitheater preserving the footprint of the 1958 Arie Crown theater. A grand staircase slices the mat building connecting lakefront and Museum Campus amenities to city center. The eastern edge, a ‘water zone’, boasts public swimming pools and a new linear aquarium (highlighting specimen from the Shedd Aquarium) that activates the existing promenade along the seawall.

As a flexible surface/skin, the INLAND hosts active and passive activities including several soccer matches, or softball games, or 20,000 picnickers or 40,000 spectators watching fireworks. The raised platform provides a privileged position along the waterfront for the public. Commercial activities and water-based think tank slide underneath the skin without compromising the public virtues of the site, its edges, or views.

**Landscape**

Chicago REDOX: Reduction/Oxidation
Marc Roehrle, University of Wisconsin-Milwaukee
Mo Zell, University of Wisconsin-Milwaukee
Open
Water is vital for all known forms of life. Just as water carves out a ravine, it also defines the living spaces at ... through the site. A gradient is established as one penetrates 4.4 acres, slowly filtering out the grime of urban life.

**Research**

Conducting multidisciplinary research to meet local, regional and national goals for sustainable city design, function and growth.

**Suburban Transformation**

One of the core challenges for cities is how to transform the suburban development pattern into a sustainable structure. We work to get new ideas and approaches into the hands of local administrators. Development of a best practices guide for suburban infill development has provided opportunities to work with individual cities to help confront these challenges.

In 2010, SCI faculty developed a Suburban Multifamily Housing Site Design handbook, accompanied by workshops throughout Oregon.

**Livability**

SCI faculty learned with Susan Handy at UC-Davis and Jonathan Levine at the University of Michigan to create Performance Measures for Livability for the Federal Transit Authority.

SCI is currently pursuing a partnership with the Initiative for Bicycle & Pedestrian Innovation at Portland State University to house a Livability Clearinghouse in Oregon, relying on the strong research expertise of key SCI faculty in transit-oriented development, built environment development, and regional economic development.

**Walking and Biking**

The University of Oregon is known as a national leader in research on the connection between sustainable city form and active transportation. The nation's first community mapping assessment tools were created at the University of Oregon. A Community Planning Workshop team from the University of Oregon was recently awarded the highest national student award in Planning for their development of the Eugene Pedestrian and Strategic Plan. SCI has given an archive of bicycle and pedestrian policy and planning documents to the Knight Library on campus as a record of our nation’s foremost authorities and founders of the modern bicycle advocacy movement.

**Education**

Educating the next generation through real world problems and interaction with professionals and city leaders.

**Sustainable Cities Year**

The foundation of the Sustainable Cities Year is a partnership with one Oregon City per year. The city works with SCI through a variety of studio and applied-courses to:

1. Provide real service and movement to a local city ready to transition to a more sustainable and accessible future
2. Provide students with a real world project to investigate, the opportunity to engage with real clients, and the ability to see their work realized

**SCY 2009/2010 included:**

- 21 courses & projects
- 350 student participants
- 6 contributing disciplines

**SCY 2010/2011 will include:**

- 30 courses & projects
- 600 student participants
- 8 contributing disciplines
- 80,000 hours of student, faculty and staff time

**Policy**

Changing the policy framework for sustainable city design on a national, regional and local scale.

**Policy Initiatives**

One of the primary motivations of SCI is to impact the way cities evolve, including improving environments, decreasing obesity rates, reducing ecological health, growing economic activities and foster social equality. One of the most fundamental ways to address these issues is to engage in the policy making process at all levels of government.

SCI works at the federal, state and local levels to guide policy makers towards informed decisions on sustainable city planning.

- Submitted separate congressional testimony on the auto recovery plan, working with Technology and Innovation Committee of Congress to identify critical sustainable transportation and livability research needs of the nation for the next decade.
- Worked with top lobbyist for General Motors to include the importance of sustainable community design in their financial assistance request to Congress.
- Working with the Oregon DOT and Oregon TIGER program to write statewide model codes for sustainable urban form throughout Oregon.
- Met with House and Senate members of the Oregon Congressional Delegation in Washington, DC about SCI and the ability of the University of Oregon to respond to and engage national policy needs in our areas of expertise, including issues of sustainable city design and mobility.

“...perhaps the most comprehensive effort by a U.S. university to infuse sustainability into its curricula and community outreach.”

- The New York Times
PROJECTIONS

Questions

What are the likely parameters of ecological, technological, sociological, and statistical projections on the future of society by the aptly named Faith Popcorn.

