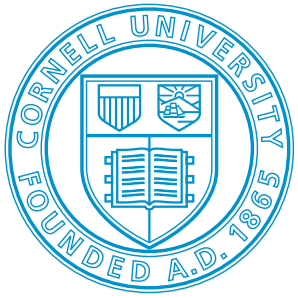
COLLEGE of ARCHITECTURE, ART & PLANNING

DEPARTMENT OF ARCHITECTURE

# SPRING 2017
# OPTION STUDIOS



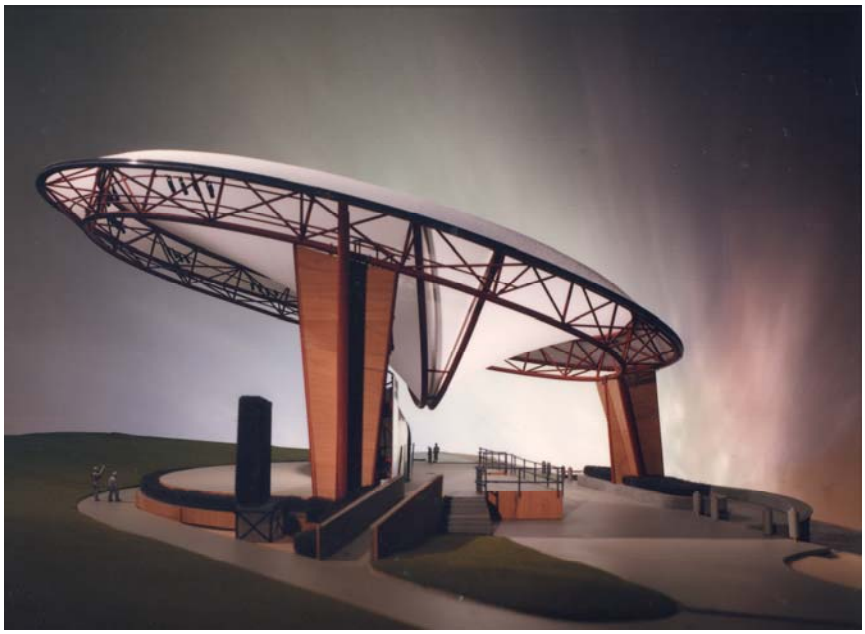

Cornell University


Elective Design Studio | Spring 2017 | Cornell AAP | Environmental Systems Lab

Population growth, urbanization and related space constraints will require new construction and densification of urban centers around the world. Until 2050, the UN forecasts a construction demand that is equivalent to 750 times the size of a city like Rome. This is a worrisome development, since roughly 40% of our energy use and greenhouse gas emissions can be attributed to buildings. On the flipside, the construction and renewal of urban centers can also be a unique opportunity to mitigate climate change through intelligent design solutions, energy efficiency improvements and an increased use of renewable energy. Apart from being resource efficient, next-generation urban habitats need to provide indoor and outdoor comfort conditions including access to daylight, high-quality public spaces and streetscapes as well as innovative transportation concepts. Concepts to cope with extreme weather such as storms and heat waves must be considered as well. This studio will address the question of how architects, urban designers can account for these diverse issues in the design processes. Students will learn about emerging building performance and mobility modelling tools and will be challenged to develop a high-density, high-quality neighborhood design in NYC through an informed design process.

Cornell University AAPESL Building Technology Research Atkinson Center for a Sustainable Future TRANSSOLAR

# Option Studio 4101/4102/5101/5116/8913: Contemporary stressed membrane and tensioned fabric structures: Exploring the State of the Art



