Portfolio

Troy Robert Nachtigall

“Clothes mean nothing until someone lives in them.”

-Marc Jacobs

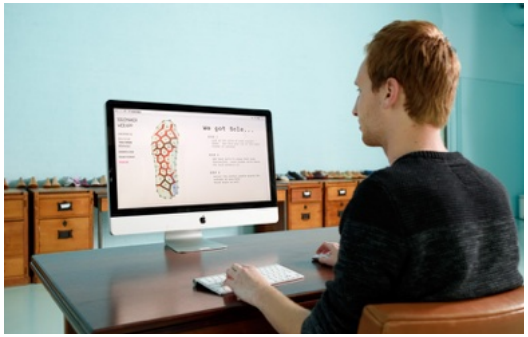
Solemaker

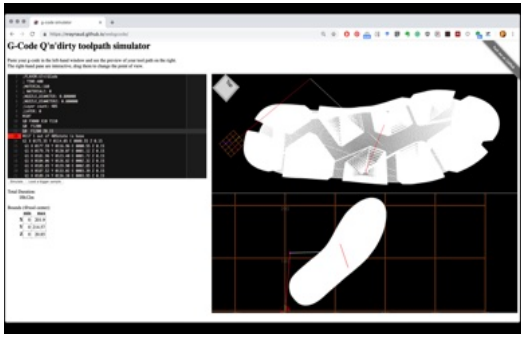
2016 - 2018

with Loe Feijs, Admar Schoonen, Bart Pruijmboom, Eva Klabalova, Henry Lin, Erwin Hoogerwoord, Fiore Basile, Rueben Lekkerkerker, Nik van Sleeuen, Sigridur Helga Hauksdottir, and Maximillian Morres

MATH DATA & COMPUTING, TECHNOLOGY & MAKING , WEARER & SOCIETY, SOCIAL & COMMUNICATION, DESIGN & RESEARCH PROCESS

Over many years and with several stakeholders, a software product service system was created to make shoes with user data. In an artisan shoe system, the shoemaker constructs a sole from a base pattern piece or patterns specifically drafted to the wearer's foot. Industrial shoe making starts with a last in a size EU39. CAD/CAM software or manual methods are used to model the sole from a shoe last. All other sizes are graded from the median EU39. In Solemaker.pde the shape of the individual foot is entered into the UI. The tread pattern is created by a stakeholder with the help of templates as needed. The sole is then generated to .gcode and printed using a Prusa or Ultimaker compatible printer. Solemaker.pde was designed to explore manufacturing and materialization in a UPPS system. Solemaker.pde was created to prove that mathematical formulas could generate gCode. gCode was to be generated and tested on different FDM 3D printers capable of printing in flexible filaments. The project aimed to allow shoes to be manufactured anywhere. Instead of injection molding, a person could print the sole themselves, or send it to a print service. Key to this process was understanding how to do distributed production. Solemaker.pde gave control over the gCode generation (slicer) process to be able to program not only the form but also the behavior of the material. This work was published at ISWC 2017 (Design Exhibition Award), RTD 2019 and CHI 2019. It has been features in many exhibitions.





Ahti

2016

with Angella Mackey, Vidmina Stasiulyte, Mila Svectarova and Marion Bernin

TECHNOLOGY & MAKING , WEARER & SOCIETY, SOCIAL & COMMUNICATION, DESIGN & RESEARCH PROCESS

Ahti was a speculative film created as a transdisciplinary project between hard scientists and artists working on the body. The project looks of the ramifications of resource deprivation and non sustainable. The film speculates on the role that textiles will play in a future where resources such as water must be harvested from comets in the solar system.

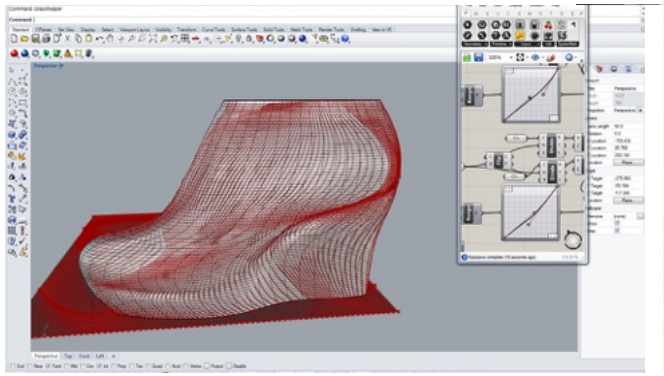
Project J

2015

with Pauline van Dongen, Leonie Tenthof van Norden

MATH DATA & COMPUTING, TECHNOLOGY & MAKING , WEARER & SOCIETY, SOCIAL & COMMUNICATION, DESIGN & RESEARCH PROCESS

Sometimes it's the data driven product that explores information technology in a new way. Minister of Science Education and Innovation Jet Bussemaker asked us if we would make her complete outfit for the Prinsjesdag event. Working as a highly complex collaborative team Pauline, Leonie and I were able to use 3D Body scanning along with generative 3-D modeling to create a complete look. My primary concentration was the shoes which use the concepts of programming matter and smart geometries to not only support the minister but guide her foot in a correct walking path. This project used user focused parametric design to go beyond physical fit and move into areas such as kinetic fit social fit and behavioral fit. Information technology was used to create a shoe specifically for the minister her body and her feet. We used the physical scan along with Kinetic movement to model the rigidity and softness of the material to provide a supportive, yet dynamically springy walking experience. I considered the project success when the minister told us moments before going to the event that she felt that we hadn't made an outfit for her, but that we had made an outfit together.

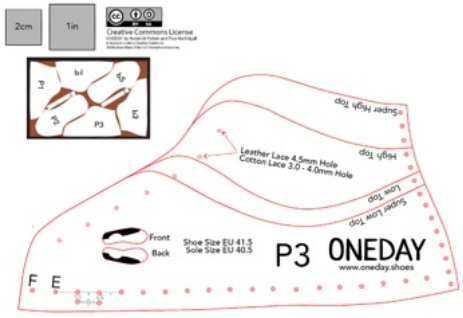


ONEDAY Shoes

2015 - 2018

with Roderick Pieters

BUSINESS AND ENTREPRENEURSHIP, WEARER & SOCIETY, SELF DIRECTED & CONTINUOUS LEARNING, SOCIAL & COMMUNICATION,



ONEDAY is a generative co-design toolkit that allows everyone from novice to expert. Created as an experiment in Crowdfunding as a business model, the ONEDAY shoe kit is a make your own sneaker kit that is simple to make, yet easy to modify and customize. Three separate levels of kit were offered at varying price levels ranging from 35€ to 185€.