What can past special events tell us about our present?

Where is Future design research heading to?

Method

The project is a study in the future of urban design and architecture, but also expands to a wider scope of function. These entries establish that they are not unconcerned with the specific element of a potential future society—water, and decade to decade. Be it the idolization of the motorcar in the 1920s or the contemporary concern for instantaneous contact with each other as heralds of a future that could be imagined to be

5 Entries

The entries below document a number of movies, television shows, and books that imagine a society permanently divided by class. These entries re/f_lect the fears and anxieties of success in technology, the increased reliance on automation, and the potential for new forms of social stratification. They include the wonderfully simple and powerful idea of a machine in the 1920s or the contemporary concern for endless pursuit of technological progress ensures its ongoing development.

17 Entries

The entries each focus their attention on a single case eventuality or to adapt to a soon-to-be situation. There is no shortage of design opportunities as a response to the future or look to the future for inspiration. Not only looks to the future of urban design and architecture, but also expands to a wider scope of function.

23 Entries

The blog creates an opportunity for open-source research that can at best provide a robust framework for future decisions. So how are projections made this far into the future?

105 Entries

Method

In making sense of these competing visions of tomorrow, the blog creates an opportunity for open-source research via an undergraduate college course that allows students to build and work on a number of research projects in potentially new visual forms.

11 Entries

Time-based Trends

These entries establish that they are not unconcerned with the specific element of a potential future society—water future or look to the future for inspiration. Not only looks to the future of urban design and architecture, but also expands to a wider scope of function.

22 Entries

The course also acts as a first pass at applying the themes to build upon existing avenues of research in potentially new fields. In doing so, these competing visions of tomorrow.

10 Entries

What can past special events tell us about our present?

The historical data represented in the form of a circular timeline sequence of visualizations and timelines. These diagrams are created to inform a synthetic interpretation of the data. The visualizations and timelines are informed by research on the future of society by the aptly named Faith Popcorn.

40 Entries

These entries re/f_lect the fears and anxieties of the future or look to the future for inspiration. Not only looks to the future of urban design and architecture, but also expands to a wider scope of function.

21 Entries

VIEWS OF THE FUTURE: How the Pop and Prognostic Dystopias of Urban Design Compare

SO MUCH SHALLOW POP CULTURE REFLECTS THE ZESTFUL SPIRIT OF ITS TIME

THE CRASS IS ALWAYS GREENER IN THE FUTURE

Take comfort in the thought that things could always be worse.
ENTREPRENEURSHIP IN ARCHITECTURE

HOW ARCHITECTS CAN ENHANCE THEIR VALUE PROPOSITION BY EXPLORING NEW HORIZONS OF OPPORTUNITY THROUGH AN ENTREPRENEURIAL APPROACH TO PRACTICE

ENTREPRENEURSHIP IS MORE THAN STARTING A BUSINESS

“Entrepreneurship is the process of creating value by bringing together a unique combination of resources to exploit an opportunity.”

Open Entrepreneurship in Architecture
Nathan Richardson, Oklahoma State University
In Winnipeg, the Assiniboine River Trail is the world’s longest naturally frozen skating rink, beginning already frozen in the fall and stretching nearly 10km west of the city center. It is a popular destination for skating, hockey, curling, and walking. The trail offers a unique way to explore the city, connecting various parks, museums, and cultural sites.

Each year, the City of Winnipeg sponsors a competition to design and build warming huts along the trail. In January 2012, the ROPE pavilion was selected for construction. This pavilion is an elegant and functional design that integrates seamlessly with the natural landscape of the Assiniboine River Trail.

The ROPE pavilion is a highly articulated form that nestles into its surroundings. Its form is optimized for heat retention, with a dome-like structure that provides shelter and warmth. The pavilion’s skin is made of manila rope, which provides both insulation and a unique aesthetic. The structure is composed of birch frame elements that are laterally braced by horizontal hoop members, providing stability and strength.

The interior of the pavilion is a comfortable space for visitors to relax and enjoy the surrounding natural beauty. The wooden interior creates a warm and inviting atmosphere, while the rope exterior collects snow, further integrating the pavilion with its environment.

The ROPE pavilion is a prime example of how architects can design functional and aesthetically pleasing structures that enhance the experience of public spaces. It demonstrates the power of simple materials and thoughtful design to create memorable experiences.

