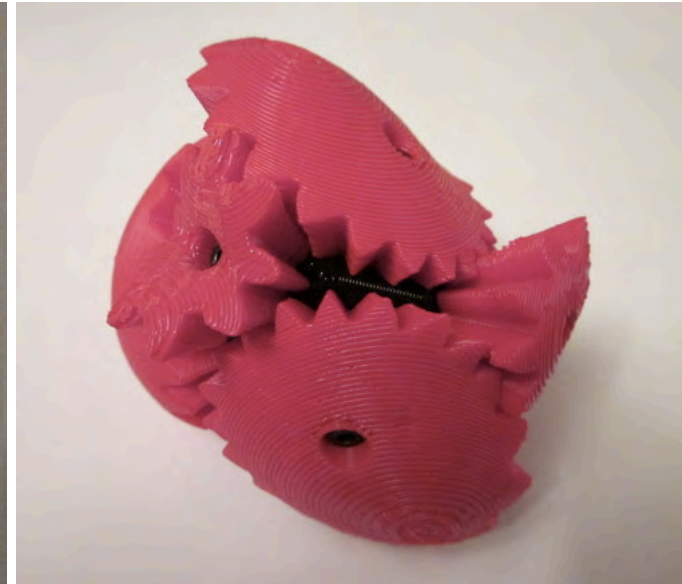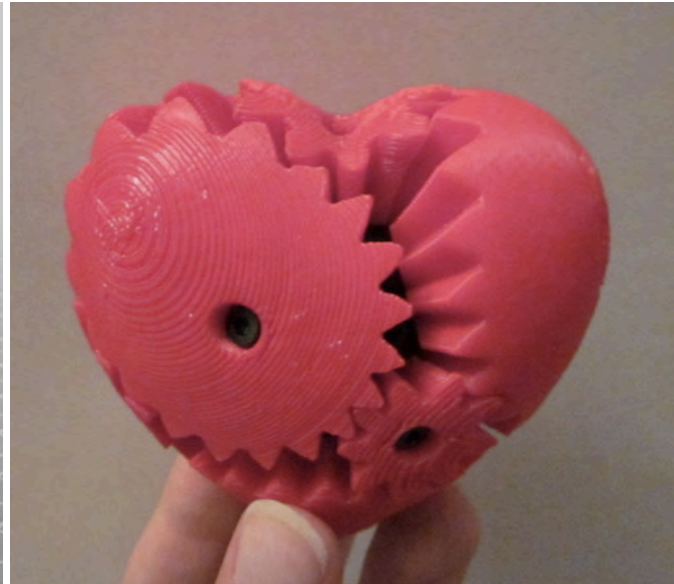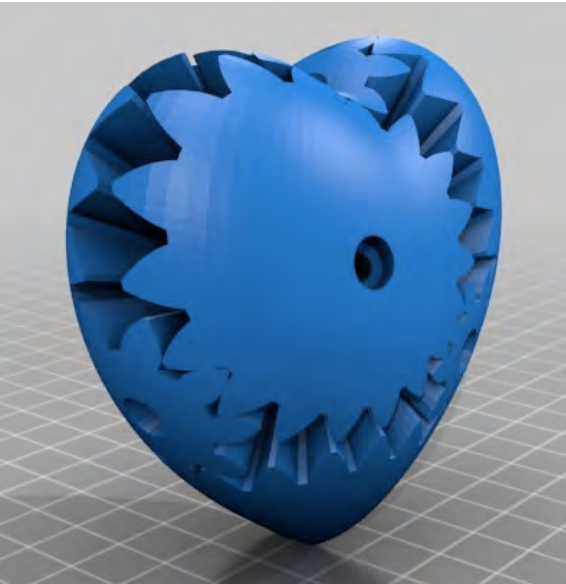# Using 3D Printing Technology for Improving Typography Comprehension in Graphic Design

KRISTINE HWANG

Kennesaw State University | Georgia | USA

Typography

from the Greek words: "form" and "to write"

… the art and technique of arranging type
to make written language
readable and beautiful …