We offered a pattern that contained four different styles of sneakers ranging from Super Low to Super High Tops. Instructions on how to modify the sneakers in many ways were also offered along with the assembly instructions

Demographic analytics were used to gauge not only the level of kit provided, but also as a gauge to measure the amount of Co-Manufacturing and Co-Design desired by the maker scene when looking at sneakers. Social Media engagement and questionnaires were critical in evaluating if the user made the design we created or modified it to be one of there own.

ONEDAY was created as an Open-Source project. To date it has been used by more than 400 people worldwide. It has also been directly used to launch two shoe brands, two shoe toolkits, two academic papers and is a fundamental part of a homeless shelters rehabilitation plan in California.

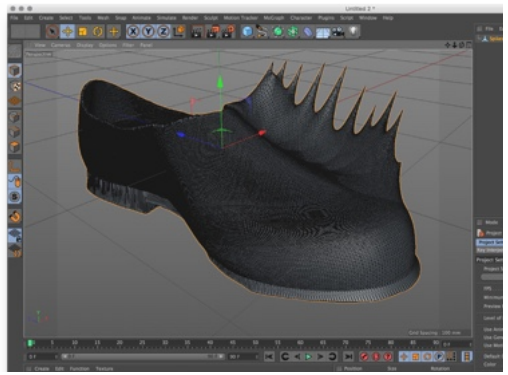
Spike Shoes

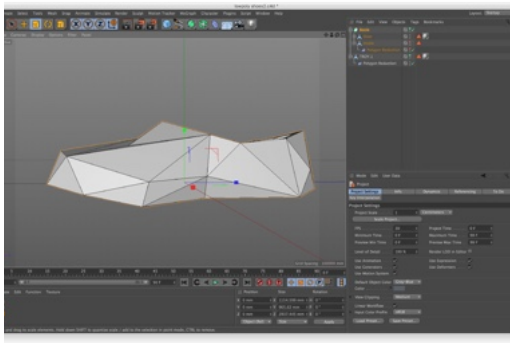
2015

with SLEM, Autodesk Shoes and Recreus

SOCIAL & COMMUNICATION, CREATIVITY & AESTHETICS, TECHNOLOGY & MAKING, DESIGN & RESEARCH PROCESS

There is often a cognitive dissonance between what a user does in a shoe versus what the shoe was designed for. Many people wear tennis shoes although they do not play tennis. The difficulty being that tennis shoes are designed to the movements needed in a tennis match and are not adapt to walking long distances. In this project we wanted to create a shoe that presented a certain physical appearance (social fit) while performing for a different social need (behavioral fit). While working with SLEM we partnered with Autodesk Footwear and later material manufacturer Recreus to create soft and comfortable. We started with a training at Autodesk Footwear in Brighton, UK where we evaluated the possibilities of designing 3D shoes using the exsisting Crispin software suite. From there we traveled to Elda Spain to work with Recreus to print the shoes in their TPE Fila Flex. Using advanced slicing techniques we were able to control the density of material to make a shoe that is correct to the specific use of the wearer. These shoes went viral as one of the first fully 3D printed shoes for women. They were designed based on the scans of feet and the spikes were initially devised as a test of how much material could self-support at an angle, but it led to a very successful aesthetic aspect that shows how 3D printing can change the expected aesthetics of footwear as it is no longer constricted by traditional construction techniques. The result is a shoe that appears artistic, but is adept at walking long distances.





Origami 3D Shoes

2015

with SLEM

SELF DIRECTED & CONTINUOUS LEARNING, CREATIVITY & AESTHETICS, TECHNOLOGY & MAKING, DESIGN & RESEARCH PROCESS,

Often in design, it is the combination of Form and Material that create the function of the object. After a week long workshop and many expert consultations with Mike Friton, lead shoe designer at Nike, Troy created a shoe that changes it's shape while being worn. Mike Friton has spent a career designing with the biomechanics of feet in their relationship with shoes. Analyzing the changing of the foot in locomotion lead Mike to develop new ideas about how shoes should work to keep feet healthy not only on the near scale, but over a lifetime. This shoe was meant as an initial exploration to express many of the ideas discussed. The use of the TPE material FilaFlex allowed for dynamic flexible geometries that aid the foot in its need for flexibility.

Conductive Spinning Frame

2015

with Fab Academy

TECHNOLOGY & MAKING, MATH DATA & COMPUTING

Troy graduated in July from the Fab Academy course in Digital Fabrication. Know as the 'How to make almost anything course' it is meant as a certification from MIT and the Waag Society in how to effectively design internet enabled objects on all of the digital fabrication tools available in a certified Fab Lab. The fifteen week long, 35 hour a week course covers 2D Digital Drawing, Laser cutting/etching, 3D Scanning/Modeling/Printing, Electronics Design (Eagle Cad and others), Atmel Programming, Electronic Board Manufacturing, Embeded Programming (C++ programing for microcontrollers and other languages), 2 Axis Milling, 3 Axis Milling, Electronic Input/Output Device creation, Composites, Network Communication protocols, Python, HTML, Markdown, Subversion Control, Web Applications for Embeded devices, Machine Building, Copyright, Documentation and Project Management.

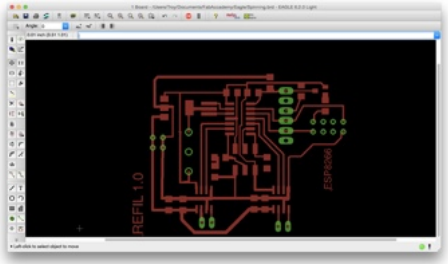
Complete documentation of the process can be found at http://fabacademy.org/archives/2015/eu/students/nachtigall.troy_robert/index.html.