Kevin Erickson, University of Illinois, Urbana-Champaign
Open
NYC 2 LV: Shifting Pedagogies between park and playground
Glenn Nowak, University of Nevada, Las Vegas
Andrea Limpede, University of Nevada, Las Vegas
TWICC
Two-Way Insulating Composite Cladding

Two-way insulating composite cladding is a customizable tile system that provides insulation to a facade with both the tile’s foam-filled eco-resin fiberglass shell and a layer of stagnant air generated by the surface geometry.

Critical to the secondary insulate performance of the system is both the shape of the tile itself and the layout of the field of differentiated tiles. Additionally, the geometry and layout of the tile defines the depth, concentration of the air layer, and the horizontal spacing between adjacent tile layers. The interplay between these factors constrains the ability to achieve a more uniform air layer in both the 2-D and 3-D simulations. The thermal flows between interior and exterior typically lead to the development of a stagnant air layer adjacent to the building surface in both the 2-D and 3-D simulations. The tiles within a given layer have the same thickness, air velocity, and direction. We expect the value to be substantially greater than the thickness of 0.7 for the test conditions. The effective thickness is determined by the CFD analysis results which verify the existence of a substantial stagnant air layer.

The thermal performance of the TWICC system is in addition to the typical air layer present in the outermost level. A full-scale mock-up of the system has undergone weather testing and maintained positive water shedding under hurricane force conditions. The current iteration of the system shown represents a fine-tuning of the system as further field testing and verification is in progress.

The primary purpose is to create a unique visual aesthetic. As shown in the unrolled facade drawing, one of the goals was to use the pattern to tie the two sides together. The result is shown in the bottom-right photograph.

The tiling pattern is generated for both airflow control and to create a unique visual aesthetic. As shown here in the unrolled facade drawing, one of the goals was to use the pattern to turn the corner of the building in a way that ties the two sides together. The result is shown in the bottom-right photograph.

The installation, much like the airspace in a wall cavity, retards thermal flows between interior and exterior. Test results currently confirm this hypothesis and the resultant R-value near 0.8 for the cladding system. Shown in combination with a higher-performance layer. This configuration allows the cladding to be moved to the most desirable position. The most important aspect is the effective thickness generated. In this installation, the designed pattern is constrained to using only six different tiles to expedite manufacturing and cost. Using these constraints to generate a gradient visual pattern and dynamic play across the facade. The result is a visual effect that is much like the airspace in a wall cavity. The primary difference is the temperature variation generated in a response to the local wind conditions balancing against maintaining the visual effect. It is extremely durable and UV resistant allowing the project to maintain this look with minimal effort. The pattern is generated by the composite material assemblage and the designed depth of 4 inches was used to generate a layer of stagnant air along the facade. This layer of stagnant air is in addition to the typical air layer present in the outermost level. A full-scale mock-up of the system has undergone weather testing and maintained positive water shedding under hurricane force conditions. The current iteration of the system shown represents a fine-tuning of the system as further field testing and verification is in progress.

Equally as important to the insulation performance is the ability to provide a unique visual aesthetic. As shown in the unrolled facade drawing, one of the goals was to use the pattern to turn the corner of the building in a way that ties the two sides together. The result is shown in the bottom-right photograph.

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Towards Growing Urbanism

Josh Brevoort, zeroplus
Lisa Chun, zeroplus
Gundula Proksch, University of Washington

[40'] .00 asl

Closed-Loop Water System

Augmenting Water and Energy Systems - Additional Information Overlaying Reality

Ecological Permaculture Food Systems

and users augmenting our intelligence so that we may fully understand by the emerging datascape of information, gathered through sensors biological organism. These micro infrastructures of [gu] are made possible an alternative, smart energy network are propagated to thrive as one closed-loop water system, an ecological permaculture food system and

Within these three city zones, micro infrastructures including a natural, closed-loop water system, an ecological permaculture food system and an alternative, smart energy network are propagated to thrive as one symbiotic paradigm. There may a hybrid fraction of [gu] that seeks to make possible an alternative, smart energy network are propagated to thrive as one closed-loop water system, and users augmenting intelligence so that we may fully understand the complexities of the symbiotic relationships we are proposing each piece coming growing together. In [gu] a hybrid, biological building system and flexible envelope controllers microclimate through adaptive sensing mechanisms as well as providing water, energy, light and food. Ultimately, [gu] is a self-generating and self-sustaining synthetic biology that will change the definition of nature and what we build.