**Spring 2017**

**Instructor:** Kent L. Hubbell
klh4@cornell.edu

**Office Hours:** Scheduled by Appointment
204E Sibley

**Grading:** Letter/ 6 hours studio credit

This Studio will begin by exploring the long history of stressed membrane and fabric structures in the creation of the built environment, from pre-history to the present.
Subsequent to the research phase, two design problems are planned to familiarize students with the unique attributes of designing with this unique formal and structural vocabulary.
Architect, **Nic Goldsmith**'74, principle of FTL in New York City, will make several visits to the studio, first presenting emerging developments in the field of stressed membrane structures and later in the semester, serving as studio critic on interim and final reviews.
Associate Professor of Fiber Science, **Juan Hinestroza**, will work with students to explore the application of state-of-the-art of architectural membranes to their designs, particularly newly-developed textiles that may be used for the Marco Island Exhibition Pavilion.
Assistant Professor of Fiber Science, **Denise Green**, formally trained as an anthropologist, will present a lecture on the history of fabrics, particularly those used in human habitats, and will explore with the students, the graphic potential of fabric membrane structures.
Professor of Engineering, **Chris Earls**, and other department faculty will visit the studio occasionally to act as consultants.

The studio will undertake **three design projects** of increasing complexity.
The first will involve the creation of a shade pavilion for the court bounded by Milstein and Sibley, or Running Fence for Bandon Dunes, OR.
The second studio problem will take up the design of a concert pavilion to be located in the natural amphitheater just Southwest of the Johnson Museum.
After these two preliminary problems, the studio will begin work on designs for The Marco Island Art Center/Exhibition Pavilion, located in Marco Island, Florida.
The Art Center Board has generously made a gift to support the studio and a teaching associate, and will attend final reviews in May.

The studio will take a **field trip to Buffalo**, NY to visit Birdair Inc.(birdair.com) one of the world's premier manufacturers of stressed fabric structures.

ARCH 5116, ARCH 8913 & ARCH 4101/4102, 5101: Option Studio
Cornell University, AAP Department of Architecture
Spring 2017; 6 Credits
Instructor: Jenny E. Sabin, jsabin@cornell.edu
Teaching Associate: Jingyang Liu Leo, jl3449@cornell.edu

# Digital Ceramics: Clay Tectonics

*"One can discuss, design, and make at the same time-just as pre-modern artisans and pre-Albertian master builders once did." – Mario Carpo*

**Figure 1** - Selection of student work produced in prior installments of Sabin's seminar titled, *Special Topics in Construction: Digital Ceramics*, Department of Architecture, Cornell University.

Digital architecture has radicalized the conception & fabrication of form in our built environments. No longer privileging column, beam and arch, our definition of architectural tectonics has broadened alongside advancements made in computational design. How have these advancements impacted material practice in architecture, engineering and construction at economic, technological and cultural levels? How might we address these issues during the design and fabrication process? More specifically, how might we probe these changes within a single material?

The production of ceramic blocks and tiles has a vast technological and design history. Ceramic modules of standard measurement have been used as a building block and replacement of stone for centuries. Contemporary interest in the ceramic module and technical advancements in pre-fabrication, have offered up pre-fabricated non-load-bearing brick façades.[1] Ceramic bricks and tiles, so ubiquitous in their application in the built environment, have surprisingly lacked recognition as a viable building component in contemporary architecture practice until now. Industrial and technological advances have shown us that ceramic production can be manual, mechanical, and now digital. The use of CAD/CAM and robotic technologies to automate the design and fabrication of ceramic form has since inspired a new appreciation for ceramic material in architecture, but further design research and production is necessary. Importantly, the plastic nature of clay offers up a potent material solution to contemporary generative design processes in architecture, which frequently feature organic and natural forms of increasingly complex expression and ornamentation.

# Designing on the Limit

ARCH 4101/4102/5101/5116/8913 Spring 2017

Paulo David + João Almeida Option Studio

Madeira Island, with its volcanic genesis, has materialized itself into a heterogeneous territory with peculiar orography, where a central mountainous mass defines the highest elevation areas.

Along this area, and below the cloud level, the deepest valleys and the densest arboreal masses from local forest can be found. By contrast, above this line, the territory presents itself as rude, bare and with harsh environment, which include occasional frosts.