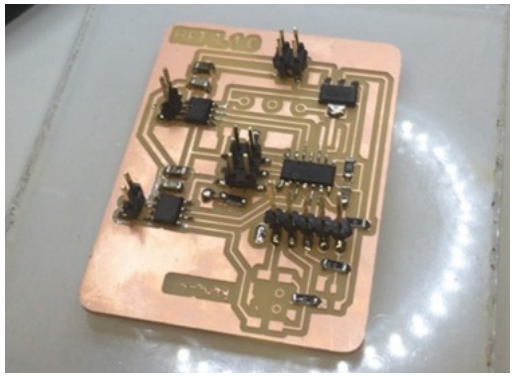
Conductive Spinning Frame

Spun Fibers
Ply Yarns
'S' or 'Z' Configurations
Stepper Twist Control
Web Interface

Troy Nachtigall

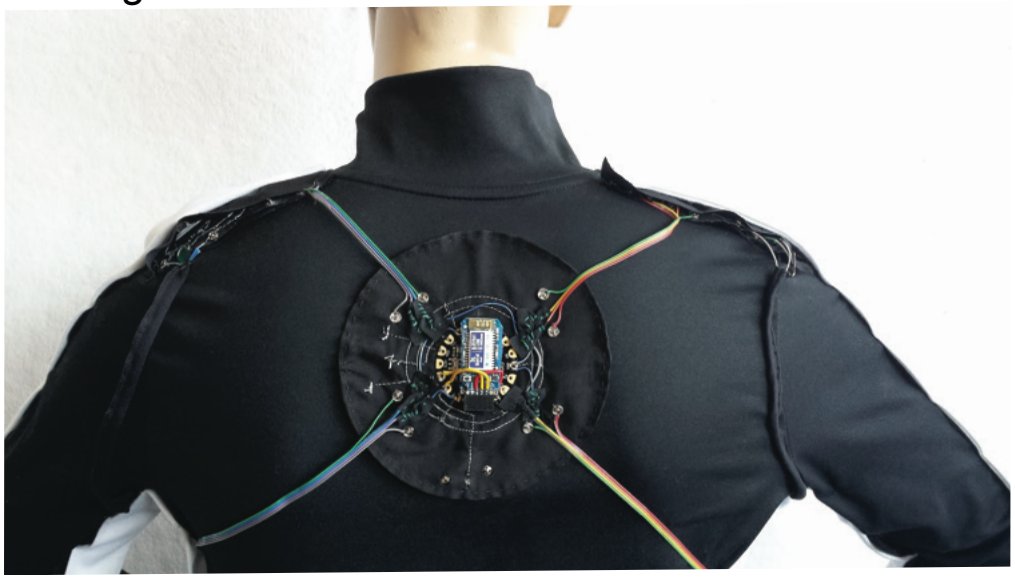
FABLAB CASCINA





WearIT

International Symposium on Wearable Computers
Design Exhibition and Wearables Showcase



September 18th - October 24th

Microsoft Research Building 99

WearIT

2014

with Microsoft Studio 99, Asta Rosway

SOCIAL & COMMUNICATION, DESIGN & RESEARCH PROCESS

I was asked to curate the “Wear IT“ exhibition wearables exhibition immediately proceeding ISWC 2014. Along with the work of the ISWC design exhibition finalists, we brought together pieces from wearable technology legends like Maggie Orth and Sara Taylor together in the exhibition Space of Microsoft Studio 99. In curating an event of highly specialized design artifacts for a highly gifted audience particular attention had to be paid to layout and significance.

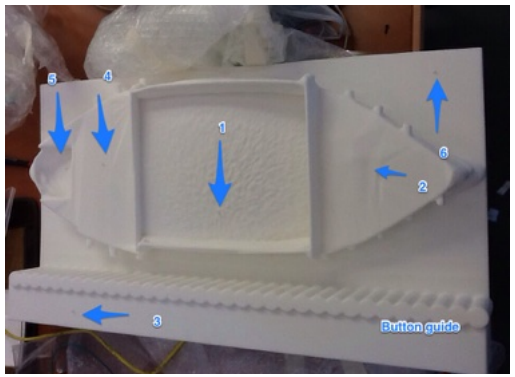
This project represents a moment of research and design thinking that brought together the young and interesting researchers of today with seminal wearable designers of the past in a highly engaging context.

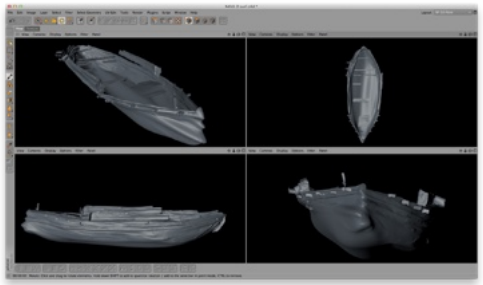
Navi per Tutti

2014

with Paola Puma, Le Nave Antiche Museum, University of Florence Architecture Dept.

WEARER & SOCIETY, SOCIAL & COMMUNICATION,
TECHNOLOGY & MAKING



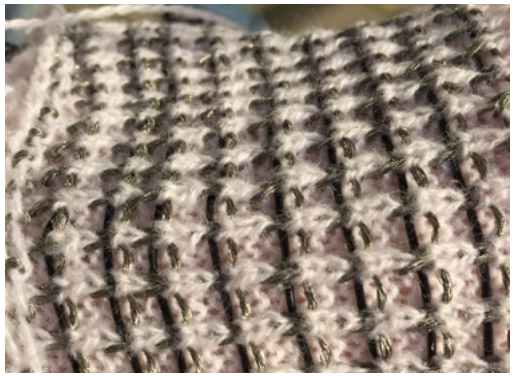


The University of Florence Architecture Department asked for my help in 2011 to create an interactive system for deaf and blind visitors to the Museum. Dr. Paola Puma and I can up with the idea to 3D print the ships in large format (70 x / 40 y / 20 z cm) Touch sensors we added to the boat so that when the hand passed over the small haptic sensor a multimedia video would be played. This video was didactic in nature and created to impact people with varying kinds of disabilities. While we intended to use capacitive sensors or textile pressure sensors under the base, interviews with blind and deaf users revealed that they preferred a physical and haptic button instead of the other options as it helped their perception of the object they were interacting with.

This complicated things quite a bit and by the end of the project I not only created a Raspberry Pi based interactive system, but also 3D modeled both boats from highly dense point cloud data. This was a large moment of personal growth as previously I had done 3D scanning and 3D modeling, but never before had I brought them together in such and intricate way.

This project took three years to complete that to the complicated nature of working with public museums in Italy. In the beginning I had no intention of modeling the boats but doing so helped to ensure a perfect user experience for a plethora of users.

http://www.navidipisa.it/



Power Generating Textile

2013

with Zoe Ramona, Meg Grant

TECHNOLOGY & MAKING, MATH DATA & COMPUTING

Using a commercially available Konstatan yarn that is traditionally used in costume decoration we were able to create a power generating textile that uses the temperature differential between the body heat of the wearer and the external environment thanks to the Seebeck Effect. At the same time the textile can be used as a Peltier element by using an H-Bridge to reverse the power flow. We demonstrated that we can monitor the amount of excess heat generated by athletes which is important due to the fact that performance is decreased by 10% for every degree Celsius over 37 of the skin surface.