[gu] rethinks developments and trends of the current sustainability debate for cities that blurs the boundaries between nature and our built environment. [gu] is a vision for Seattle in 2036 that embraces the re-emergence of natural systems in a symbiotic relationship with human developments on multiple scales throughout the city.

Open [gu] Growing Urbanism

Towards Growing Urbanism

Josh Brevoort, zeroplus
Lisa Chun, zeroplus
Gundula Proksch, University of Washington

Aerial View of Growing Urbanism in Seattle 2036 - Looking South from Dense City to Tidal City
DATA-SCAPE: a biomimetic surface

In most building designs, walls are manifest as barriers to inside space. Interior spaces from the inside world, exterior spaces from one another and to the outside. The DATA-SCAPE project is about creating a surface, a surface that is capable of responding to environmental conditions. It seeks to explore the concept of "performativity" in architectural design. The surface is designed to respond to environmental conditions, such as temperature and humidity, by changing its shape or texture. This project is an exploration of how surfaces can be designed to interact with their environment, creating a dynamic and responsive architecture.

PERFORMANCE POROSITY

Open Susannah Dickinson, University of Arizona

BIOMIMETIC SEMINAR EXPLORATION II

PERFORMATIVE POROSITY

The DATA-SCAPE project is an exploration of how surfaces can be designed to interact with their environment, creating a dynamic and responsive architecture. The surface is designed to respond to environmental conditions, such as temperature and humidity, by changing its shape or texture. This project is an exploration of how surfaces can be designed to interact with their environment, creating a dynamic and responsive architecture.

BIOMIMETIC SEMINAR EXPLORATION I

DATA-SCAPE: a biomimetic surface

Buildings can no longer be seen as singular and fixed bodies, but as complex energy and material systems that function as parts of the environment. This seminar explores the concept of "biomimetics" in building design, drawing inspiration from natural systems such as the Sonoran Desert and termite mounds. The seminar focuses on the development of a "biomimetic" surface that can adapt to its environment, responding to changes in temperature, humidity, and solar radiation. The seminar includes lectures, workshops, and discussions on the latest research in biomimetic design and its potential applications in architecture and urban design.
Society
The cookie cutter house is an emblematic ‘status quo’ symbol, for the twenty-first century middle class in America. The postwar American Show House no longer represents family patriarchy, nor financial security. Neither the nest where the family remains united with all their moral and behavioral values. It is an iconic representation of success. “I own an MTV Crib, therefore I exist.” To have some validity, the iconic palace of the family should look as a monumental French villa full of toys and gadgets... practical counter tops in the kitchen, a sparkling hot tub, and as many flat screens as possible. The scenographic Venturian mask from glittering Vegas mutates via HGTV inside the most intimate living spaces. Culture and class have been replaced by a new social status. There are new definitions for the culture of “bad taste”, everything is valid, and no one accepts the criticism for lacking good taste.

After researching on different typologies of suburban single-family dwellings, students made critical architectural interventions on the cookie cutter house to transform it into a multifaceted modern loft dwelling. Some of these proposals were: a) Cody Carter, Stephen Roy, perspectival house. Using two cameras inside their study house, front and back views were simultaneously recorded. Frames were then traced one by one and used as diagrammatic templates for creating the sections of the perspectival house. b) Bilateral printers, Elurco Herrera, voyeuristic house. The definition of privacy was challenged with a critical discourse. c) Adrián Larriva, Laurence Garcia, folding house. The case study house was unfolded as a cereal box, a template with many folding possibilities was then created. d) Victor Cruz, Mario Silva, green house. Through simultaneous mapping drawings, the traditional cookie cutter house was transformed into a multifaceted modern loft dwelling.
PROJECT 1: SIBYLLINE TXT Syracuse: Research Project, fictional story, dispersed over time and network map

My own research project, begun the sequence. This project dispersed a fictional story through 60 separate text messages, dispersed through 26 urban sites, over 30 days. The project is named for the Cumaean Sibyl of the Oracle of Delphi (seen in Virgil’s Aeneid). The Sibyl inhabits a cave, one hundred openings, and reveals her prophecies on a series of oak leaves within the cave. When a wind blows the oak leaves are scattered, thus re-sequencing the prophecy and creating potential through mis- and reinterpretation. The project explores the potential of digital communication to operate as a modern oracular mode of narrative grafted on to physical spaces in the city.