3D printing typographical object

comprehending the fundamentals of typography

+

creating 3D typographical objects using 3D printer

overview

// History of 3D Printing
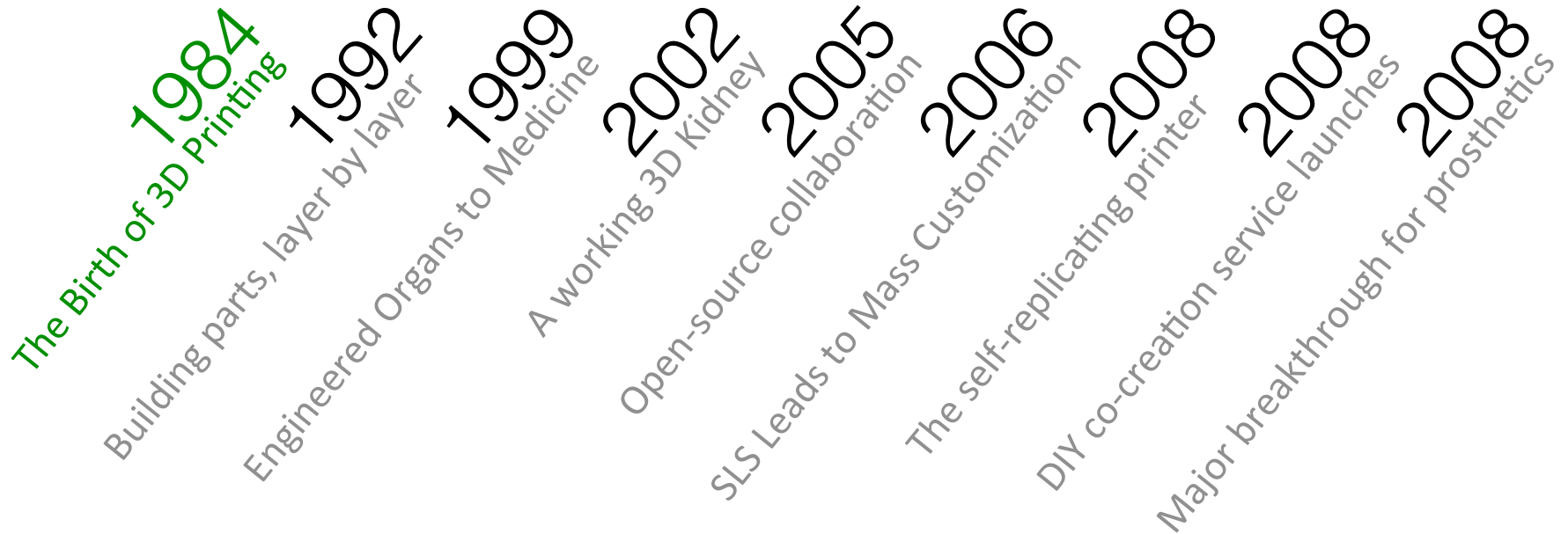
// Affordable 3D Printers

// 3D Printing Project of Typography 1 Course

// Conclusion + Further Suggestion

// References

History of 3D Printing

Charles Hull: stereolithography
process of printing 3D object from digital data

1984 — The Birth of 3D Printing

1992 — Building parts, layer by layer

1999 — Engineered Organs to Medicine

2002 — A working 3D Kidney

2005 — Open-source collaboration

2006 — SLS Leads to Mass Customization

2008 — The self-replicating printer

2008 — DIY co-creation service launches

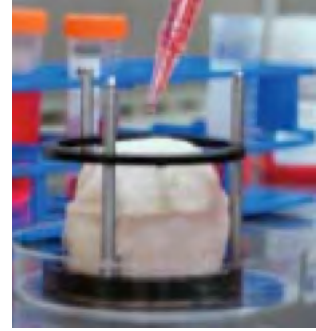**2008** — Major breakthrough for prosthetics

The first SLA machine (stereolithographic apparatus)

1984
The Birth of 3D Printing

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Building parts, layer by layer

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A working 3D Kidney

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DIY co-creation service launches

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Major breakthrough for prosthetics

Urinary bladder augmentation using 3D synthetic scaffold coated with their own cells

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3D printed organs and tissues at the Wake Forest Institute

1984 — The Birth of 3D Printing

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RepRap, an open-source initiative
Dr. Adrian Bowyer at University of Bath