On another note, along Madeira's coastline a succession of beaches, bays and scarps can be found. This contour is extremely irregular and diverse which originates an opportunity to rehearse several and exciting architectural exercises, within diverse plots from shallow sea shores to 500-meter tall cliffs.

Starting on occasional points along this coast, some old stone paths are still present. These are called the royal paths and they are the primitive routes within the island after the boat routes. They twine along the slopes and present on their own another interesting starting point for other architectonic interpretations.

The challenge's objective divides into the following steps: Time, Place, Program, Matter and Technique. The aim is that an evaluative reading is elaborated on the insular territory and, after a substantiated analysis, intervention proposals should be presented along this place, with pertinent and adjusted materiality and constructive techniques.

[For those who are interested, assistance on the development of models and presentation drawings for this studio (or others') will be part of João Almeida's elective course.]

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gensler visiting critic paulo david + visiting critic joão almeida • college of architecture, art and planning • cornell university • new york

# Havana II: *Projections*

## Landscapes of Prefabrication and Nature's Afterlife

Kannan Arunasalam, *Havana Vignettes* / Tao DuFour + Tom McEnaney, Mellon Seminar Fall'16

Instructor: Tao DuFour dufour@cornell.edu
Meeting times: Mon, Wed, Fri 12:20pm–4:30pm
Class location: Milstein Floor Plate / 3rd fl. E. Sibley
Office hours: Tue 3:00pm–5:00pm
Grading: Letter grade only / 6 credits

**I. Course Aims and Objectives**

This studio extends the Havana studio of the Fall Semester 2016 – 'Havana After Nature' – and is concerned with the environmental question of urban transformation in the post-Fidel era. It explores this through methods of architectural inquiry, which function from the scale of the construction detail to that of urban-territorial form. At the scale of the detail, the studio will interrogate the legacy of socialist housing, as manifest in urban landscapes of prefabrication. At the scale of the territory, we will investigate topographies of urban and environmental fragmentation and ruination. Thematically, the studio is concerned with the relationship between housing, and the city as an ecological phenomenon. It places the intimate question of domesticity alongside that of responsibility toward the Earth as the ultimate horizon of dwelling or *habitus*. The city of Havana is for us an exemplary context, having been both the site of large-scale experiments in socialist housing, and urban planning imagined as the creation of an extensive landscape infrastructure defining the urban perimeter. Although we will not lose sight of the historic city – *Habana Vieja* (Old Havana) – the studio's urban-territorial focus will be on the landscapes of prefabricated housing in East Havana, the fragmented and ruinous urbanity of Central Havana, and the vast environmental topographies along the Almendares River in the west and south of the city. The design problem

# SITE-SPECIFIC, SMALL-SCALE INTERVENTIONS

## Spring 2017 Option Studio

**Sami Rintala + Dagur Eggertsson + Mark Cruvellier** *with* **Erin Pellegrino**

### STUDIO AIMS AND OBJECTIVES

The intention of this studio is to engage in the detailed design of site-specific, small-scale interventions within the context of large-scale natural landscapes. An essential challenge and objective will be to explore how to accomplish a lot with a little in such an environment. We are thinking of a pedestrian bridge across one of the Ithaca gorges to get things started for the first few weeks. The second project will be sited in northern Norway, the Lofoten peninsula in particular. Site specificity in such remote places has a lot to do with the human beings who have been living there for centuries, their culture and their understanding of their landscape. All this has generated an inner landscape which we need to explore and our intent is to work with a real client for a project (or several small ones) which in a few years from now could potentially be built in full scale. One of the possible tasks could be to design a watchtower overlooking a North Atlantic beach that is used for surfing competitions and that also can be used by tourists who are on the lookout for whales and sea birds.