As a forward-looking pedagogical model for students, these projects of spatial inquiry with mobile communication, enhanced by their digital elements, can provide an opportunity for making the most immediate effect on the environment. This work is not both theoretically speculative and real and engaging as physical practice. These projects necessitate immediate engagement for students with the community and with urban conditions. The work combines the reality of the urban field with the design techniques that rely on quick, fluid work to get on the ground as soon as possible. It is the experimentation and mobilization of theory, a powerful pedagogical tool, an important future model for the integration of studio teaching and field research within an increasingly complex set of urban conditions.

The “Spatial Context” course sequence was funded by an Imagining America Grant, meant to support courses pairing scholarly work with community engagement. These courses focused on the production and installation work that engages mobile communication technologies. The student installations, What If... and SyrAsks, both claim that a public can be gathered and encouraged to inhabit the city through urban “conversations.” These conversations were facilitated through the dispersal of physical installations within the city that act as collection and markers of the discourse. What If... worked with vacant storefronts in the city as sites to ask citizens to send texts specializing on the possibilities for the city. SyrAsks created sculptural pieces fastened to existing infrastructure to pose questions, created through our workshops with 7th and 8th grade students in one of the city’s schools and answered through text message. Both projects culminate in a final projection events that invited all contributors to read the city’s responses, furthering the recursive nature of the work.

PROJECT 2: WHAT IF... Course, uses vacant storefronts, installations citywide, asynchronous conversation

culminating in projected conversations at a local city art house

PROJECT 3: SYR ASKS Course, workshop with Syracuse youth, installations citywide, asynchronous conversation

culminating in projected conversations through the Urban Video Project

Spatial ConTXTs  

Sibylline TXT (SP2009), What If... (SP2010) and SyrAsks (SP2011) are three text message based urban installations that explore how an emerging form of mobile communication and its attendant social models have and can shape the use and understanding of public space. These research projects identify a rapidly changing urban landscape, which is only visible, comprehensible and accessible through direct experimentation. The work examines spatial practice which encourages public interaction. Speculation about the possibility to heighten, augment or reframe this practice through the integration of digital communications is best served by testing in the public realm, using the devices directly.
REAPPROPRIATION: abandonment adapted
A Communal Intervention for the Madereria La Victoria
Monterrey, Mexico

This project for the Mercado La Victoria (Victoria Market) in central Monterrey, Nuevo Leon, Mexico, reflects a strategy of reappropriating the historic La Victoria Lumber Yard as a marketplace serving residents in the urban core of Mexico's second largest metropolitan area. Rather than considering the market as a self-sustained environment, this proposal reimagines a reconstituted building into a restructured urban landscape. The project introduces a network of new market buildings that create a dynamic mesh within a larger community to produce a new shopping and social center. The new market provides a communal space for local residents, while drawing attention from the urban landscape.
Digital fabrication has become more and more influential in the architecture and construction industry and so must be explored to better understand the benefits for the future of the field. The goal of this project was the investigation of digital fabrication as a detailing tool to better understand the benefits of high tech manufacturing processes. There is a unique opportunity with digital fabrication to facilitate an ease of construction that lends itself to projects such as those required by organizations like Habitat for Humanity. The cost limitations experienced by Habitat for Humanity necessitates volunteers to help with construction that have either limited or no construction skills and experience. The ability of digital fabrication to detail and establish a “kit-of-parts” that can be put together by every skill level gives architects and contractors the capacity to push the limits of design past the boundaries of currently available volunteer construction techniques. Three building sections were constructed by the students instead of an actual house due to the cost and space limitations of the institution and client. However, the full-scale sections gave viewers an understanding of what the space would feel like through a view of the materials utilized both inside and outside of the building envelope, and how the building would be constructed using Computer Numeric Controlled mills that generated the parts needed for assembly.

Social media has proliferated among today’s millennial students as an important communication tool and therefore is important to be explored as a communication tool in an educational setting. On his blog site, Andy Carvin of the Digital Divide Network, explains how “social networking in education opens doors to an unprecedented array of learning opportunities in an environment where educators often feel freer to express themselves, share their ideas and be a catalysts for change” (2006). The use of social media and other digital tools as a major source of communication in an architecture design studio is an important issue to discuss and develop as current students and the students entering our programs already use these tools and will only gain from the implementation within their curriculum.