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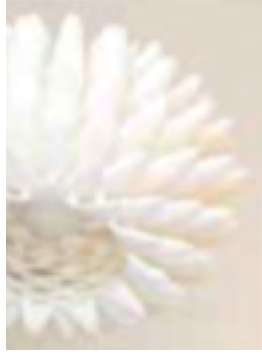
2008
Major breakthrough for prosthetics

A laser to fuse materials into 3D products SLS (selective laser sintering)

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Shapeways

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The Birth of 3D Printing

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Major breakthrough for prosthetics

**3D-printed prosthetic leg with knee, foot, socket
Bespoke Innovations' 3D-printed Prosthetics**

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2005 — Open-source collaboration

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2008 — DIY co-creation service launches

2008 — Major breakthrough for prosthetics

MakerBot Industries, an open-source hardware company

2009 DIY kits for 3D printer

2009 From cells to the blood vessels

2010s World's first 3D-printed Robotic Aircraft

2011 World's first 3D-printed car

2011 3D printing in gold and silver

2012 3D printed prosthetic jaw

2013 NASA to fund world's first 3D food printer

2014 World's first 3D printers for food

2015 3D Printed Paintings exhibition
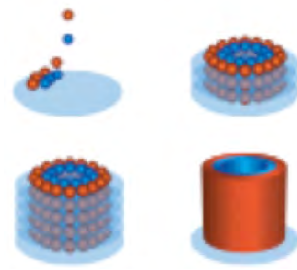
Bioprinting innovator Organovo Dr. Gabor Forgaces' technology

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This unmanned aircraft was built in seven days / £5,000, University of Southampton

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2015 — 3D Printed Paintings exhibition

Urbee / a sleek, environmentally friendly prototype car, Dr. Jim Kor / Kor Ecologic

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2015 3D Printed Paintings exhibition

i.materialise
14K gold and sterling silver

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2015 — 3D Printed Paintings exhibition

3D prosthetic lower jaw
Doctors and engineers in the Netherlands

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NASA: fund world's first 3D food printer
The world's first 3D printers for food

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History of 3D Printing

Museo del Prado in Madrid
40 hours for printing / 12 hours for a chemical treatment

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Affordable 3D Printers

//   Polar 3D Printer ($800)

//   Samto® 3D Stereoscopic Printing Pen ($199)

//   MakerBot ($1,000+)

//   PrintBot ($ 350+)

//   Cube ($1,000)

//   XYZprinting Da Vinci 1.0 AiO 3D Printer ($800)

//   LulzBot Mini 3D Printer ($1300+)

//   Custom-made 3D printer

project description (Typography 1)

//   History of the typeface, including information about the type designer/s.

//   Type category and identifiable characteristics.

//   At least five (5) good examples of usage.Include historical as well as contemporary examples. One source for type examples is the Type Director's Club Annuals.

//   Any other interesting/relevant information.

//   You must have at least four (4) sources and at least one must be a non-internet source.

4 projects (Typography 1)

// powerpoint presentation

// poster for an upcoming lecture

// lecture hand-out

// 3d printing takeaway

Why a 3D Printing Project of Typography 1 Course

// "form" and "to write"

// tactile engagement for connecting to audiences

Project description of 3d printing takeaway

tactile engagement for connecting to audiences
// Characteristics of typeface
// Originality of design
// Storytelling object
// Professional craftsmanship
// Adobe Illustrator + TinkerCAD + MakerBot

Concept: Begin with descriptive

// What is it?
// What type of form?
// What degree of dimensionality?
// What type/s of experience?
// How do you interact with it?
// How does negative space operate?
// All the descriptive or formal considerations
    contribute to a work's meaning:
    esp. color, context, form…

Concepts (3D)

// volume
// area
// perimeter
// planes
// angles
// flips
// an array of geometric concepts