Such interventions will reflect and interpret their site closely. Moreover, they will be highly material specific and closely detailed, with wood being of primary but not necessarily exclusive interest. Prototype model building and material testing is intended to be done at large scale – e.g., 1:1 – even if not necessarily on site. Structural form and its relation to design ideas/concepts will be of central focus and concern, as will be the close relation of these interventions to their immediate site and larger landscape context. Cold weather climate and dark winter days will be integral to design considerations, but so will be their opposites during the precious and light-filled Scandinavian summer.

A field trip to Oslo and the northern Norwegian city of Bodø and the spectacular setting of the Lofoten Islands will take place. Vernacular as well as contemporary examples of Nordic architecture and other built works will be closely studied for the lessons they convey.

**Cornell University / Department of Architecture**
**ARCH 4101 / 4102 / 5101 / 5116 / 8913 Option Studio with Field Trip to Berlin**
**Mona Mahall, Visiting Assistant Professor**
**Spring / 2017 / 201 Milstein Hall / MWF 12.20 - 4.25pm / 6CR Graded**

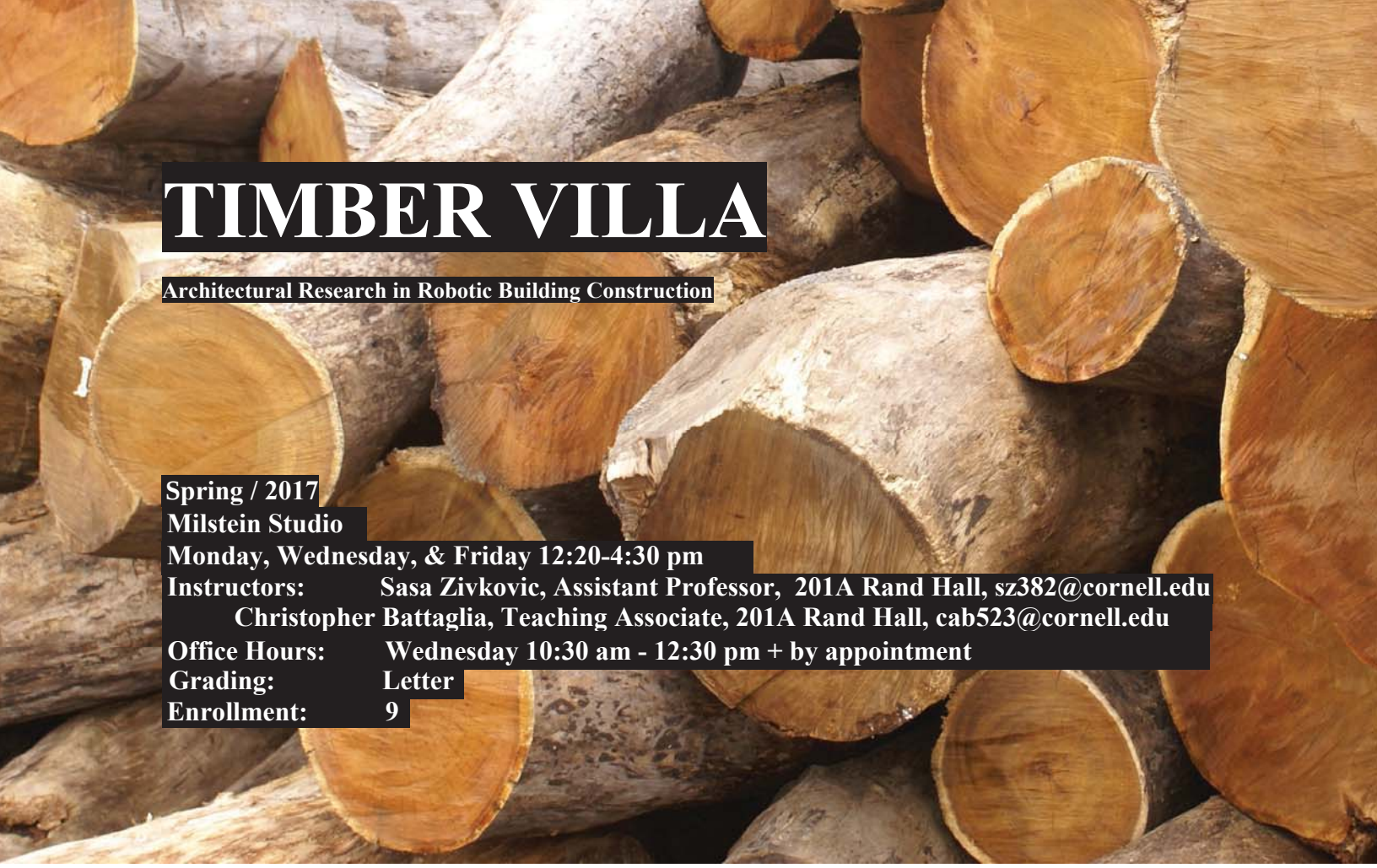
## Types and Pipes

The objective of the studio will be to develop an exhibition project showing acute (field trip) observations as well as (post-) typological research and speculation on Karl Friedrich Schinkel's (1781-1842) built projects in Berlin. The observations of today's existing, heterogeneous situations will form various "realities", documented through still and moving images. Typology, as implied in Schinkel's work, will not just help us acknowledge that observations are already comparative constructions, it will also serve as a method to induce fiction and invention into the process.

Schinkel's types are going to inform the studio's project that not just collects their current states within the city of Berlin, but also investigates their relationship to art and media. Moreover, will these types and images become starting points to develop (post-) typological variations, superimpositions, and speculations on those buildings that Schinkel was able to constitute as types in the first place: the museum, the theater, the architecture school, the park, etc.

