3D Printing Flexible Textile Structures
3D PRINTSHOW
Exhibition Report
NEW YORK 2014:12-15 February

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Sponsored by ICAT
3D Printing Flexible Textile Structures

The DREAMS Lab together with Negar Kalantar and Alireza Borhani have collaborated on researching Flexible Textile Structures with 3D Printed fabrics. Flexible textile structures is an exploration into printed fabrics. The prototypes were generated by Rhino, Grasshopper and SolidWorks CAD softwares and fabricated with two additive manufacturing approaches, Powder Bed Fusion Process and FDM Process. The main design goal is designing a fabric that has both flexibility and rigidity. The fabric can be easily manipulated into a fixed shape due to interference among the links of the printed textile. This research has potential applications in several domains such as medical, textile and fashion industries.
**Research Background:**
Flexible textile structures is a multidisciplinary design-research between the DREAMS Lab and School of Architecture. The invention of this project was guided by the question, “How to design 3D printed textiles that can be flexible and rigid at the same time?” The main design challenge of Flexible Textile Structures was changing the property of rigid material by design and 3D printing manufacturing.

The research resulted in several designs and printed prototypes, which can be seen in this video. The video, which captured the project’s intersection of design and manufacturing, was virally promoted in professional media (e.g., blog posts related to 3D Printing). The article was the most read article on 3DPrintingIndustry.com during the week of February 1.

From this exposure, the team has received an invitation to present their work at the upcoming 3D Printshow in New York.

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Exhibition (3D Printshow):
The group has been invited to attend and present the result of the research at the 3D Printshow and involve in a very high profile panel discussing material development in the field of 3D printed and computational fashion in New York in February 12-15. 3D Printshow brings together the biggest names in 3D printing technology alongside the most creative, exciting and innovative individuals using additive processes today. The show offered an incredible range of specialized content and it is a great opportunity for our group to present the outcome of the research and develop connections and receive feedback from the industry and the market.
Institute for Creativity, Arts and Technology (ICAT) sponsored the team for attending the New York 3D Printshow since the research was align with the mission of ICAT to promote new trans-disciplinary research domains that transcend institutionalized boundaries between science, engineering, art, and design.
Exhibition (3D Printshow):
The shows consisted of exhibitions, workshops, events and evening shows, bringing together fashion designers, industrialists, scientists and entertainers. The exhibitions were in three different floors.

First Floor: 3D print-Industry

Second Floor: 3D print-Designers

Third Floor: 3D print-Artists
First Floor: 3D print-Industry

EXHIBITORS:

- MAKERBOT
- ADOBE
- SHAPEWAYS
- FUEL3D
- M3D EVOLUTION
- D2W
- SHAPIFY.ME
- EXTREME FLIERS
- SHAPEWAYS
- FUEL3D
- M3D

- ECONOLYST
- FORMLABS
- VOXELJET
- MCOR TECHNOLOGIES
- 3DHEIGETS
- DIGITS2WIDGETS
- Digikey
- CIDEAS
- 3MONSTR
- 3D HUBS
- BEIJING TIERTIME
- DIGITEYEZER
- SHAPIFY.ME
- EXTREME FLIERS
- SHAPEWAYS
- FUEL3D
- M3D

- ULTIMAKER
- LEGACY EFFECTS
- SCULPTED
- DIGITAL FORMING
- THINGIFY
- BEEVERYCREATIVE
- BFORMIA
- UFORMIT
- I.MATERIALISE
- SKETCHUP
- PRINTRBOT
- BFORMIA
- UFORMIT
- I.MATERIALISE
- SKETCHUP
- Digikey
- CIDEAS
- 3MONSTR
- 3D HUBS
- BEIJING TIERTIME
- DIGITEYEZER
- SHAPIFY.ME
- EXTREME FLIERS
- SHAPEWAYS
- FUEL3D
- M3D

- SIXENSE
- LEAPFROG
- OMNI3D
- 3NTR
- BFORMIA
- UFORMIT
- I.MATERIALISE
- SKETCHUP
- Digikey
- CIDEAS
- 3MONSTR
- 3D HUBS
- BEIJING TIERTIME
- DIGITEYEZER
- SHAPIFY.ME
- EXTREME FLIERS
- SHAPEWAYS
- FUEL3D
- M3D
Second Floor: 3D print-Designers

Catherine Wales
Bradley Rothenberg
Sabine Seymour
Three Asfour
Threeform
Julian Hakes
Kay Kwok
Hannah Soukup
Madeline Gannon
Joshua Harker
Francis Bitonti
Bryan Oknyansky
Sensoree & Machinic
The Laser Girls
Nervous System
XYZ Workshop
Frances Guevara
Rob Elford
Alissia Melka-Teichroew
Heidi Lee
Feetz
Pia Hinze
Michaela Janse van Vuuren
Lionel Dean
Virginia Tech Booth at 3D PrintShow New York

Flexible Textile Structures-Flexible Geometry

The exhibition was a perfect opportunity for the group to develop and interact with like-minded people in the industry and progressive individuals that are spearheading a movement that blurs the lines between design, art, fashion and technology. It also provided an opportunity to further promote Virginia Tech’s presence at the intersection of arts and technology.
Virginia Tech Booth at 3D PrintShow New York

Flexible Textile Structures-Flexible Geometry
Virginia Tech Booth at 3D PrintShow New York

Flexible Textile Structures - Flexible Geometry
Flexible Textile Structures - Flexible Geometry

The main challenge: how we can make a flexible responsive material out of non flexible and rigid substance, using Geometry. Depending on the geometry and size of the modules each design shows a different behavior regarding flexibility.
Flexible Textile Structures-Flexible Geometry

Flexible textile structures can be developed to use and convert three-dimensional data into skin-conforming fabric structures.
The team believes good design is concerned with how we may want to live in future worlds and designers invent or conceive possible futures. The new manufacturing process 3D printing opens new design possibilities. Moreover, it potentially represents a change in the way that we learn, in the way that we think, and in the way that we solve problems.
3D printing - Strength Aspects in Design:
- **Multi Material** 3D printing
- Triple jetting technology that combines droplets of three base materials
- Unlimited combinations of rigid, flexible, and transparent color materials as well as color digital materials
- All in single print run
- Characteristics of an assembled part without assembly or painting is a significant time-saver.
- It helps product manufacturers validate design and make good decisions earlier before committing to manufacturing and bring products to market faster
3D printing—Industrial Design Revolution

- The software supply chain
- Removing global and local barriers to manufacturing
- Anyone can manufacture
- Shapeways, Ponko, Kraftwurx and i.Materialise
3D print-Industry
3D scanners
3D print-Industry
3D scanners
3D print-Industry Medical Application
3D print-Industry
Large Scale
3D print-Industry
LIVE CATWALK SHOW
3D printing-Designers
3D printing-Designers
Third Floor: 3D print-Artists

JOSHUA HARKER
TOBIAS KLEIN
SOPHIE KAHN
LINLIN & PIERRE YVES-JACQUES

DANN CHERIT
DAVIDE PRETE
NERVOUS SYSTEM
MONIKA HORCICOVA & DUSAN VANA

JIM STANIS
SERGE ECKER
MONAD STUDIO
RUSS OG

ANDREJ BOLESŁAVSKY
MARIUS WATZ
JEAN PIERRE GAJARDO DIAZ
ERIC VAN STRAATEN

LILIA ZIAMOU
ANTONIS KIOURKTSIS
DAVID VAN NESS
MICHAL GABRIEL
THIRD FLOOR: 3D PRINT – ARTIST SECTION