This exploration of digital tools for both architecture and architectural communication is important for architects, contractors and especially organizations like Habitat for Humanity so that they can see how current and developing technologies like digital fabrication can not only help generate good design through detailing, but how it can also save money, be volunteer friendly and therefore help establish a home.
Technology
Project Description

This project is part of an ongoing research project on responsive systems in architecture. It is driven by an interest in adaptive systems in nature and a desire to explore the capacity of built spaces to respond dynamically and adapt to changes in the external and internal environment. The intention is to explore ways to integrate smart systems (sensors, actuators, and controllers) and kinetic systems (movable architectural components) into buildings to enable them to sense, respond and interact with us. The broader goal of this research is to develop technologies and designs that are capable of transforming static building components into active responsive surfaces in order to produce added functionalities in architectural spaces. Buildings that can sense and interact with their environment can operate more synergistically within larger ecologies and therefore move closer towards more sustainable participation within global environment.

The goal of this project is to develop small scale prototypes of adaptive kinetic surfaces capable of spatial modulation and response to environmental stimuli. The emphasis in this project is on the nature of the material system and it is our intention to treat elements, structure, surface and performance of this material system as integrated layers that make up a "tissue" capable of accommodating dynamic nature of human occupation.

The "Soft" Kinetic (SK) Surface is organized around the network with embedded muscle wire that provides for a range of motions and facilitates surface transformations through soft and muscle-like movement. The material system that develops around the network is variable and changes its thickness, stiffness, or permeability within a continuous composite system. The variability of the material system enables the system to behave differently within surface regions; to vary the speed and degree of movement; to vary surface transparency; to enable other levels of performance such as capturing heat produced by the muscle wire and distributing heat within the surface regions. We believe that the variability of the material system will bring us closer to the seamless material integration found in biological organisms.

Our focus on seamless material integration and capturing of emitted energy hints at our broader goal that architectural intervention should find a more productive place within larger ecologies. We are very much interested in suspending a challenge of finding a non-permeable and clearly defined boundary between inside and outside in exchange for a surface that fosters constant flow of information, matter and energy.

Architectural Deployment Scenarios

One of the applications of the SK Surface is to provide a heated surface/structure that is capable of mediating environment in cold climates in order to make outdoor public spaces more accessible and enliven the urban experience.
The overall form of the project can be manipulated through the development of a parametric system in the software program Grasshopper. This allows variables such as the shape of the footprint, height of arches, and dimension and anisotropy of the wall to be changed continuously throughout the design process.

Once a parametric solution is selected, a series of control lines are output for each vault form. Following, a computer script is run on the control lines, generating a triangulated frame based on a second series of variables including density of triangulation and pipe dimension. Also from these control lines the skin of the structure—a series of developable surfaces—are produced.

THE GLS KITCHEN TENT is a project that is situated on a rural site in southeastern Michigan. The design employs both high and low-tech methods in its development and subsequent fabrication. Structurally, the project benefits from the traditional form of the arch and vault. Yet these forms are manipulated through parametric and scripted systems to allow for variation in the overall form in response to aesthetic and pragmatic conditions. The project will ultimately utilize CNC tube bending technologies in conjunction with a gantry laser cutter to resolve the complex tube geometry, in combination with CNC fabric cutters and sailmaking technology to facilitate the construction of the project's skin.

Once a parametric solution is selected, a series of control lines are output for each vault form. Following, a computer script is run on the control lines, generating a triangulated frame based on a second series of variables including density of triangulation and pipe dimension. Also from these control lines the skin of the structure—a series of developable surfaces—are produced.

The projects form is in part a response to the program—the creation of a multi-purpose meeting, dining and food prep space. It is also shaped in response to particular views, neighboring mature surrounding trees, and existing site elements that must be accommodated. The design of a computer-based solution allows for the continuous adjustment of the complex geometry through real-time visualization—without having to remodel the form for subsequent iterations.

A physical model is used in conjunction with the computer model and software to explore different patterning techniques of the structure's skin, which will eventually be fabricated out of nylon sailcloth. A wire-frame armature of one of the vaults is constructed and used as a type of dress form. Variations of the covering are patterned, sewn, and fitted to the model.
Electropolymeric Dynamic Daylighting System

**display technology for bio-responsive mediated building envelopes**

The Electropolymeric Dynamic Daylighting System (EDDS) is a dynamic glazing technology that could respond to variations of sunlight and temperature while also taking into account user preferences. In electropolymeric shutters, the switchable materials can be turned in and out of the neutral position creating a geometric and spectrally selective electroactive polymer (EAP) display technology assembly. The EDDS could provide the modulation of heat gain through the building envelope and control over dynamic patterns and views for the manipulation of visual effects along the IGU surface. The EDDS is anticipated to have substantial energy savings over the course of the year in comparison to existing fixed layer systems.