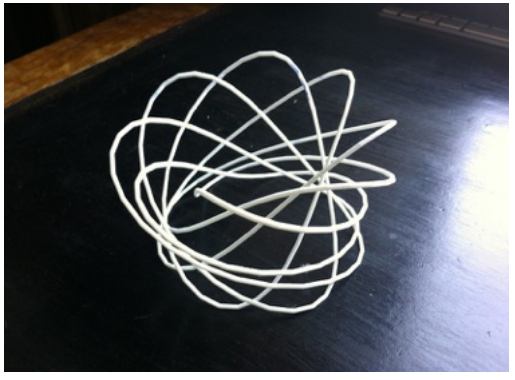
Research on the thermoelectric effects of this fiber combination has continued with a new sample made recently at the CRTTT textile research center in Barcelona at the Eurocat Soft Wearables Conference Workshop. Original documentation can be found at http://etextile-summercamp.org/2013/?p=1330

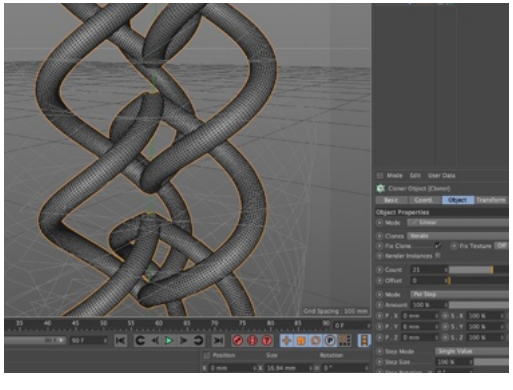
TWIST OF FATE JEWELRY COLLECTION

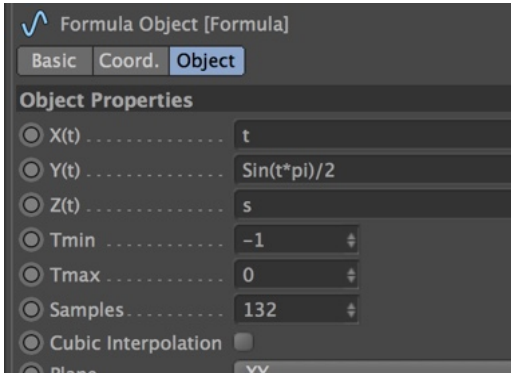
2013

CREATIVITY & AESTHETICS, TECHNOLOGY & MAKING, MATH DATA & COMPUTING, DESIGN & RESEARCH PROCESS, SELF DIRECTED & CONTINUOUS LEARNING, BUSINESS AND ENTREPRENEURSHIP

Created to be sold in on demand printing services, these jewelry pieces use mathematical formulas not only to create their aesthetic appeal, but to create strength while being incredibly light weight. I used Nylon 12 used in SLS printing is nearly identical to the nylon used in fashion in the 1970's. Using complex geometries and a sense for synthetic materials a series of experiments and jewelry was created. For the jewelry a precious meta such as 14 karat gold was selected and different modeling methods were tried in order to create an object that behaved like a similar metal piece. This was done so that open and mathematical forms could be created, yet not destroyed with use.
One of the necklaces, won 2nd place at the Florence Design Week jewelry competition. They were also featured at the first Maker Faire Europe in Rome.







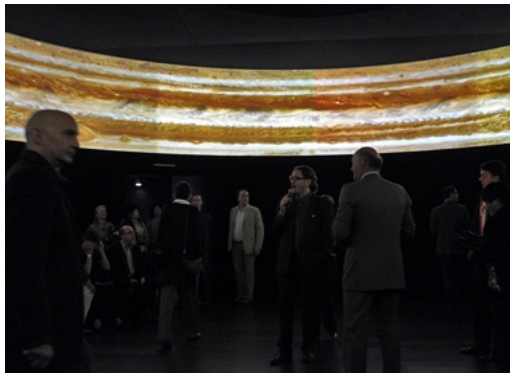
Panerai Time and Space

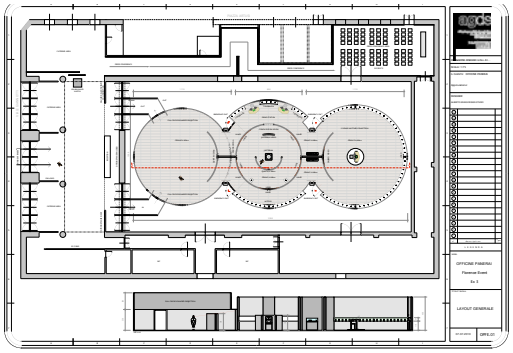
2011

WITH ALBERTO GRASSI, LORENZO MASSINI

SOCIAL & COMMUNICATION, CREATIVITY & AESTHETICS, TECHNOLOGY & MAKING, WEARER & SOCIETY

In May 2011 Troy art directed the Panerai Watches exhibit 'Time and Space' a tribnute to the 400th anniversary of Galileo discovering the planet Jupiter. This included a 100m round panopticon theater of interstellar voyages and pieces from the Florence Astronomy museum. The exhibit traveled the world including Shanghai during the worlds fair. Multi Camera Video Stitching was employed to creat a 90 meter circular video that would transport the user out of their environment and into that of a watch that traveled thru time and space. Troy directed the video and its relationship to multiple pieces from the Gallileo Astronomy museum of Florence.
http://www.agds.it/portfolio/panerai-time-and-space_shangai/





