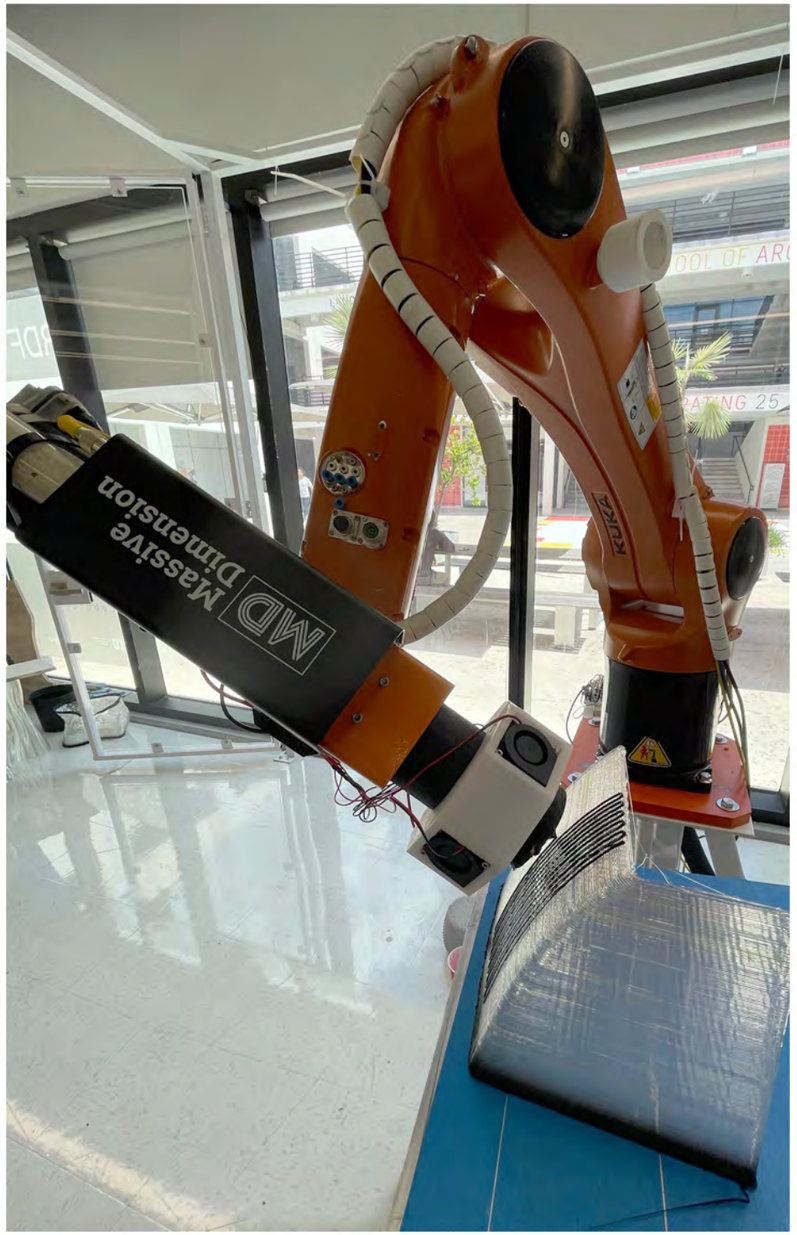
RESEARCH PORTFOLIO

Fabrication as Education

Eric Peterson, PhD
Assistant Professor
School of Architecture
University of Hawai'i at Mānoa



Education
My research in education focuses on developing transdisciplinary curriculum and pedagogy for informal educational spaces where *Learning by Doing* is the primary teaching method.

Fabrication and Technology
My research in fabrication focuses on using both traditional and emerging technologies for making objects, furniture, and building components at the scale of the human body.

EDUCATION **Technology Enhanced Curriculum**

NSF | C-ACCEL Preparing the Future AEC Workforce for Robotic Automation Processes

The Robotics Academy

FIU FLORIDA INTERNATIONAL UNIVERSITY

ABSTRACT

The NSF Convergence Accelerator supports team-based, multidisciplinary efforts that address challenges of national importance and show potential for deliverables in the near future.

The broader impact/potential benefits of this Convergence Accelerator Phase I project will address a crucial national problem by preparing the nation's workers and businesses in the Architecture, Engineering, and Construction (AEC) industries for an increasingly automated future workplace. This convergent research and development project involves researchers in architecture, construction, engineering, computer science, STEM education and economic development, as well as industry collaborators from the robotics, architecture, engineering, construction and software industries. Its Phase 1 deliverables will benefit businesses, workers and professionals in the AEC industry cluster, as well as regional and national economic development policy. Phase 1 provides the platform for critical solutions: maximizing employment opportunity, minimizing job displacement, and improving national economic competitiveness in the AEC industries. Improving AEC industry performance also promises solutions leading to a more energy efficient and sustainable built environment.

This Convergence Accelerator Phase I project will contribute to research and application of Artificial Intelligence (AI) and immersive virtual environments in education as well as examining economic impacts of automation technology adoption in the AEC industries. The rapid adoption of AI and automation promises new employment and business opportunities, but will also create job displacement and business disruption. The Project's Phase 1 research objectives are to develop 1) a prototype interactive virtual reality robotics training and educational software package, and 2) a new model to measure the economic impact of automation adoption. Phase 1 will provide a platform for an immersive virtual software to teach new skills, improve process workflows, and increase efficiency in the AEC industries. Integrating advanced technologies including Reinforcement Learning, Computer Vision, Augmented and Virtual Reality, the project will advance methods of remote and on-site training for a large segment of employees in the AEC industries. By applying STEM learning strategies, the project will contribute to understanding how people learn in technology rich environments and bridge the gap between technology advancement and application to practice. The Project's economic analysis will utilize a "bottom-up" approach to estimating the employment impacts resulting from the adoption of AI and robotics.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

ROBOTICS ACADEMY

National Science Foundation C-ACCEL

NSF#1937019, 2019-20. $973,300
NSF Convergence Accelerator Program.
Senior Personnel, Curriculum Development Team Leader.

Robotics Academy

On the Curriculum Team I worked with roboticists, designers, and Unity programmers to create an immersive learning environment to deliver robotics curriculum using game-like strategies.

Teaching Robotics with Virtual Reality

To illustrate learning about robotic anatomy and movement types we developed methods to highlight simulated industrial robots and created a position-matching game using a ghosting protocol.