Field Trip: On our way through Berlin we will explore through video, photography, and text Schinkel's projects (the museum, the theater, the park, etc.), and some of those works referencing his fiction: Ungers, Stirling, and others. We will observe the rapidly changing context of the city, how it interacts with Schinkel's types and opens up the possibility for our own fictions.

**Methodology**
**The studio starts where the last one ended, with a Chinese Encyclopedia, where is written that the animals are divided into: (a) belonging to the emperor, (b) embalmed, (c) tame, (d) sucking pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camel-hair brush, (l) et cetera, (m) having just broken the water pitcher, (n) that from a long way off look like flies.**
**The Argentinian writer Jorge Luis Borges (1899-1986) offered this taxonomy as an alternative to our Western system of classification. For three reasons it is a programmatic passage to the studio:**
**1. It exhibits how cultures make sense of the world by drawing relationships between things.**
**2. It implies that a classification might be intelligible to someone or some culture, but that it could always have been other than it is.**
**3. It shows –as it is fiction–, how making begins with worlds already there that are both negated and affirmed. Translated into architecture, typology is recognized as a system of classification, a fiction of an order of (functional or formal) "realities". As an attempt to define what is typical, what is common to all, typology is invented more than discovered by recognizing relationships, connections, structures, arche- or prototypes. It is very much an observation intervening with that which is perceived and which is in the process invariably transformed. Architecture is made and remade by imposing such a fiction on "reality", and every fiction is governed by fictive, though sometimes rigorous standards.**
**Such fictions are good to think with, of course. They are devices rooted in history, they are an approach to collect and produce architecture through a methodology directed to the past and future.**



# TIMBER VILLA

**Architectural Research in Robotic Building Construction**

**Spring / 2017**
**Milstein Studio**
**Monday, Wednesday, & Friday 12:20-4:30 pm**
**Instructors:** Sasa Zivkovic, Assistant Professor, 201A Rand Hall, sz382@cornell.edu
Christopher Battaglia, Teaching Associate, 201A Rand Hall, cab523@cornell.edu
**Office Hours:** Wednesday 10:30 am - 12:30 pm + by appointment
**Grading:** Letter
**Enrollment:** 9