Fendi Fatto a Mano for the Future

2011

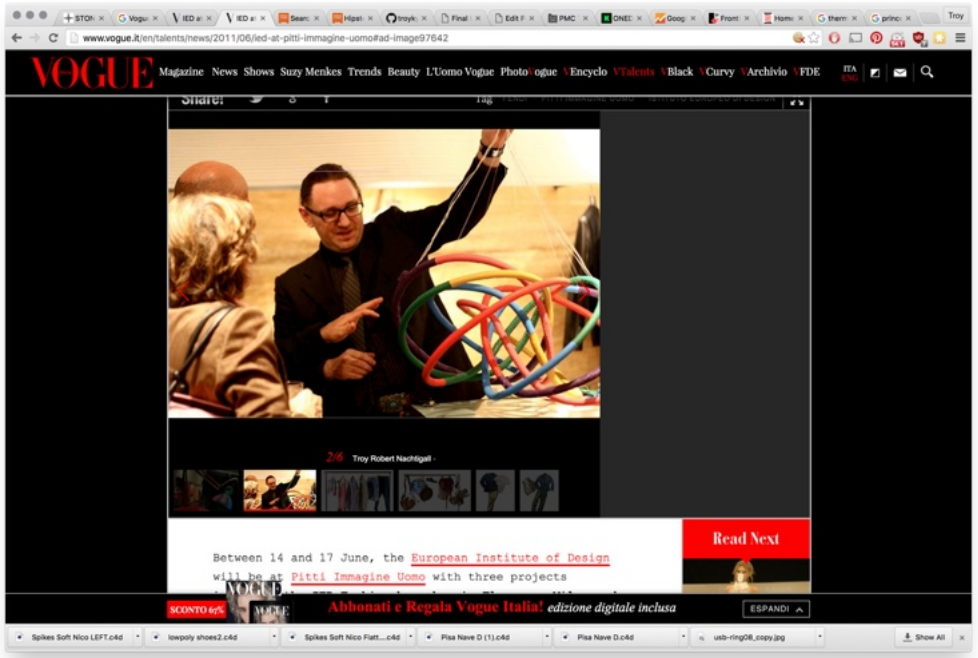
with Fendi Artisans, IED Florence

TECHNOLOGY & MAKING, WEARER & SOCIETY

Fendi asked Troy to create an live installation where one designer is placed with one artisan to create something magical. The result was two lamps, both Kinect controlled. Both lamps now reside in the Fendi Museum permanent collection in Rome.

As Fendi is a luxury product for the first lamp, a ubiquitous Loris Lamp was selected to connect to the user. Servo motors and textile sensors were added to the lamp to sensitize the structure and make it move. A kinect camera was added to so that the lamp could understand the ambient situation and an arduino was added to allow for interactive movement. When left alone for to long, the lamp will look up and try to observe other things moving around it. A stroke of the lamps bell will cause the lamp to return to it's original position. An unexpected result was caused by the heating of the metallic structure with the internal lamp. Combined with the soft Fendi leather the lamp behaved like an puppy and evoked a strong sense of empathy.

The Second light was a chandelier. LED's were mounted in the arms of a 9 fold torus. The torus was spun and a Kinect camera was used to regulated the brightness of the LED's. The further away an object, the more light was cast. This was an initial exploration as how to use a mathematical model to create a complex interaction yet on a programming level it was very simple.

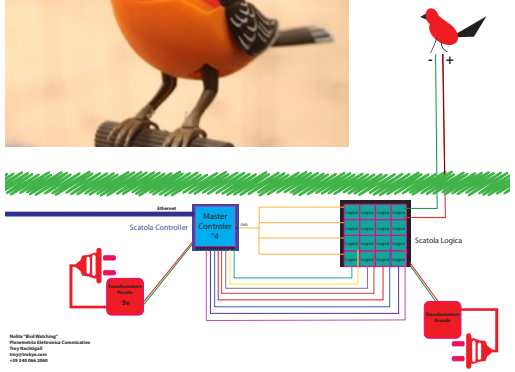


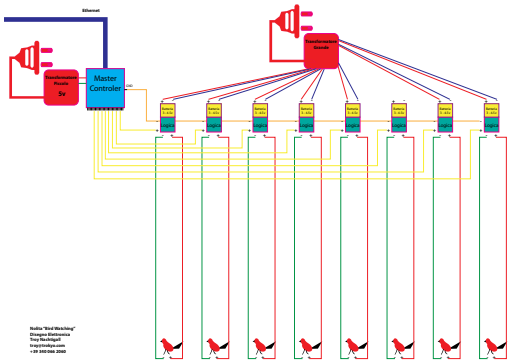
It's Right to Sing a Song

2011

with Alberto Grassi, Gianluca Patini

SOCIAL & COMMUNICATION, CREATIVITY & AESTHETICS,
TECHNOLOGY & MAKING, WEARER & SOCIETY





For Pitti Bimbo 2011 Troy and Alberto Grassi designed an interactive system of mechanical birds who reacted like natural birds thanks to an algorithm found in nature . Inspired by the 18th century 'Peacock Clock' by James Cox in the Hermitage museum, the birds reacted to tweets on twitter.

The system included a command and control protocol developed specifically for the exhibition. 19 networked Arduino controlled 16 individual birds. Lighting, Sound and real grass in the Laurentine theater sealed the magic.