EDUCATION **Technology Enhanced Curriculum**

NSF | RETTL Intelligent Immersive Environments for Learning Robotics

The Robotics Academy

FIU FLORIDA INTERNATIONAL UNIVERSITY

ABSTRACT

The global economy is being rapidly reshaped by sophisticated robots that enhance human dexterity, visual perception, speed, and strength. This intense focus on creating and implementing new automation technologies is bringing disruptive changes to job markets. In Architecture, Engineering, and Construction (AEC) industries, robotics automation is transforming jobs at a speed and scale never experienced before, leading to new demand for skilled workers in advanced technologies and robotics. Addressing the learning needs of AEC students, future professionals, and industry workers is critical for ensuring the competitiveness of a large proportion of the US workforce. Our proposal is inspired by recent technological achievements in self-adaptive, data-driven, and autonomous systems for virtual learning. These technologies bear the promise to transform education by personalization and tailoring the learning content and sequence for differences in ability, experience, and sociocultural background. Leveraging these technologies, we will research, develop, and test a personalized learning tool for delivering an industrial robotics curriculum to prepare the next generation of the AEC workforce.

We plan to achieve this goal with five educational and scientific innovations: 1) Artificial Intelligence (AI)-assisted Adaptive Intelligent Learning System 2) AI-assisted coaching, 3) Novel curriculum content and delivery in virtual reality, 4) Game-based learning user experience, and user interface and 5) AI-enabled learning analytics. The design and implementation of this project will contribute to technological advancement in AI-assisted Adaptive Intelligent Learning systems and our ability to apply state-of-the-art AI and Natural Language Processing techniques for the analysis of learning data. Advancing this frontier is critical for our ability to evaluate learner data at scale. Further, our development of AI-Assisted coaching will lead to broadly applicable advancements in intelligent tutoring systems. It includes a novel capacity to detect and identify learner failure patterns and to apply known remediation to improve learning outcomes. In addition, the design and implementation of a curriculum that dynamically changes in response to learner input, skill level, and advancement toward learning goals can bring new pedagogical approaches to curriculum development, reshaping our current practices. Finally, our project will enrich learning analytics by integrating biometric and performance data leading to a greater understanding of the learning process.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

National Science Foundation RETTL

NSF#2202610, 2021-22. $850,000

NSF Research on Emerging Technology for Teaching & Learning.

Senior Personnel, Curriculum Development Team Leader.

Intelligent Immersive Learning Environment for Robotics

On the Curriculum Team I am working with roboticists, designers, and programmers to create an immersive learning environment to deliver an expanded robotics curriculum using game-like strategies.

Control Group Testing

In year one of the project I am developing and testing curriculum while capturing baseline data about student teacher interactions in real-world training scenarios.

NSF | IUSE Augmented Learning for Environmental Robotics Technologies

The Robotics Academy

FIU FLORIDA INTERNATIONAL UNIVERSITY

EDUCATION Technology Enhanced Curriculum

ABSTRACT

Augmented Learning for Environmental Robotics Technologies (ALERT) aims to serve the national interest by developing and testing an Augmented Reality (AR) learning platform for Architecture, Engineering, and Construction (AEC) students to prepare them for working with environmental data and robotics. ALERT will be designed to address the training needs of the AEC industry, which is expected to face disruptions due to robotic automation. ALERT will leverage advancements in Artificial Intelligence (AI), AR, and information technologies to create immersive, interactive, and data driven environmental robotic learning environments. It will integrate an AI-powered intelligent learning systems with AR to collect and analyze learner performance data to customize learning experiences and improve learning outcomes. ALERT will also develop a novel interdisciplinary curriculum focusing on environmental monitoring and data visualization for sustainable building design and construction.

The project will address the need to prepare the AEC students to capture, analyze, and apply environmental data in order to reduce the impacts of human development and construction. It will also address the shortage of a skilled workforce in the AEC industry, focusing on the sustainability of the built environment. ALERT will provide a technology-rich learning experience, which will enhance students' competitiveness for future jobs. By developing and testing ALERT at Florida International University, one of the largest majority-minority student populations, the project will take advantage of a unique opportunity to create a curriculum tailored to diverse learners. Project results will be disseminated through various channels including webinars, press releases, publications, and presentations in a variety of disciplinary and interdisciplinary venues. The project team plans to utilize social media as a vehicle to communicate with interested students and educators. The NSF IUSE: EDU Program supports research and development projects to improve the effectiveness of STEM education for all students. Through its Engaged Student Learning track, the program supports the creation, exploration, and implementation of promising practices and tools.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

National Science Foundation RETTL

NSF#2315647, 2023-25. $400,000
NSF Improving Undergraduate STEM Education.
CoPI, Curriculum Development Team Leader.

Augmented Learning Environmental Robotics Technology

On the Curriculum Team I work with small robotics specialists, user experience designers, and natural language processing experts to create an augmented learning curriculum for environmental robotics.

Curriculum Prototype

I have designed a new curriculum in coordination with an AI specialist who will deploy an Intellegent Learning System (AILS) to monitor student performance and re-order lessons based on performance.

FABRICATION Additive Manufacturing

Additive Manufacturing for Nautical Design: An Automated Approach to Marine Manufacturing

Eric Peterson

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Abstract: How can additive manufacturing (AM) technology be applied to automate the production of small marine vessels? For the past 50 years small (below 40 meters) marine vessel manufacturing has been dominated by moulded fiber-reinforced plastics (FRP). There are several shortcomings to this manufacturing method that affect both the formal outcome and the manufacturing process of boats built in FRP: 1) manufacturing requires the use of expensive moulds, 2) formal geometric freedom is limited by moulds which reduce the potential for customization, and 3) special assemblies and structural reinforcements must be moulded separately and joined using a time-consuming hand lay-up process. The use of AM may reduce cost of production by eliminating need for moulds, allow greater ease of customization, and improve worker safety by limiting exposure to harmful materials and chemicals.

The purpose of this research project is to evaluate existing AM technology and assess its potential for application to small marine vessel manufacturing. The project aims to investigate new methods for generating novel AM toolpaths and demonstrate through proof of concept that it may be possible to produce the complex topological surfaces and assemblies that are common in marine vessels using multi-bias additive manufacturing (MBAM). However, AM is a broad term that describes a variety of different ways to manufacture objects. As such, AM can be applied to marine manufacturing in a variety of different ways, in different phases of the manufacturing process, and to different extents. At the same time, building boats is a complex process that presents specific problems that must be addressed in any automation solution. Several marine vessel construction projects have already been completed using AM which can serve as case studies for understanding the opportunities and challenges for applying AM to the marine sector. A review of the current state of the technology and qualitative analysis (QA) of case studies provides a set of guidelines for designing a manufacturing method that may prove effective for producing small marine vessels using AM.

The project relied on design-based research (DBR) to develop a series of experimental extruder prototypes for novel toolpath testing on excerpts from a small reference vessel. The combination of QA and DBR experimentation point to a manufacturing solution using articulated robotic manipulators and a continuous fiber thermoset plastic extruder using a modified version of the fused filament fabrication process. This kinematic solution can be extended with external linear or rotational axes and/or by mounting robotic manipulators within a large gantry. This will allow the extruder to approach the work using a wide range of orientations that will be optimal for both the geometry of marine vessels and the requirements of MBAM extrusion. Meanwhile, toolpath generation using Grasshopper and KukaPRC demonstrated a proof of concept for creating MBAM toolpaths optimized for small marine vessels. While the method proved feasible for smaller excerpts there remain significant challenges to successful deployment of this manufacturing method that can only be addressed with additional research.