Process of 3D printing object

Design + Produce + Print

Franklin Gothic
Grace Easton

> Design
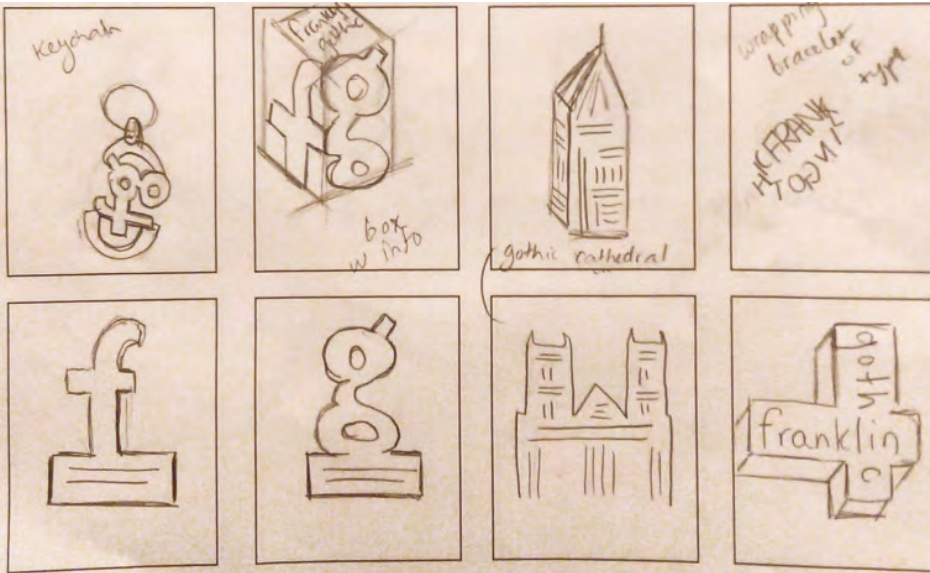
create the condensed feeling
and emphasize that a lot of
information was being
simplified and packed into a
small keychain.

> Produce + Print

// Illustrator: .stl /.svg
vector graphic

// TinkerCAD: .stl
web-based platform

// MakerBot: .x3g
Dutch-based company
founded in 2011

TINKER CAD

Design   Edit   Help

Undo   Redo

New

Duplicate

Exquis
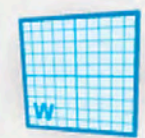
Save

Properties

Download for 3D Prin

Download for Minecr

Order a 3D Print

Upload to Thingivers

Close

Download for 3D Printing

Download this model as an STL, X3D or VRML97 file if you want to use external services or 3D printers.

.STL   .OBJ   .X3D Colors   .VRML Colors

Download for laser cutting

The 2D file contains cross section of the model on workplane suitable for laser cutting. Use the preview button to see the results.

.SVG   Preview .SVG

Is the download taking a while? Your model might be too complex.
Check out the FAQ for help.

MAKERBOT DESKTOP

VERSION 3.7 NOTES *LATEST RELEASE* ∧

3.7 Notes:

We're always working to improve MakerBot Desktop and MakerBot Firmware so you can get the most out of your MakerBot Replicator 3D Printer.

To take advantage of all the latest improvements and capabilities, it's important to keep your MakerBot Desktop and MakerBot Firmware current and up to date. You can download the latest version of MakerBot Desktop from this page. To update MakerBot Firmware, please follow these instructions.

Important: When printing files via the USB port, your printer's internal storage, or your Library, reprepare (reslice) them through MakerBot Desktop to achieve the best results. Files that are not reprepared (resliced) will not achieve best results.

Improvements:

- New custom profile editor

For Fifth Generation MakerBot Replicator 3D Printers:

- Variable layer height: High quality prints now use thicker infill layers for faster printing
- Ability to connect to hidden wireless networks
- Ability to set a static IP address for printers connected over Ethernet
- Smart Extruder information added to the device preferences

MAKERBOT DESKTOP 3.7

FOR ALL MAKERBOT REPLICATOR 3D PRINTERS

INCLUDES
MAKERWARE FOR DIGITIZER

FEATURING
MAKERBOT MULTISCAN™ TECHNOLOGY

MAC OS X (LION / 10.7+) ∨

DOWNLOAD

MakerBot

166910-512971 - Mary Ea...