**Solar-tracking:**
- Modulation of daylight and heat gain
- The EDDS in a window offers the potential to allow the building occupants to control their level of passive heating by designing the building envelope to capture solar energy for surfaces 2 and 3; maintain some heat capture on the surfaces 2 and 3; and shed minimal heat on surfaces 1, 7, and 8.
- The EDDS also offers the benefits of individual control to the building occupants and the ability to let in direct sunlight for the manipulation of visual effects along the IGU surface.
- The flexibility of the EDDS allows for remote control, view and image modification, access to multi-directional flows, and dynamic visual effects and user interactivity.

**Media-exchange:**
- Control over dynamic patterns
- The remote control of the EDDS is an opportunity for exterior viewers and image modification, user manipulation, and image reuse in the future.
- The EDDS allows for remote manipulation of visual effects along the IGU surface.

**Technology:**
- Electropolymeric display technology assembly
- EAP film arrays applied to glass
- EAP film arrays applied to the building envelope
Technology
Roberto Bottazzi, Royal College of Art

MOLECULAR CITY

Molecular City is an interactive space set at the intersection of digital technologies and urban environments. By using a range of digital tools, architects and designers can explore new possibilities for urban design and development. This approach challenges conventional notions of urban planning and design, offering a new perspective on the future of cities.

(Copyright: Roberto Bottazzi, Royal College of Art)
Points + Clouds: Tactical Hermeneutics:

"We hold to the idea that architecture is not simply reducible to the container and the contained but that there exists a dynamic exchange between the life of matter and the matter of our lives." Reiher + Umemoto

Research-through-Making as an explicit vehicle, provokes interrogations and explorations of environments. It consistently reiterates the condition that links the gap, situated between spatial representation and the built environment, informed through a series of hermeneutic devices. The devices create the occurrence of malfeas, errors, holes, and mistakes that formulate poetic spatial possibilities. The potency of the unfamiliar and the unseen that lurks within the atmospheric construct is exploited. It is simultaneously ambiguous and specific to the slippage between spaces and realms. Defined tactics expand the traditional thinking of spaces and volumes as dualities of surfaces and solids to a notion of points and clouds: the atmospheric.

Interpretation of spaces, and designing around techniques but not reliant on them to design transmissible, navigational properties of space. Conceptualizing space through the dualities of surfaces and solids to a notion of points and clouds: the atmospheric, draws on the questions of authenticity and the inbetween. Producing a body of work that explores interpretation through representation of reality that is full of errors, distortions, gaps, and residue. The drawings act as markers for the next projective moments of this work.

"Space becomes a background for interaction rather than a co-producer of interaction. But what takes place is, in fact, a double movement: the user’s interaction with other people co-produces space which in turn is a co-producer of interaction. Through focusing on our agency in this critical exchange, it is possible to bring our spatial responsibility to the fore." Eliasson, Olafur

The research project examines and unrolls this condition of space through the use of digital technology explicit though a do it yourself culture, hacking the Microsoft Kinect sensor to map and project alternate realities that co-exist within. It draws a spatial condition in a different light prior to traditional techniques of 2D representation of solid and void within the discipline of architecture. The project is a protagonist within the movement of spatializing conditions as atmospheric representations.
WHAT IF..... WE COULD GROW BRICKS?

**BENEFITS**

- Bricks are “grown” via a chemical reaction with no kiln.
- Can be used structurally in place of clay brick and concrete block.
- Mortar is not needed—units self-bond with cementation process.
- Bacteria can be grown efficiently in a range of temperatures (10°C-50°C).
- Locally sourced aggregate reduces the weight of materials requiring delivery to the site.
- Utilization of waste materials significantly reduces pollution and cost.
- The material is inexpensive to produce and can be manufactured with both traditional casting and 3D printing methods.
- The material exhibits potential self-healing properties.
- The material does not shrink during curing, a common problem in concrete construction.
- The material takes less than 5 days for manufacture.
- The process can work with a variety of aggregates (sand, stone, plastic, flyash, recycled glass, etc.).