Keywords: Additive Manufacturing · Robotics · Fiber-Reinforced Plastics · Toolpath Generation · Multi-Bias Printing

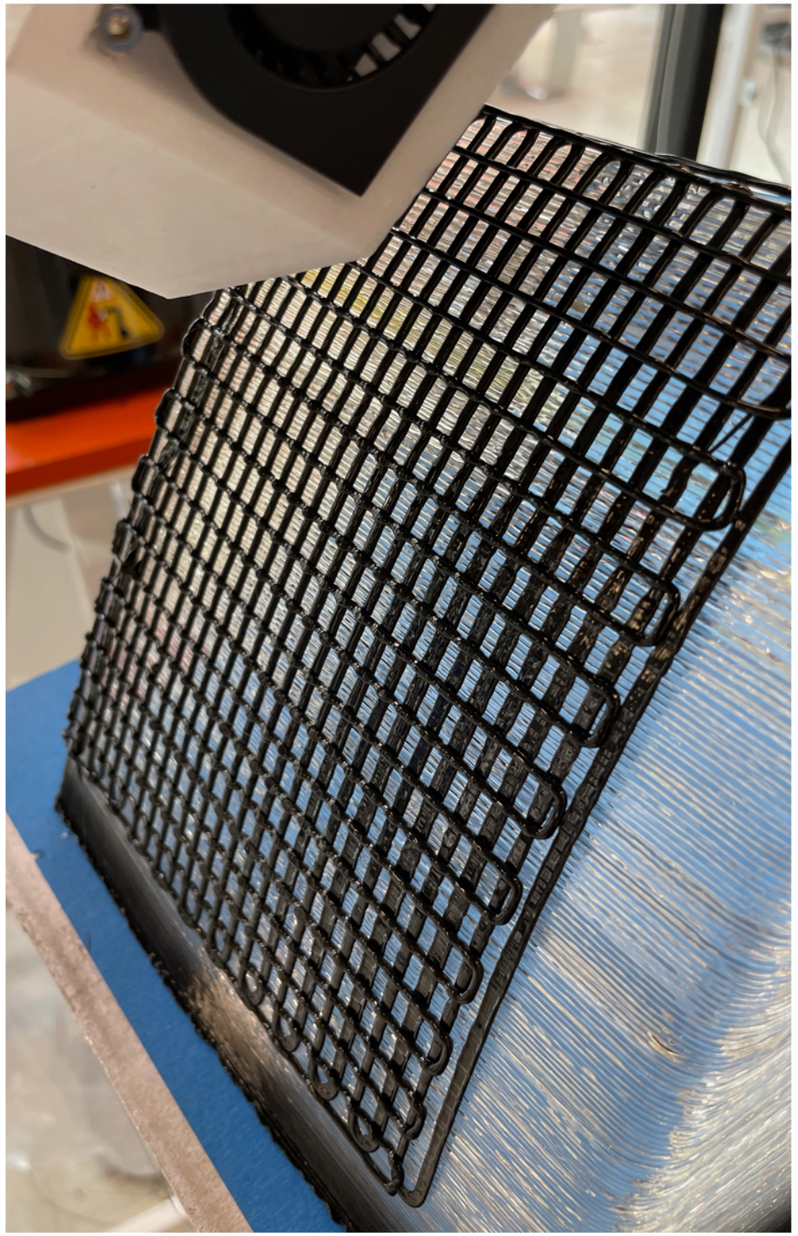
Doctoral Dissertation

PhD in Design: Università Degli Studi di Genova.
Dissertation defense December 6, 2022. An investigation of robotic multi-bias additive manufacturing for the marine sector.

Additive Manufacturing for Nautical Design
An Automated Approach to Marine Manufacturing

Research Question

How can additive manufacturing technology be applied to automate the production of marine vessels?

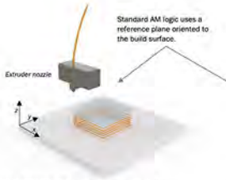


Broader Impacts

Robotic multi-bias additive manufacturing has the potential to revolutionize manufacturing across a broad range of industries including furniture, durable goods, and architectural applications.

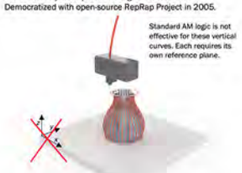
FABRICATION **Additive Manufacturing**

Fused Filament Fabrication: *(FFF)*
FFF Method. Invented in 1988.
Successive layers deposited using XY coordinates.
Democratized with open-source RepRap Project in 2005.

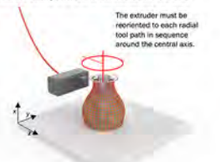


Laminar Printing: *Standard slicer software.*
FFF Method. Translates geometry into laminar toolpaths.
Profile slices are deposited using XY coordinates.
Objects are strong in XY plane but weaker in the Z axis.

Additive Manufacturing: *Common 3d Printing.*
FFF Method. Translates geometry into laminar toolpaths.
Profile slices are deposited using XY coordinates.
Easy to produce a variety of shapes and forms.



Vertical Toolpaths: *Printing curved lines vertically.*
No Standard Method. It is not possible to print vertical lines.
Continuous strands of material follow vertical contours.
Extruder will collide with geometry without a different method.



Multi-Bias Printing (MBP): *Orienting in many directions.*
MBP Method. This is the technical challenge of this research.
Continuous strands are oriented in multiple directions on surface.
Toolpaths are optimized for loading conditions of a 3d surface.

Extruder Orientation: *Stronger surfaces w/ more layers.*
MBP Method. This is a second technical research challenge.
Surfaces can be built with multiple layers to strengthen 3d form.
The extruder is re-oriented to follow the geometry of surfaces.

Case Study 1: *7' Flat-bottomed canoe.*
University of Washington Fabbers Club. 2012.
Single gantry extruded recycled thermoplastic.
Extruded HDPE manufacturing demonstration project.

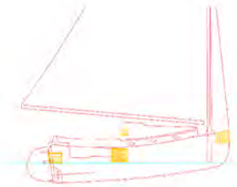
Case Study 2: *17' Tahoe open skiff.*
Thermwood Corporation. 2018.
Dual gantry Large-Scale Additive Manufacturing (LSAM).
Extruded thermoplastic CNC milled plug mould.

Case Study 3: *25' Catamaran demonstration project*
Oak Ridge National Laboratory MFD. 2019.
Single gantry BAAM with 6-axis robotic mill.
Extruded thermoplastic and finish-milled cavity mould.