EXPORT PRINT FILE

Devices Services Help

Update Firmware
Device Preferences
Change Filament
Register Your Device

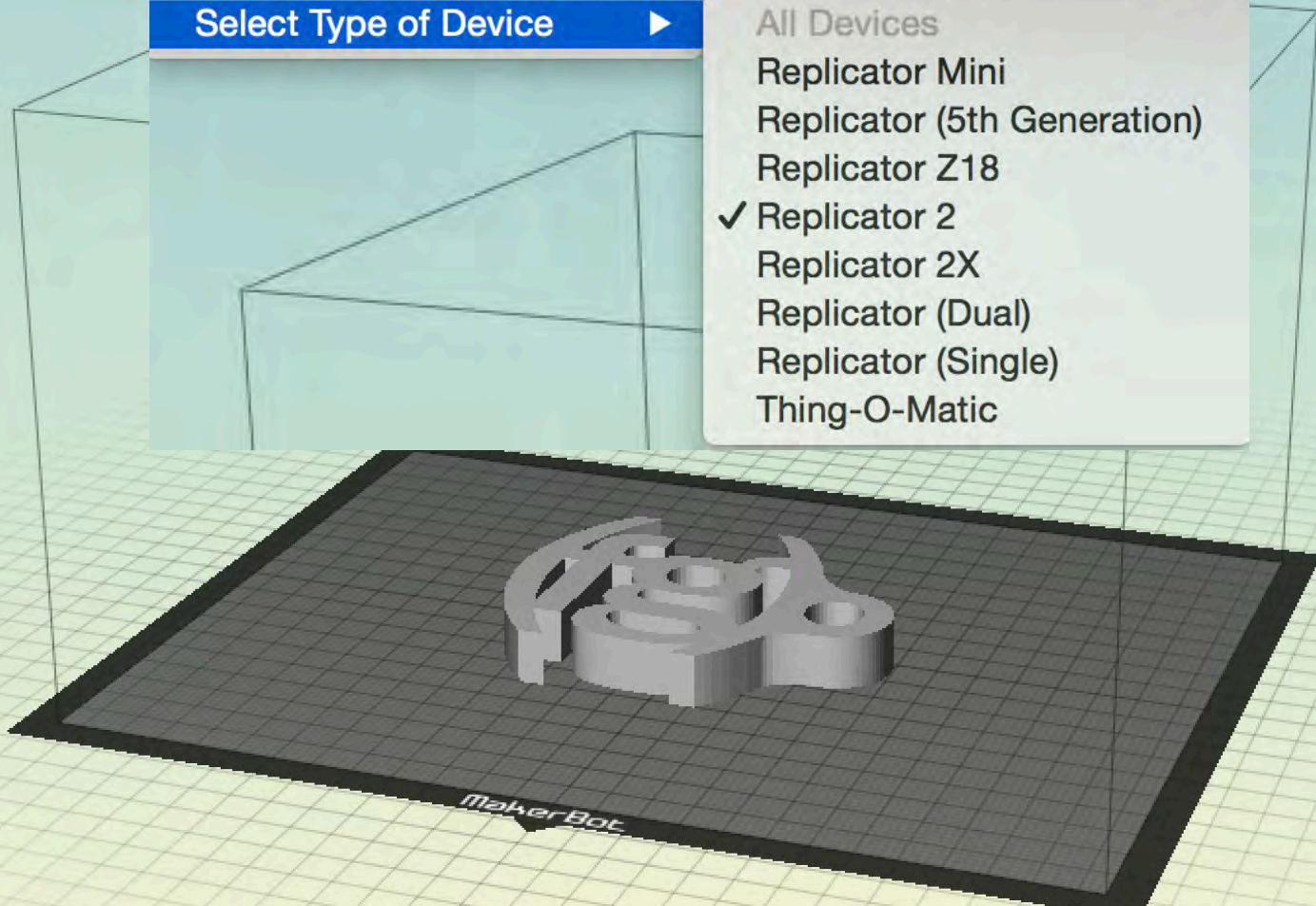Remote Printers ▶
Connect to a New Device
Select Type of Device ▶