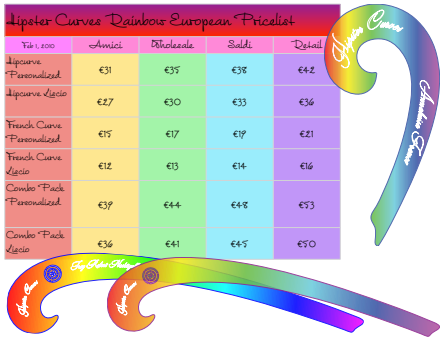
Hipster Curves

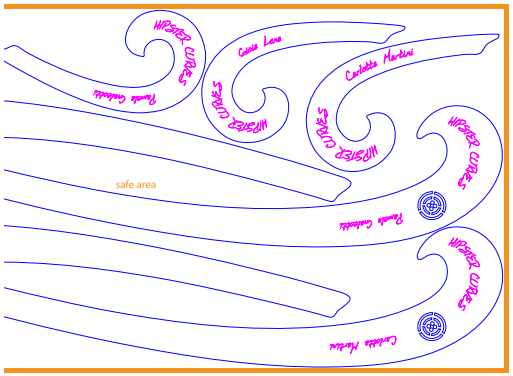
2010

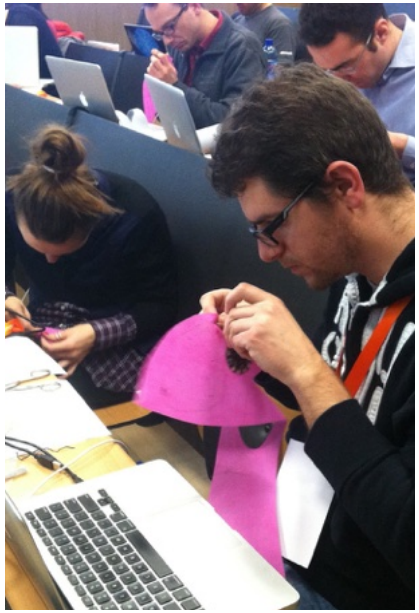
with Annaluisa Franco, Make Tank

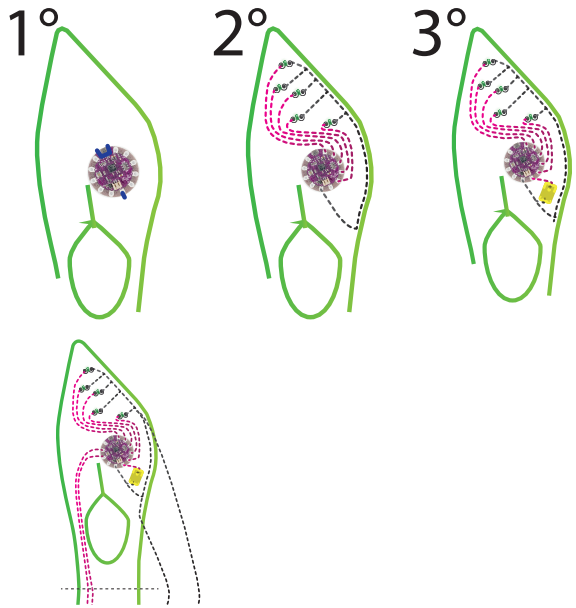
WEARER & SOCIETY, MATH DATA & COMPUTING,
BUSINESS AND ENTREPRENEURSHIP

Created with Fashion Theorist Annaluisa Franco, and online store Make Tank, the Hipster Curves were a series of laser cut personalized pattern making tools created with lessons in pattern making available for the young maker community. This project represented small project going into a more medium sized production that required the management of wholesale relationships while still building a product that was customized to each individual user. In many fashion schools tools are often lost or stolen. Each of these tools was personalized to the user for an educational context to ensure that all students would have access to the tools. Beyond the logistics and design we also created a website with instructional videos and e-commerce.









Shoeperflous

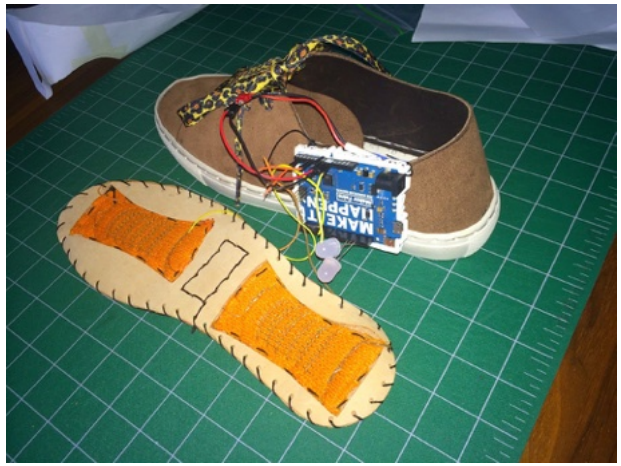
2010

with Zoe Ramona

TECHNOLOGY & MAKING, MATH DATA & COMPUTING,
DESIGN & RESEARCH PROCESS, SELF DIRECTED & CONTINUOUS LEARNING

Work on Shoeperflous started at a 2010 workshop with Massimo Banzi and Zoe Ramona at SUPSI University in Switzerland. Wearable Technology is often relegated to the idea of light up shoes for children. Shoeperflous was created as a way to analyze user needs and create a light up shoe that brought an added value to the 'bling' effects of the LED lights.

In these shoes the lights are linked to sensors that analyze data from walking and standing to create a use profile that then effects the reaction of the lights. This can be used to communicate urgency or affect the emotional/perceptive responses of the people around you. While the shoe only once made it past a simple laser cut felted slipper. it was perfect for testing via workshoping to see what could be revealed (sensed) and expressed (actuated) with an arduino using char plexing. Shoeperslous was featured as a workshop at Code in Motion 2013 in Milan.



Hot Hat

2010

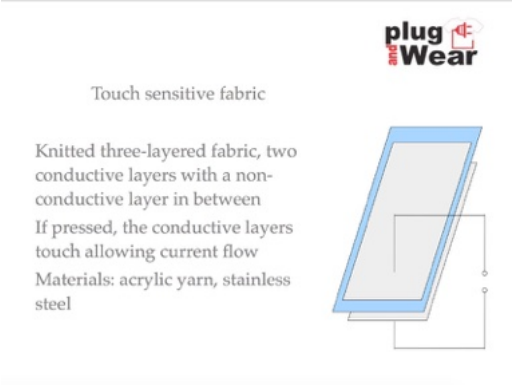
with Riccardo Marchesi, Lorenzo Capineri, Paola Puma

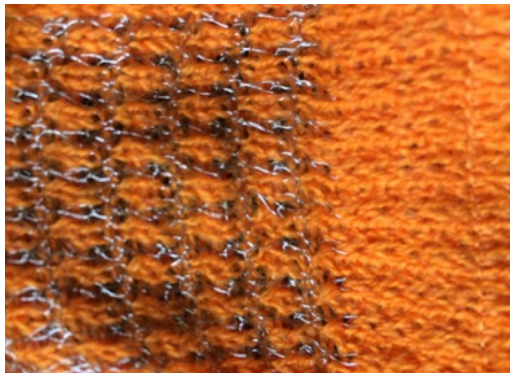
SOCIAL & COMMUNICATION, TECHNOLOGY & MAKING,

SELF DIRECTED & CONTINUOUS LEARNING

In 2008, together with Riccardo Marchesi of plugandwear.com, Prof.Dr. Lorenzo Capineri of Electrical Engineering and Dr. Paola Puma of Architecture, we created a research team for wearables. This transdisciplinary research team was known as W4IT (Wearables for Italy). Our first project was to create a hat that could measure internal and external temperature and blink in different ways. Conductive shoelace and textile buttons were used to explore different interactions that were possible with the Arduino programming environment.
In 2011 and 2012 we held a series of workshops in Florence to test and observe what designers, engineers, architects and makers would do with the hat and its soft components. We had participants from all over Europe including the wearables team of Decathlon and Pauline van Dongen.
This project was a great lesson in learning the limits of what Arduino's can do, but it was an even more vital lesson in what is interaction design compared to engineering, architecture or making.

All of the Arduino code is available at https://github.com/troykyo/Arduino





Textile Pushbutton (Easy Connection) 2009

with Riccardo Marchesi, Plug and Wear

TECHNOLOGY & MAKING, DESIGN & RESEARCH PROCESS,

These pressure sensitive textiles work amazing well as digital pushbuttons. Many of my projects involve the integration of these soft sensors. The original version of the textile pushbutton was invented in the 1950's and while it works very well as a physical digital pressure sensor, connecting to it required manipulating two thread like wires. After holding a series of workshops using the old sensor Riccardo and I observed that the limiting and frustrating factor was the connections.

We began by looking at what the end users were doing with the sensor and what they needed the sensor to be capable of doing. This research indicated that many users were using conductive yarn in their sewing machines.