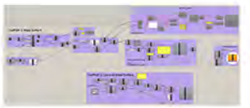
Case Study 4: *25' 3Dirigo*
U. Maine Advanced Structures & Composites Center. 2019.
Single gantry wide bead thermoplastic composite extruder.
Extruded thermoplastic deep vee patrol boat.

Case Study 5: *21' Livrea 6.50 racing yacht.*
Livrea Yachts, OCORE. 2018.
Thin-bead thermoplastic core with carbon fiber hand lay-up.
Extruded thermoplastic transatlantic racing yacht.

Case Study 6: *21' MAMBO motorboat.*
Politecnico di Milano, MOI Composites. 2020.
Robotic arm CFM with FRP hand lay-up.
Extruded continuous glass FRP motorized catamaran.



Reference Parts: *Secret/Menger/Thomcat 23' catboat.*
Test Assemblies: Excerpts from the hull tested for AM.
Additive Manufacturing using novel multi-bias tool paths.
3D model created in Rhino 7 from original drawings.



Simulation
KukaPRC. Grasshopper plug-in for simulating Kuka robots.
Association for Robots in Architecture.
Visual scripting software for robotic movement programming.

Assembly Testing
MD2: Extruder with manual switch panel.
Tool path 1 laminar 1mm vertical offset parallel to World XY.
Curved tool path perpendicular to surface curve normals.

Open Area Single Gantry System
University of Maine. Ingersoll-Rand.
Open build area with a single end effector.
Wide bead extruder on a 4-axis actuator.

Dual Gantry Systems
Thermwood Corporation. LSAM.
Enclosed system with two end effectors for two-stage process.
Wide bead extruder with a 4-axis CNC mill.

Robotic Manipulator Systems
OCORE. Kuka Robotics.
Single end effector mounted on a robotic arm.
Single narrow bead extruder on 6-axis manipulator.

Parallel Robot
Six Degrees of Freedom.
Limited workspace.
Used for high resolution prototyping fine positioning.

Linear Robot
Cartesian Coordinate System.
Limited workspace, modular, expandable.
Used for moderate to heavy payloads.

Gantry Robot
Cartesian Coordinate System.
Heavy-duty, modular, expandable.
Used for heavy payloads.

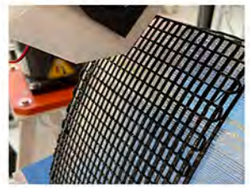
Cylindrical Robot
Radial Coordinate System.
Limited workspace, heavy-duty.
Used for material handling and simple repetitive operations.

SCARA Robot
Radial Coordinate System.
Moderate workspace.
Used for material handling and simple repetitive operations.

6-Axis Robotic Arm
Six Degrees of Freedom.
Moderate workspace and payload.
Used for high-dexterity operations.

Assembly Testing
MDPE2: Extruder with manual switch panel and Pointloader.
Toolpath 1 laminar 1mm vertical offset parallel to World XY.
Toolpath follows standard 3d printing logic.

Assembly Testing
MDPE2: Extruder with manual switch panel and Pointloader.
Toolpath 2 vertical curves perpendicular to surface normals.
Demonstrates MBAM logic for solid multi-layer surfaces (hull).



Assembly Testing
MDPE2: Extruder with manual switch panel and Pointloader.
Toolpath 2 and 3 trace grid-core pattern for sandwich assembly.
Demonstrates MBAM applied to typical marine construction.

Limitations of Laminar 3D Printing

Typical slicer software resolves a 3D object as a series of horizontal layers that are printed successively, relying on material bonds between layers that are not always optimized for loading conditions.

Limitations of Gantry Kinematics

Gantries are ideal for laminar printing because they approach work from the top, but they are limited in their ability to reorient to approach work from other directions.

Robotic Multi-Bias Additive Manufacturing

This method reorients the extruder nozzle to approach work from any direction and deposit materials along toolpaths that can be optimized for loading conditions.

EDUCATION **Fabrication as Pedagogy**

PALLETCRAFT

Courses
PalletCraft grew out of a series of interdisciplinary Furniture Design courses offered by the Department of Interior Design offered to students in the School of Architecture.

Exhibition
An exhibit at the Coral Gables Museum displayed three years of student furniture projects built from recycled pallet wood using our material reclamation method.

Sponsorship
WholeFoods Marketplace sponsored our exhibiton and commissioned several tables. Proceeds supported a Graduate Teaching Assistant for the Fabrication Lab.

PALLETCRAFT

EDUCATION **Fabrication as Pedagogy**

Over a period of three years, Eric Peterson has worked with students at Florida International University School of Architecture building furniture and researching the material potential of shipping pallets. This exhibition is both a retrospective of this work and an invitation for us to reconsider how we value humble materials.

Shipping pallets are made in many different countries and are used to transport consumer products, foods, and raw materials around the globe. Pallets change hands, travel across oceans and continents, are damaged and repaired multiple times over their useful life-cycle. These ubiquitous devices play a fundamental role in supporting our consumer culture and yet go largely unnoticed in our daily lives.

The furniture and architectural material prototypes displayed in this exhibit dispense with the notion of a predetermined material nobility. Wood from shipping pallets is investigated for its potential properties as cladding, surface, structure, or spatial modulator. Through the investment of human labor, Palletcraft exposes the hidden qualities of an overlooked material resource and asks us to reconsider the ramifications of our participation in global material and product transportation networks.

November 1 - December 1, 2013
Anthony R. Abraham Family Gallery

Events:
Lecture by curator Eric Peterson on sustainable furniture and product design
Tuesday, Nov. 5, 7pm

Designers Walkthrough and Public Reception sponsored by Whole Foods
Tuesday, Nov. 26, 7pm

CORAL GABLES MUSEUM

CORAL GABLES MUSEUM | 285 Aragon Avenue | Coral Gables, FL, 33134 | 305-603-8067 | coralgablesmuseum.org
Located at the corner of Salzedo Street and Aragon Avenue in the heart of the City Beautiful. Open Tuesday through Sunday.