All Devices
Replicator Mini
Replicator (5th Generation)
Replicator Z18
✓ Replicator 2
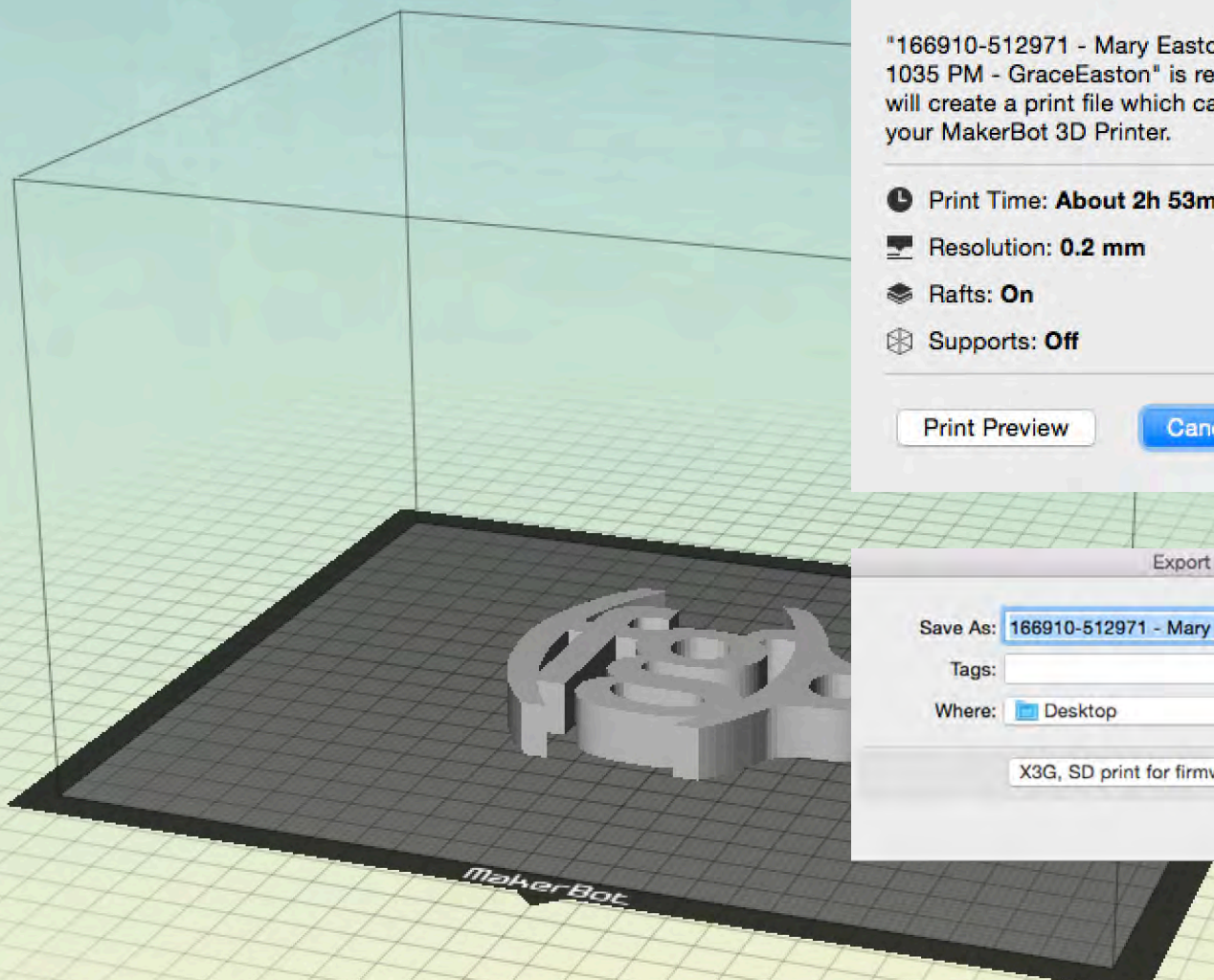Replicator 2X
Replicator (Dual)
Replicator (Single)
Thing-O-Matic

Library   Prepare

SETTINGS   ADD FI...

Replicator 2

MakerBot

MakerBot

"166910-512971 - Mary Easton - Dec 10, 2014 1035 PM - GraceEaston" is ready to export. This will create a print file which can be used with your MakerBot 3D Printer.

Print Time: **About 2h 53m**

Resolution: **0.2 mm**

Rafts: **On**

Supports: **Off**

Print Preview   Cancel   Export Now

Export

Save As: 166910-512971 - Mary Easton - Dec 10

Tags:

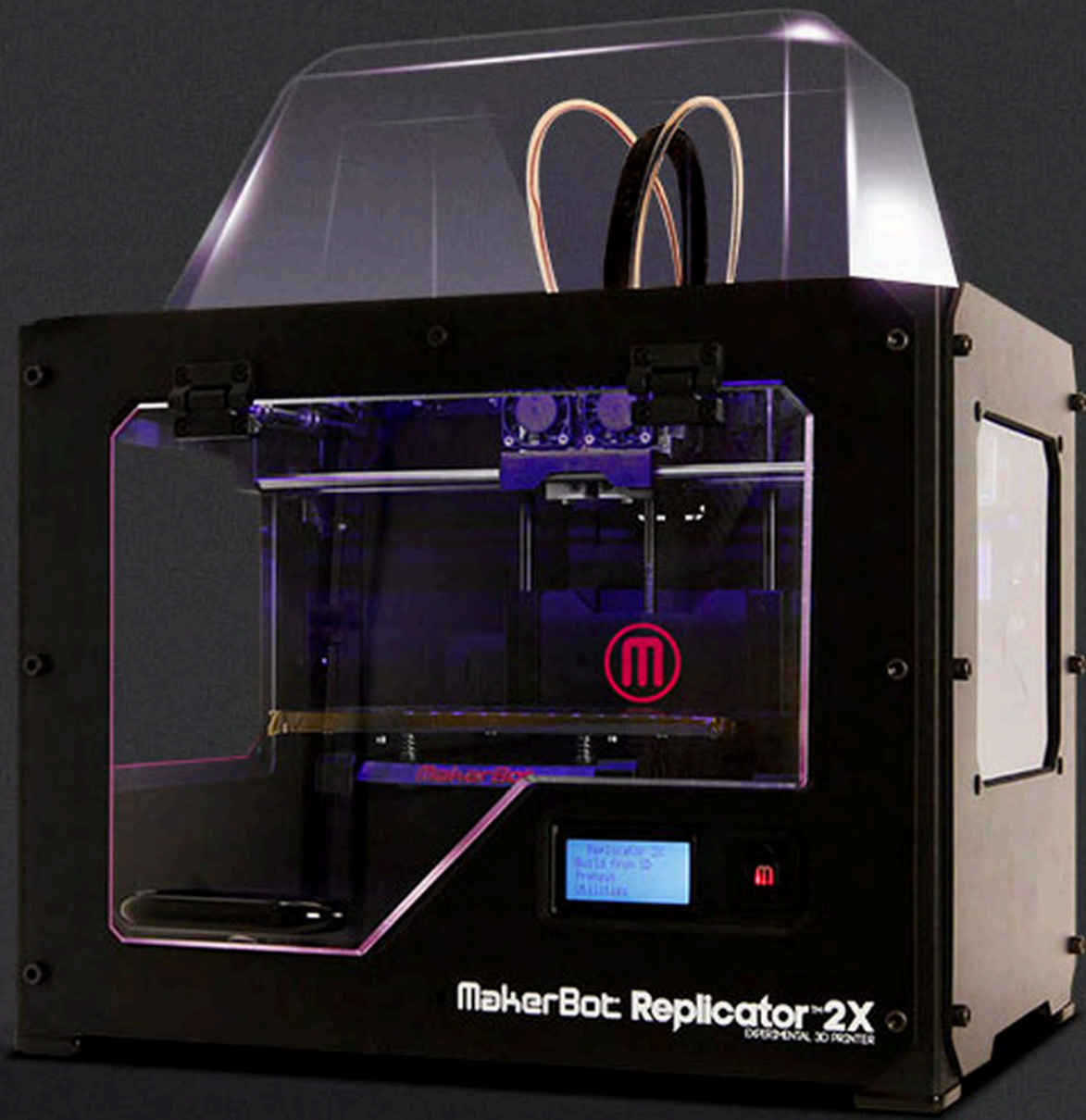Where: Desktop

X3G, SD print for firmware 7.0 or...