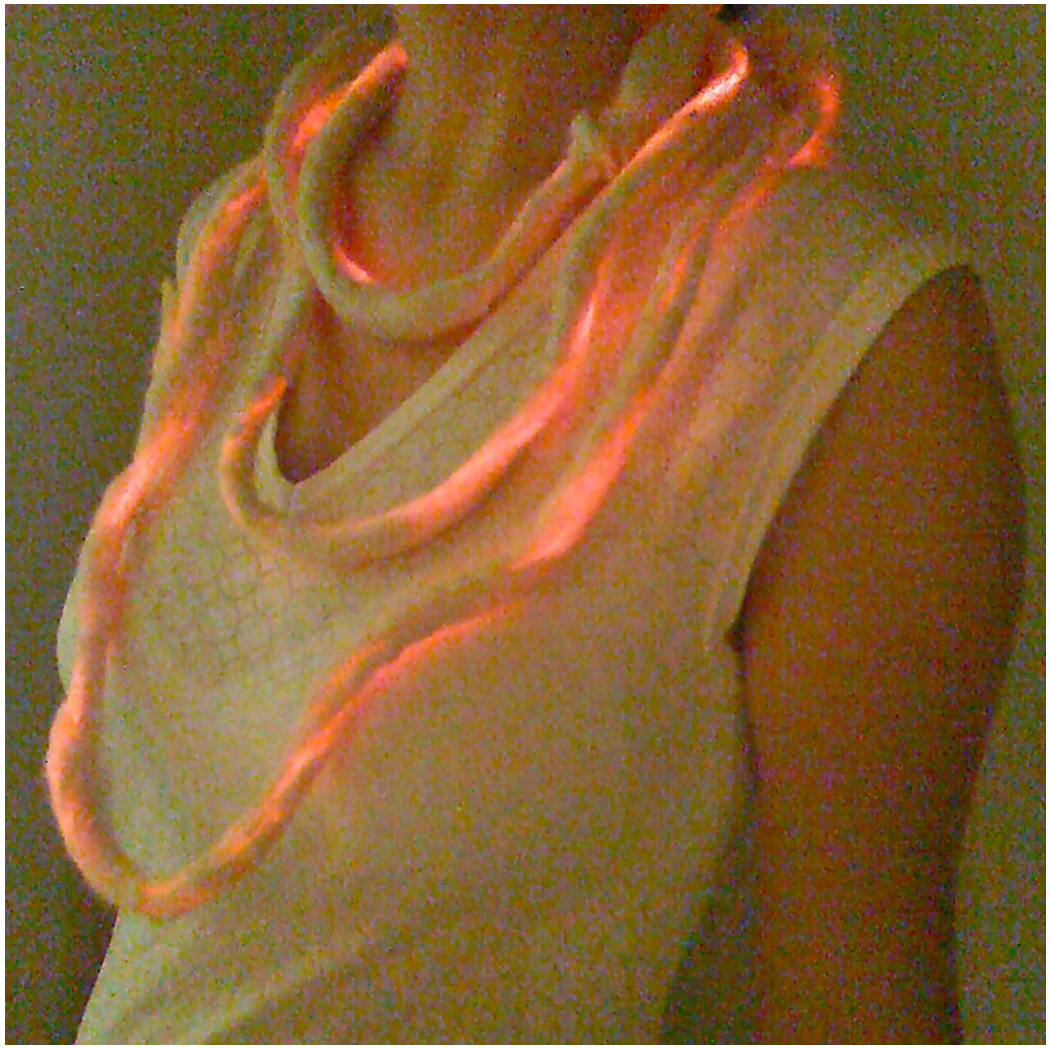
We redesigned the sensor so that the first and last course of conductive knit would act as a terminal. After some initial testing we added a bit more space between the sensitized area and the terminal endings so that no damage would be incurred on the sewing machine.

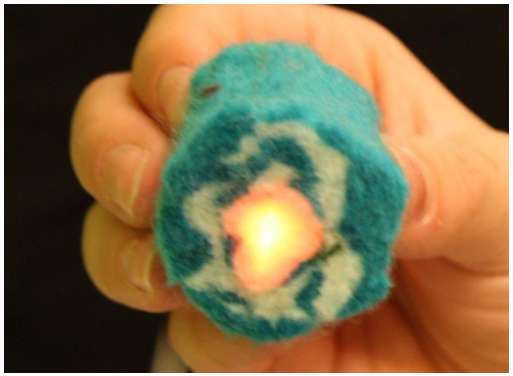
What began as a user focus ended with an unexpected finding; The new connection works well in industrial applications as well.

Space Skirt
2008

TECHNOLOGY & MAKING, WEARER & SOCIETY,
SELF DIRECTED & CONTINUOUS LEARNING

The Space Skirt explores the use of soft sensors and the interactions involved with personal space. There are two soft sensors placed in the hips of the shirt that cause the skirt to inflate when depressed. This could be caused by the unwelcome grabbing of the hips by a separate individual, or by the placing of the hands on the hips, often a signal of displeasure or disbelief.
The original skirt was designed for the 2003 Fall Winter Collection for Emilio Cavallini. The use of the paper Tyvek material was intended to create a large volume while creating a futuristic look. In creating the Skirt it was realized that Tyvek has a tight cover (technical term in fashion design used to describe how air flows through a textile) which would make it optimal for inflation. A coating was used to exaggerate this property of the cover. The electronics uses soft textile sensors and
The skirt creates a sense of personal space and helps the user define that space in a physical manner.





Felted Light

2007

with The Accademia di Moda e Costumi

CREATIVITY & AESTHETICS, TECHNOLOGY & MAKING,
SELF DIRECTED & CONTINUOUS LEARNING

One of the favorite workshops I participated in as a student was Felting Technologies by Thessy Shoenholzer at the Fashion Institute of Technology, State University of New York. As I moved into design I kept asking what does light look when its worn? While most designers imagine something close to Tron, I wanted to created a softer and subtler effect. In a series of iterative experiments I attempted to felt LED's LEC's, El Wire and Light Bulbs. The design questions that were important were 'How does this make the skin feel?' What does this type of light express about the wearer.