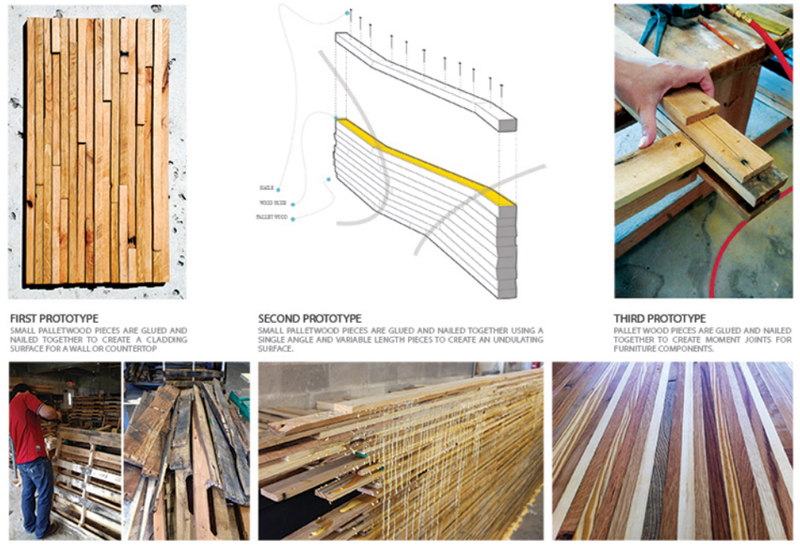
A special thank you to our sponsors:

FIU Architecture + The Arts
Florida International University

Whole Foods Market

PALLETCRAFT

PALLETCRAFT WOOD RECLAMATION SYSTEM



Sustainable Furniture and Product Design
Global shipping has transformed furniture and product manufacturing from largely regional industries into an international enterprise dominated by flat-packed fast-furniture.

PalletCraft Pedagogy
Students learned about the global shipping industry and were encouraged, individually or in groups, to design and build a piece of furniture offering a critique of 21st Century consumerism.

Pallet Craft System
Palletcraft treats shipping pallets as a raw material that need to be milled and processed like any other forestry product before being used for making furniture.

EDUCATION **Fabrication as Pedagogy**

Eric Peterson
Ass. Teaching Professor

As Design Instructor and Manager of the School of Architecture Fabrication Lab, Eric Peterson is in the unique position of being able to work with students both designing and making furniture. For the past 4 years he has worked with over 50 students designing and making furniture using recycled shipping pallets donated by a local grocery store distributor. Currently, his students are working on a large community table and an exterior bench for Whole Foods Market Cafe in South Beach.

Eric Peterson has collaborated with nearly every professor in the department, helping to design, develop, and build models, prototypes, installations, and furniture pieces. He is currently working on a large urban model of the cities of Miami and Miami Beach for an exhibition on Sea Level Rise.

PALLETCRAFT

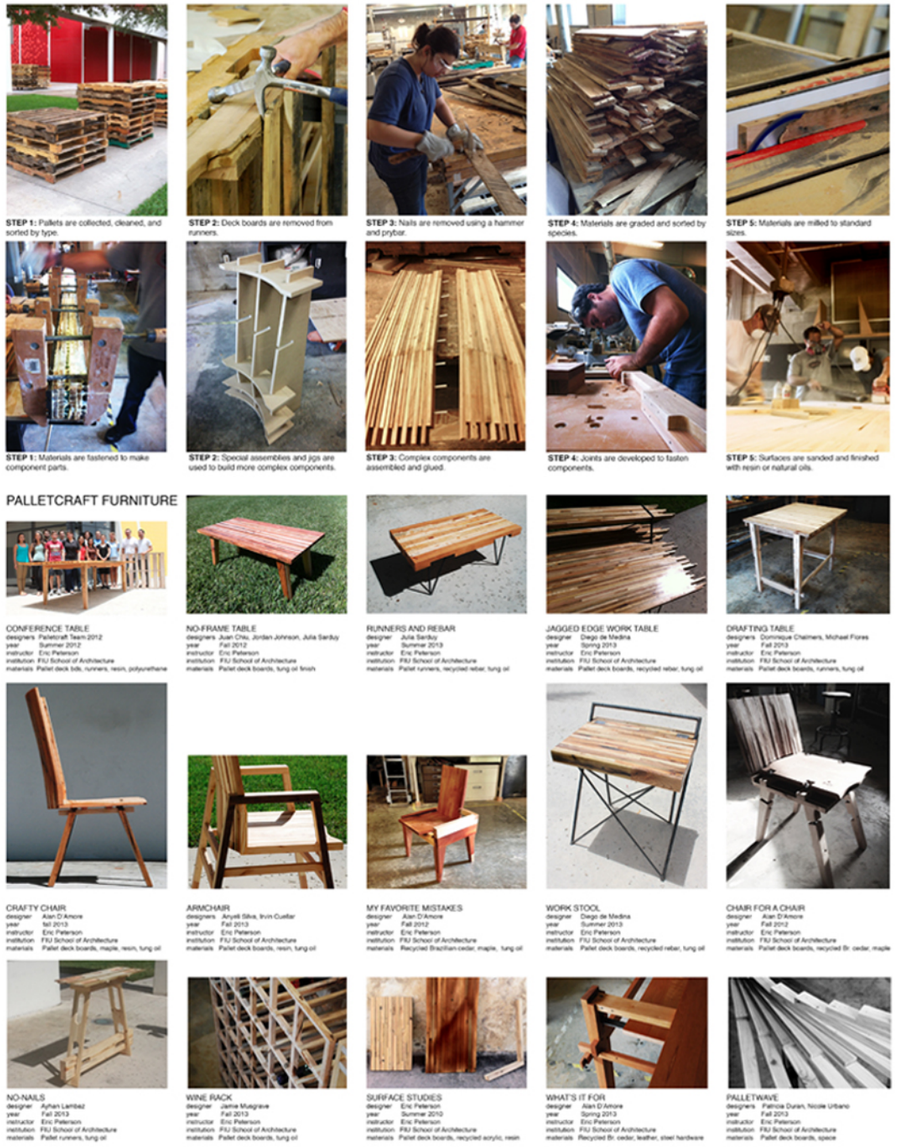
The production of shipping pallets is the single largest consumer of solid wood in the United States. It is estimated that there are between 1.2 and 2 billion shipping pallets in circulation. That is the equivalent of six shipping pallets for every citizen in the country. We produce 1.37 million new shipping pallets every day to continually replace worn and damaged shipping pallets resulting in 16 new shipping pallets produced every second!

Palletcraft questions our culture of consumption and our reliance on long-distance transportation networks. By using national and international shipping to deliver goods and products that can often be produced locally, we spend valuable resources on moving the things we consume from all around the globe. At the same time, we inhibit our own local economy from growing and sustaining itself through local production and local distribution of durable goods and consumables.

By building hand-crafted furniture from the very infrastructure that literally supports produce in these shipping networks, Palletcraft attempts to draw attention to our own habits and patterns of consumption. Each furniture piece, painstakingly made, demonstrates the value of the humble materials from which it is made and compels us to appreciate the effort and skill of emerging local furniture designers and furniture makers.

FIU Architecture
COLLEGE OF ARCHITECTURE + THE ARTS

PALLETCRAFT



PalletCraft Aesthetic

Unlike much of the palletwood furniture popular a decade ago, the PalletCraft system using pallets as a raw material, leads to furniture that is not tied to the formal and tectonic qualities of shipping pallets.

Collective Projects as Curriculum

Over time, the curriculum for furniture design course shifted from individual, self-funded projects to collective projects supporting local environmental initiatives and scholarship opportunities.