## I. Course Description

***Today's buildings will be built by robots and machines!*** We engage and shape the most dramatic paradigm shift in architecture and construction since the Industrial Revolution: the transition from manual building practices towards **mass customized robotic assemblies, advanced sustainable material explorations, automated manufacturing processes, and digital design principles.**

The **TIMBER VILLA** studio expands on heavy timber construction by utilizing and **developing new robotic construction methods**, with the aim to reveal their full architectural potential. Using the archetypal American manifestation of a house - **the log cabin or timber frame structure -** as a starting point, the studio will **rethink construction with heavy timber** from the ground up by **examining the entire process of manufacturing and design with wood through the lens of new technology**. 3d scanning irregularly shaped trunks, tree forks, and asymmetrical parts of trees, students will question the dominant paradigm of standardized and mass-produced wooden parts and dimensions. **Investigating historic wood and timber construction techniques**, the course will participate in a dialogue with the past, examine and understand critical practices of sustainable building with wood and **broaden those practices through the implementation of new craft, technique, and technology.**

In the beginning weeks of the semester, the class will **collectively design and assemble its own set of tools** to conduct research in robotic timber and log construction. Expanding upon the Vitruvian practice of construction machine design, we will **develop and build a large scale open source robotic arm with a linear rail system** equipped to mill and cut timber, allowing students to radically rethink and challenge wood construction. The school's fabrication equipment as well as the RBCL lab's large **DEADALUS** 3d printer will be used in addition to the new robotic arm. Interdisciplinary work will be essential to creating a **studio culture of intellectual exchange across disciplines**: the class will collaborate with engineers, material scientists, computer scientists, artists, historians, and building industry. We will engage digital processes by using advanced computational methods and analysis tools in all stages of the design and fabrication process.

# WEAVERS
## AN ARTISANS' COLONY IN DOWNTOWN BOGOTÁ

**CORNELL UNIVERSITY DEPARTMENT OF ARCHITECTURE**
**OPTION STUDIO SPRING 2017**
**JULIAN PALACIO. VISITING CRITIC**

'The beginning of building coincides with the beginning of textiles.'
Gottfried Semper, Der Stil

This option studio will focus on Bogotá, Colombia, interrogating the agency of architecture in the context of the contemporary Latin American city. Bogotá represents a fertile laboratory for investigation as it has become in the last decades a vibrant urban environment with a population that reaches today 7.5 million people, making it the fourth largest in Latin America, and which is projected to grow to 25 million by 2038.

More specifically, the studio will explore ideas for the redevelopment of the *Centro Histórico* (Historic Downtown) through the design of an arts and crafts center for a community of artists and artisans. In doing so, the studio will test the capacity for material and spatial strategies to become catalysts for the transformation of urban areas. The project will include living, working and gallery areas as part of a much needed space for master artisans and apprentices to live, work, exhibit and interact with the public, helping to raise awareness of the important tradition of arts and crafts that has existed in the country from pre-Columbian times.

In tandem with the contextual aspects of the project, the studio will also be concerned with engaging materiality as a social and cultural project. Bogotá is known as the 'City of Brick.' The use of ceramics as one of the main construction materials dates back to the times of the colony, when adobe was produced in *chircales* in the periphery of the city, where clay was readily available. During the 20th century, industrialization brought improved manufacturing processes, increasing the aesthetic quality and performance of bricks and resulting in its extensive use as an exposed material in the facades of houses and buildings. Capitalizing on this rich knowledge of brick work traditional to Bogotá, we will investigate its relationship to the local culture through the work of a group of architects like Rogelio Salmona and Fernando Martinez-Sanabria, whose projects heavily influenced the development of Colombian architecture during the 20th century. Furthermore, the studio will research contemporary practices that are invested in a more tactical engagement with materiality and formal expression, as the manifestation of a social agenda in tune with its context. As such, we will explore the lineage of thought presented by Eladio Dieste in his inventive projects as well as his writings, which include ideas on 'rationality versus expressiveness,' and 'financial economy versus cosmic economy.'