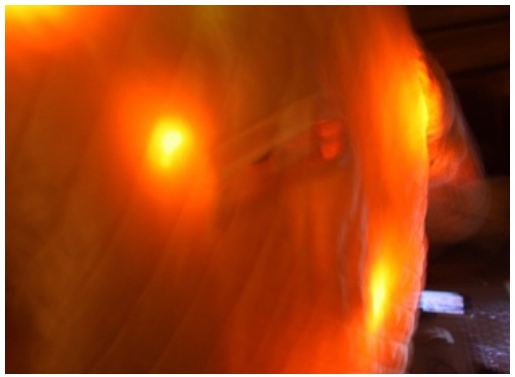
Early explorations into the felting of technology such as LED's into woolen felted structures led to the felting of 50 meters of Electro Luminescent wire for an exhibition at the Macro Museum of Contemporary Art of Rome. While these explorations are often basic and may seem simple, these early attempts at wearable light lead to a later fascination with micro controllers and data driven design.

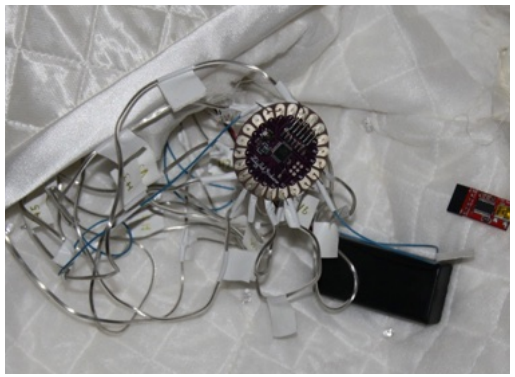
Jump Jacket
2006

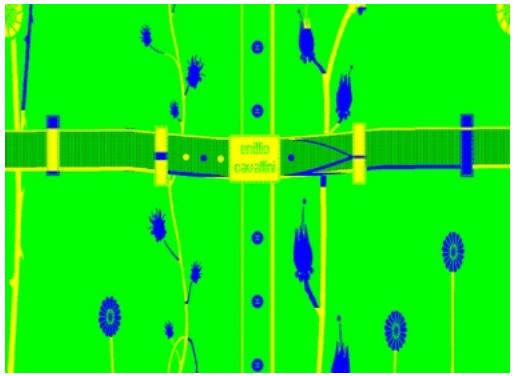
Sapienza, University of Rome

TECHNOLOGY & MAKING, DESIGN & RESEARCH PROCESS,
SELF DIRECTED & CONTINUOUS LEARNING

Created in 2005, the Jump Jacket was an exploration into technology as much as it was a wearable piece. Using Charlie Plexing and row scanning with and Arduino NG the Jump jacket used a hacked Nintendo Wii Chuck for it's Accelerometer. In the early iterations of the project a library for the same accelerometer that the Wii uses was shared on Sparkfun, but the connections and reliability offered by Nintendo along with explorations into Hardware Hacking lead to using the Wii Chuck.







Seamless Jean Jeggings

2005

with Emillio Cavalini, 'Bepe'

SOCIAL & COMMUNICATION, CREATIVITY & AESTHETICS, DESIGN & RESEARCH PROCESS, BUSINESS AND ENTREPRENEURSHIP

Working with Emilio was always an adventure. One of the unique aspects of seamless knitwear is it's ability to deform and stretch on the knitting machine and on the body. There is a distortion field that occurs when the body meets a seamless knitted garment that can be controlled via a series of specialized knitting stitches. With the seamless jeans series we explored how to use this knitting technology to reduce the amount of material/number of processes needed while creating a product that could work for at least 95% of our users. We had to create more dynamic 3D knits where the textile density was changed to create better fitting garments as we looked to fit of the user. These had to change with different body shapes.

We chose jeans not only because of the desire for skin tight jeans in fashion at that moment but also because a stretch cotton yarn capable of passing through a Santoni knitting machine had just been invented. Innovation takes effort, but after six months of 12 hour days we managed to create a thick jeans like material on tubular knitting machine.

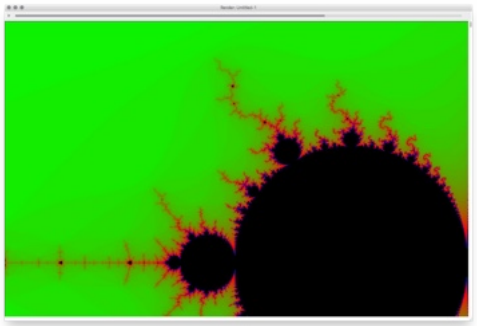
The amazing part of the project was the fact that only two models need produced (S/M, M,L) to fit the majority of users as the knit would adapt on body. This was thanks to a loosening and straightening of specific yarns in specific places to cause the knit to adaptively fit to the wearer. This project required that I learn textile design on the job via experimentation. In no other project have I ever used as much calculus in order to calculate slope plane. This project launched what would become know as jeggings in fashion. Sales reached 500,000€.

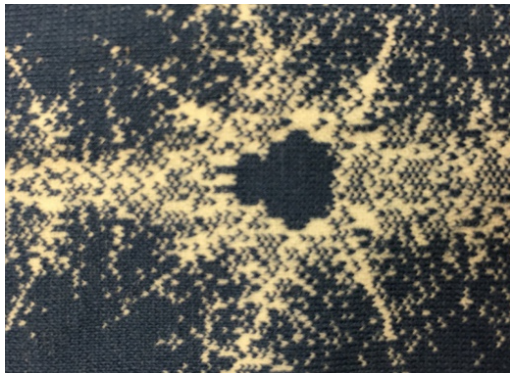
Mandlebrot Sweater

July 2003

with Emilio Cavalini

CREATIVITY & AESTHETICS, TECHNOLOGY & MAKING, WEARER & SOCIETY





Troy's first job after University was with Emilio Cavalini, Troy started as an Assistant designer. At the conclusion of the first year Emilio suggested that Troy go work in the major fashion studios in Empoli and helped him find a job with the head designer of Hugo Boss and Calvin Klein. Two years later Troy returned to become associate and finally head designer. Designing with Emilio was to be the Avant Garde. Visionary not only as a designer, but also as an Artist, Emilio was open to new ideas daily and expected the unexpected. The production facility was next door to the factory making rapid prototyping the absolute expectation. Working directly with the technicians on the Santoni tubular knitting machine, Troy was able to create a series of Photoshop scripts to create dynamic and innovative knitwear. Client focused design meant interviewing the best clients and designing to their needs and desires

Troy made multiple mens and womens collections of approximately 72 garments each collection twice a year with Emilio for the four years they worked together.

Textile Heritage Collection

July 2003

Fashion Institute of Technology

CREATIVITY & AESTHETICS, WEARER & SOCIETY

This project represented a look into how World Heritage can be reflected in to modern garments for the modern women. Detailed research was performed and many craft techniques were employed to create a series of garments that were historic yet modern at the same time. All garments were realized by myself and an annotated portfolio accompanied the presentation on the runway.

Troy Nachtigall

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