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**Structural Testing**

**Mortarless Bonding System**

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**Scanning Electron Microscopy**
The rapid expansion of the world’s economies demands enormous consumption of fossil fuel and construction materials. According to 2011 Energy Information Administration Data, world marketed energy consumption grows by 53 percent from 2008 to 2035. The rapid growth and increasing emissions of greenhouse gas are expected to accelerate global climate change. Scientists expect that the average global surface temperature could raise an additional 1 to 4.5°F within the next 50 years which are attributed by both human and natural causes (Figure 1).

The environmental impacts of a building are alarming and it is important to understand how global warming in future is going to affect the energy performance of a building. Certainly, there are many building systems that can play a role in implementing sustainable concepts and mitigating impacts from climate changes. Among various building systems, a building envelope system – an immediate mediator between outdoor and indoor climate conditions – requires through understanding of its response to climate changes. The primary purpose of the presentation is therefore to address the impact of climate changes on the energy performance of building envelopes and further on the built environment. As a pilot study, a transient heat transfer analysis using finite element modeling was used to simulate the thermal response of a building envelope based on hourly recorded weather data in Charlotte (Figure 2). Further, the presentation also will discuss about challenges and opportunities using transient heat transfer analysis method in class or seminar environments as an efficient learning tool to visualize the dynamic nature of the built environment. Detailed analysis results will be presented in the conference meeting.
CROSS-FABRICATED SCALES

Sue Biolsi, WE-DESIGNS.ORG
Wendy Folk, University of Houston
Spider Cow
Design / Build Project for a Portable Acoustic Partition Wall

A Three Credit Design / Build Course
PERFORMANCE-BASED GENERATIVE DESIGN
An investigation of the parametric nature of architecture

Wing design is a complex form due to the many parameters that affect the performance and ability to take flight. Such parameters include planform and airfoil geometry shapes, as well as the angle of attack, pitch, and lift forces. David Aksamija, leading aerospace engineer at the University of Cincinnati, used the Galapagos plug-in in Grasshopper to design a set of wings with minimal development costs and final weight. The process, known as performance-driven form seeking, is based on the concept of genetic algorithms and natural selection. The goal is to set a few requirements for the wing configuration and allow the system to optimize the design. The wing is then proved to be in the correct configuration and is ready to take flight. Such parameters include planform and airfoil geometry shapes, as well as the angle of attack, pitch, and lift forces. The wing is then proved to be in the correct configuration and is ready to take flight. It is possible to use both genetic algorithms and natural selection for this type of problem. However, it is possible to use both genetic algorithms and natural selection for this type of problem.
tetra | n

Note 1: A project is driven by the impetus to design a generative self-supporting structure capable of variable size. Through utilizing a single mechanism – one which could be fabricated out of simple materials – that could be expanded infinitely in both scale and form.

Note 2: The project is driven by the impetus to design a generative self-supporting structure capable of variable size. Through utilizing a single mechanism – one which could be fabricated out of simple materials – that could be expanded infinitely in both scale and form.

The script is 'run' on an assembled tetrahedral base structure – part generation, connective elements generation, labeling, drill holes, and part flattening are integral functions of the script.

The three branch elements are exploded into three parts, labeled, and perforations for folding are etched and cut into each element. Parts are nested on sheets for cutting out of aluminum or steel. Parts are connected using either screws or rivets.

Depth and redundancy in the form of scale or form.

WHOLE GENERATION

Individual parts are generated hierarchically. If the whole part is produced, the branches can be produced iteratively. If individual elements are produced, the branches can be produced in reverse.

Selected Ver: 344 tetrahedrons
Tetrahedrons are aggregated either into branches. These elements would support themselves simply by standing on the ground. Depth and redundancy in the form. Small tolerance allowances are made in the order of degree for fold, connection holes, and perforations.

Three elements for every connection are its specific location, angle and degree for fold, connection holes, and perforations.

PART GENERATION

When aggregated, branches are exploded and nested into a single plane. If the whole part is produced, the branches can be produced iteratively. If individual elements are produced, the branches can be produced in reverse.

Components made iteratively, with each component nested into a single plane. This enables blending of techniques during the scripting process.

Tolerance points for every component are generated.

Parts are connected using other components in parts.

FULL GENERATION

When aggregated, branches are exploded and nested into a single plane. If the whole part is produced, the branches can be produced iteratively. If individual elements are produced, the branches can be produced in reverse.

Selected Ver: 344 tetrahedrons
Tetrahedrons are aggregated either into branches. These elements would support themselves simply by standing on the ground. Depth and redundancy in the form. Small tolerance allowances are made in the order.

Three elements for every connection are its specific location, angle and degree for fold, connection holes, and perforations.

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