Making Furniture Designers

Several students from my furniture courses have gone on to launch successful careers in furniture design, architectural millwork, fabrication, and contracting.

FABRICATION **Fabrication as Pedagogy**

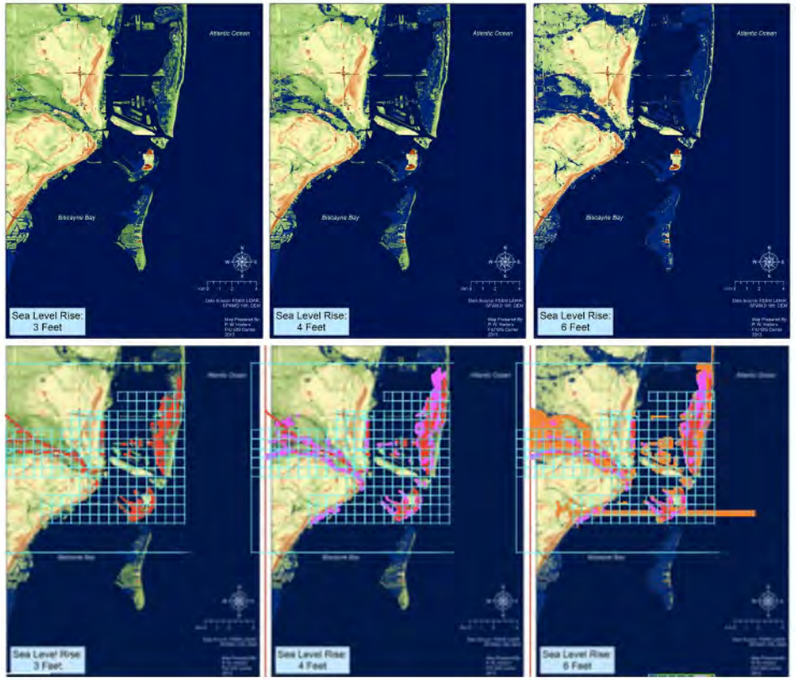
MIAMI 2100 Exhibition

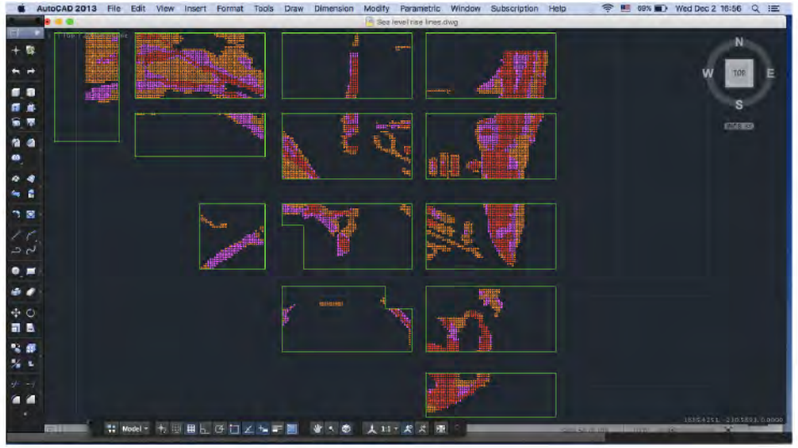
Sea Level Rise Exhibition
As exhibition designer and fabricator I worked with faculty in Architecture and Landscape Architecture to design and mount a show at the Coral Gables Museum.

Sea Level Rise Model
The centerpiece of the exhibit was a large interactive model that depicted areas of flooding due to sea level rise in Miami and Miami Beach using over 6000 LED lights.

Fabrication
The model was built on a shoestring budget with a small team of students in a course on exhibition design. The project used 3D printing, laser cutting, CNC milling, carpentry, and electronics.

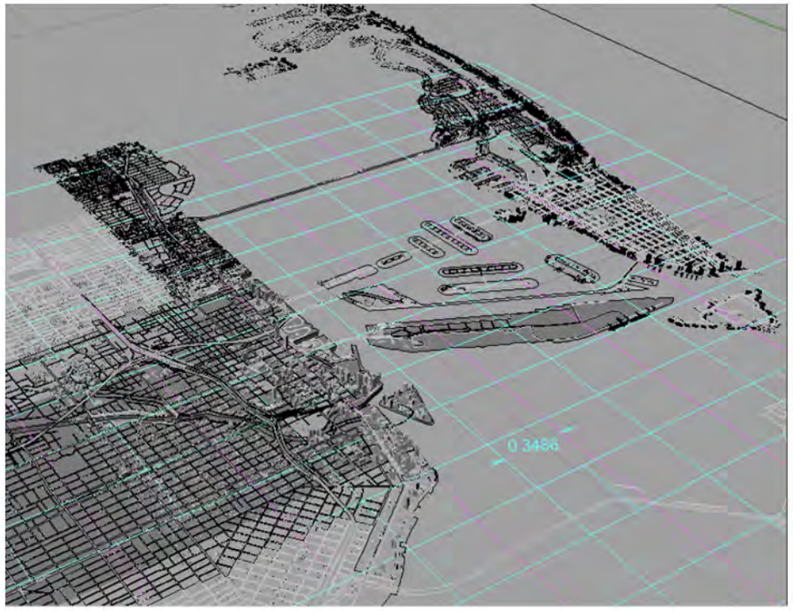
FABRICATION **Fabrication as Pedagogy**

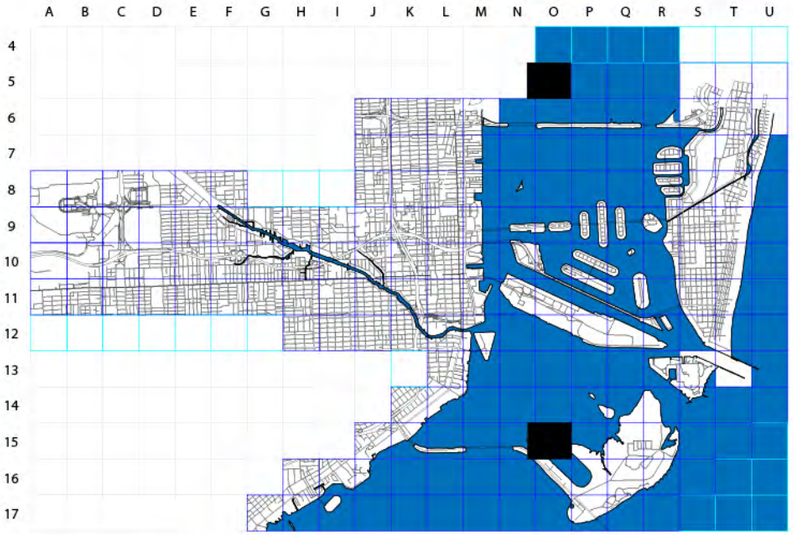




Fabricating the Miami Sea Level Rise Model

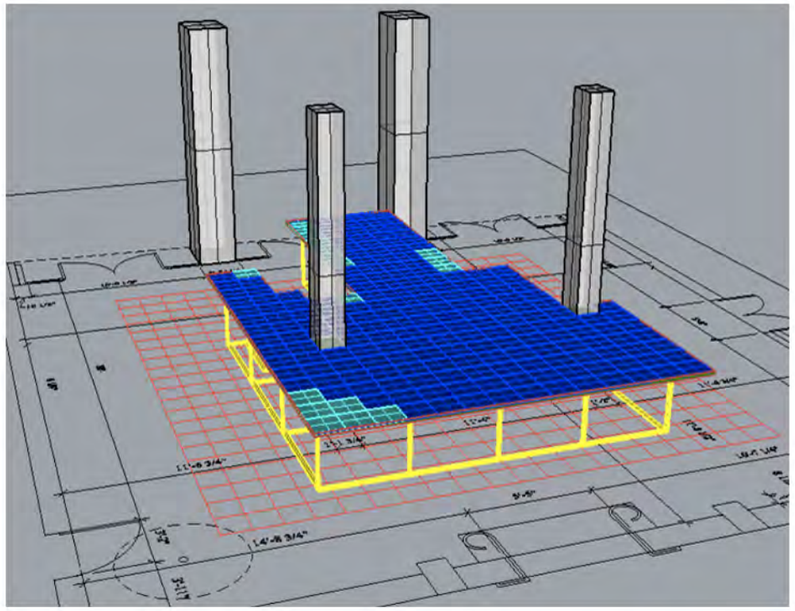
Using LIDAR maps describing low lying urban areas adjacent to Biscayne Bay and the Miami River we developed a gridded area of operation to record flooding at 3′, 4′, and 6′ of sea level rise.

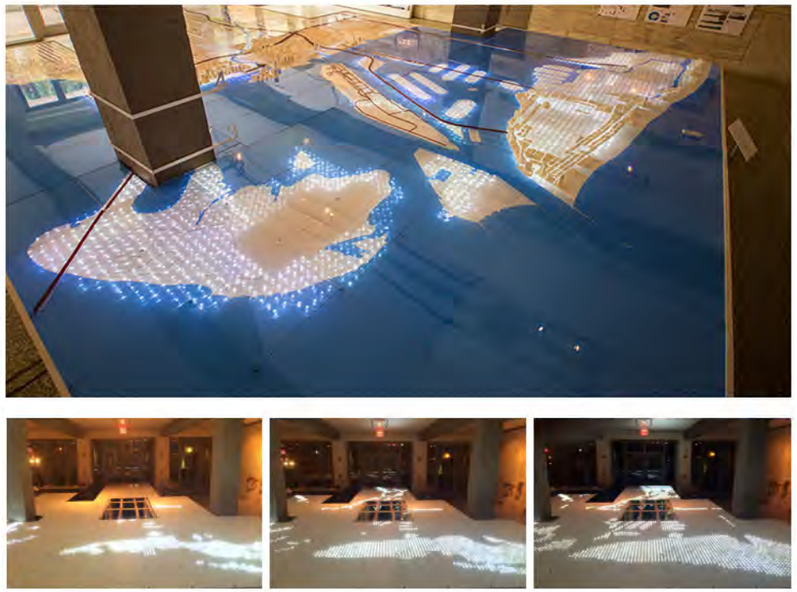




Comprehensive 3D Model

With available models and aerial photographs we built a comprehensive 3D model of the area, including every block with multistory buildings, and prepared them for 3D printing.

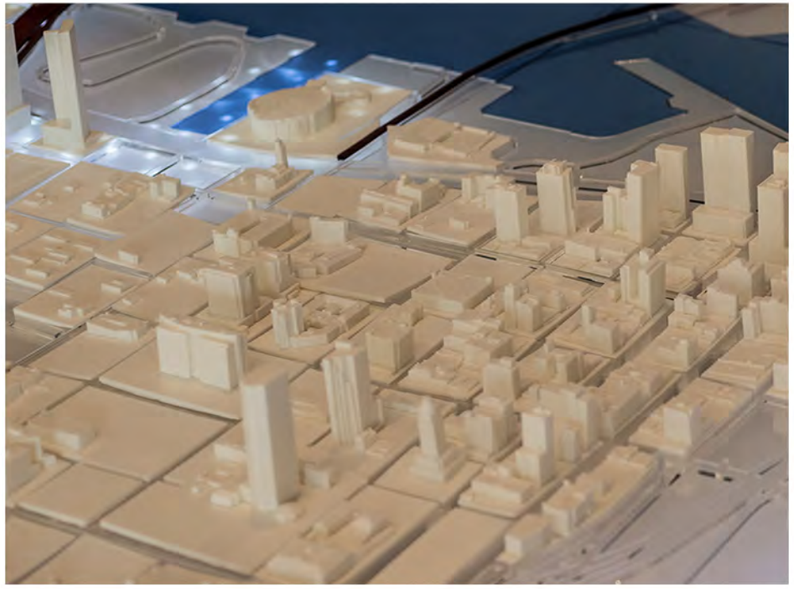




Using Light to Depict Flooding

We milled sheets with three types of distinctive holes for LED lights creating separate switched circuits to show areas of flooding in several sea level rise scenarios.

FABRICATION **Fabrication as Pedagogy**



Exhibition Build-Out
The exhibition design included custom-built display furniture, partition walls, a video display room, an interactive projection-mapped display, laser-cut signage, and printed panels.

Sea Level Rise Timeline
An infographic timeline of the history of Miami in relation to marine systems was designed and developed in tandem with a student graphic design team and the student fabrication team.

Projection Mapping
Using standard low-cost projectors, we adapted graphic maps for projection overlay on a lasercut world map to highlight sea level rise issues in other regions of the world.

FABRICATION **Design / Build as Pedagogy**

Day exterior photos. Visiting Tours, Washington D.C., 2011. FIU Team
Fotos exteriores de día. Recorridos de visitantes, Washington D.C., 2011. Equipo FIU

SOLAR DECATHLON

U.S. Department of Energy
Solar Decathlon, 2011.
U.S. Department of Energy applied research in sustainable building.
Senior Personnel, Interior Fabrication Team Leader.

Interiors Team
I worked with an interdisciplinary team of six students building the interior cabinetry core in the fabrication lab. Once each portion was completed it was disassembled and installed in the building module.

Design / Build Pedagogy
Students learned about the design of their building by assembling it with professional builders. The Interiors Team learned about the design of cabinetry and finish detailing in the fabrication process.

Interior photo at the competition site, 2011. Jim Tetro/ U.S. Department of Energy Solar Decathlon
Foto del interior en el lugar del concurso, 2011. Jim Tetro/ Departamento de Energia Decatlón Solar de U.S.

Interior Design
Students produced detailed drawings and specifications typical for a professional project. Assembling the finished product allowed them to understand the role and limits of their drawings and specifications.

Interior Sponsorship
All of the building materials and components were sponsored by IKEA, presenting specific challenges for fabricating with prefinished ultra-thin, high-gloss plastic laminates.

Customized Casework
Building with low-cost modular casework (that was donated after the interior was fully designed) required that nearly every cabinet be individually customized.

Interior photo at the competition site, 2011. Jim Tetro/ U.S. Department of Energy Solar Decathlon
Foto del interior en el lugar del concurso, 2011. Jim Tetro/ Departamento de Energia Decatlón Solar de U.S.

Competition in Washington D.C.
I traveled with the team to prepare for the competition. I worked with a team of over 30 students setting the building modules and deck panels and completing the interior finish work.

Interior Core Design
Typical modular construction avoids cabinetry spanning module joints. This project required two field-installed spanning panels with adjustable living room cabinets to negotiate module joint variability.

Custom Murphy Bed
The interiors team designed and built a custom Murphy bed with a drop leaf desk that can be opened when the bed is in the closed position.

EDUCATION Interdisciplinary Design Curriculum

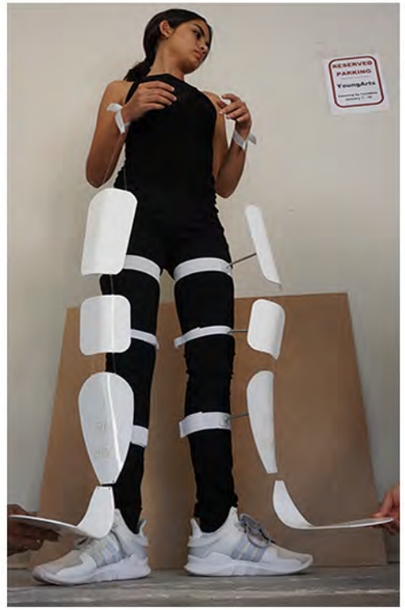
NATIONAL YOUNGARTS FOUNDATION

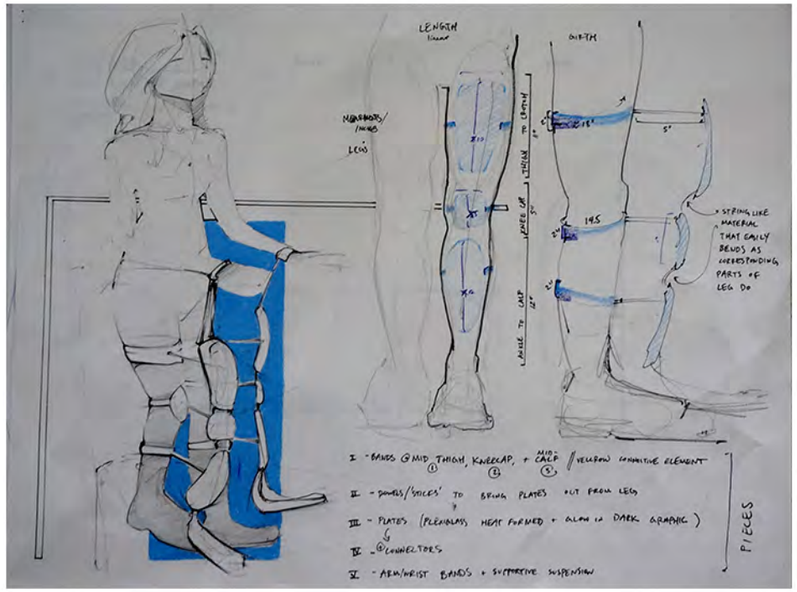
National YoungArts Foundation
In 2014 I was invited to develop and teach a new intersisciplinary Design Arts curriculum for one of the premier arts education organizations in the country supporting gifted highschool artists.

Discipline Coordinator
In my three-year tenure as discipline coordinator I wrote curriculum, secured guest lecturers, organized office visits and field trips, currated and hung exhibitions, and managed design charettes.

Master Teacher
As a Master Teacher I led classes in design concept development for students in architecture, industrial design, fashion, furniture, and theatrical costume and set design.

EDUCATION Interdisciplinary Design Curriculum



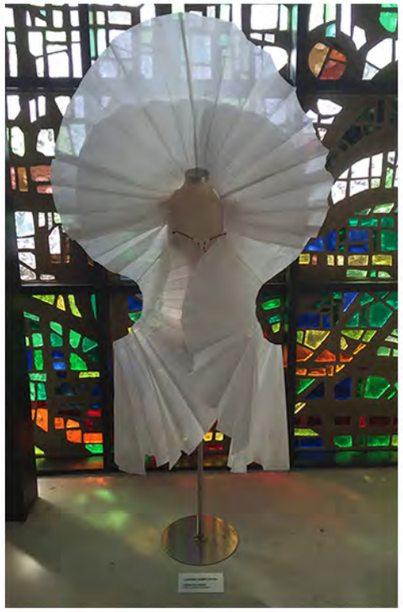


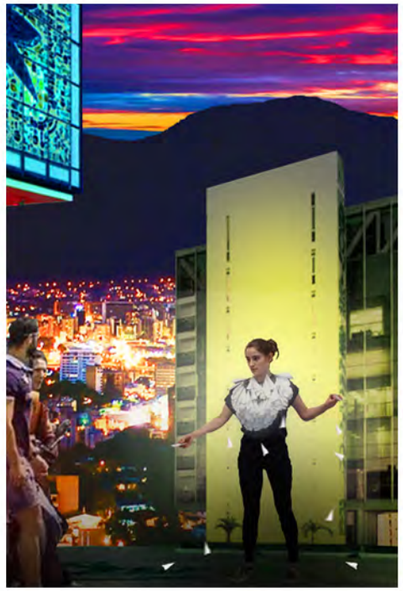
Design Charette
I worked with a team to manage a design charette that focused on architectural installations, designed objects, architecture of the body, and fashion design.

Exhibition
For the annual exhibition I directed a team of graduate students to work with YoungArts participants creating a rendered vsiualization of their design project using a dramatic visual theme.

Fashion Show
As participants skewed more toward fashion design we staged annual design / fashion shows to unveil and display each participant's project in a performance.

EDUCATION Interdisciplinary Design Curriculum





Interdisciplinary Designers
As exceptionally talented highschool students, YoungArts participants worked in multiple disciplines. The charette team included an object designer, a fashion designer, and an architectural designer.

Fabrication Specialist
As a design charette coordinator I was responsible for sourcing art and fabrication materials, equipment such as laser cutters and 3D printers, and providing tools and fabrication expertise for the team.

US Presidential Scholar In the Arts
I was part of a team recommending participants for monetary scholarships and the US Presidential Scholar in the Arts Program: the most prestigious national award for highschool artists.