Cancel   Save

Replicator 2

KRISTINE HYEJUNG HWANG | Kennesaw State University, USA | GECA 2015, San Luis Obispo, California, USA | July 5–10
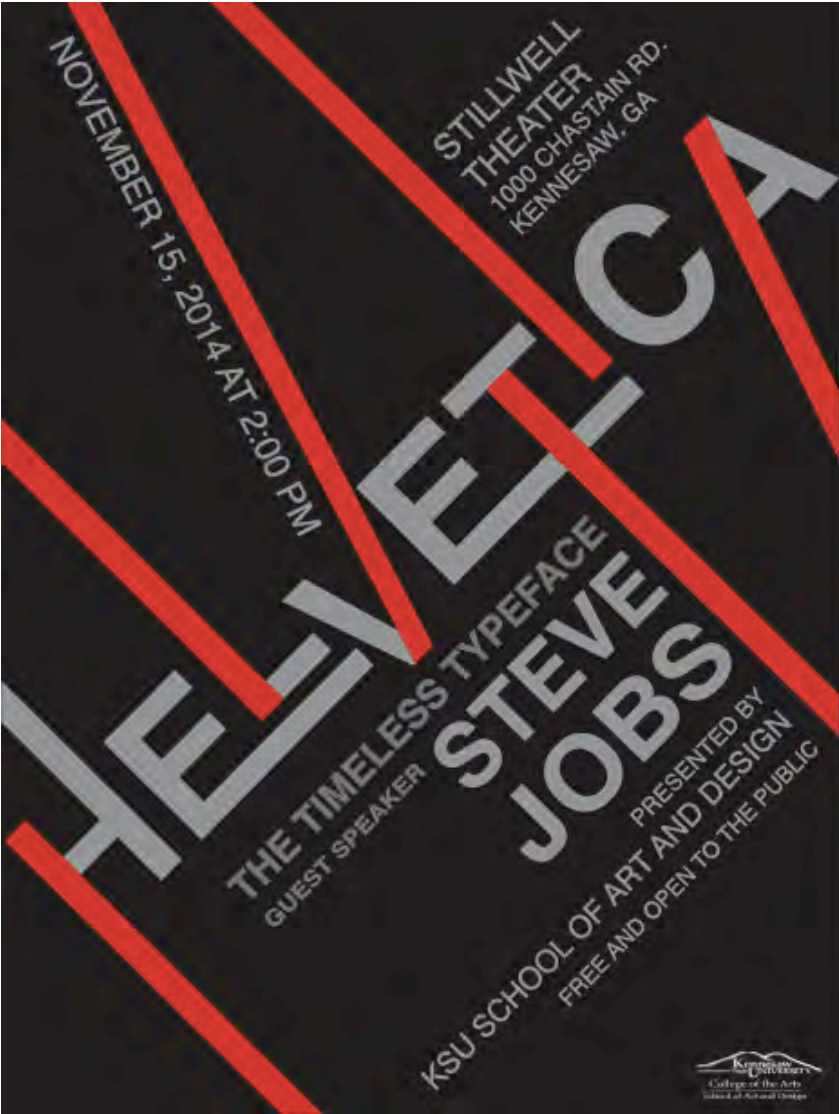
Students' projects

overlapping letters
Hannah Fortune

moon and geometric theme
Celianne Pianeta

Clarendon
Tayor Evans

Katherine Vines

Bodoni
Virginia Moore
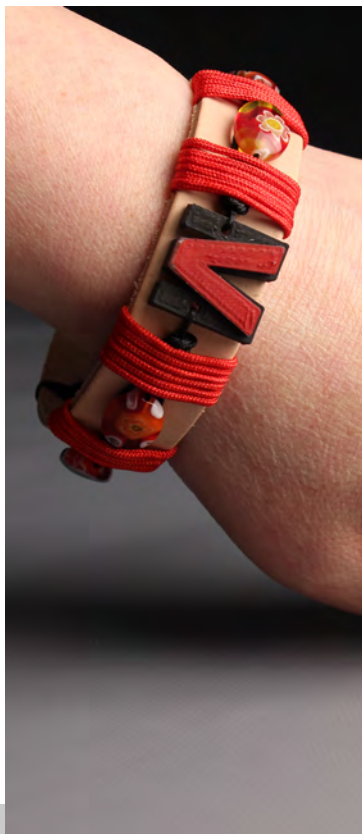
Trade Gothic
Chelsea Wilson

Avenir
Sarah Watson

Univers
Patricia Thompson

Conclusion + Further Suggestion

//   enhancing the learning
more engaging and enriching of students' learning experience

//   creating rapid prototypes
having an idea, designing it, printing it, and making it again if it doesn't work

//   practicality of creativity
visualize creations

//   collaborative learning environments

//   personalized communication

MakerBot Starter Lab

References

software

123D Design: www.123dapp.com/design

3D printing services

Shapeways: www.shapeways.com

Maker6: www.maker6.mxd3d.com

Amazon's 3D printing store

thank you

KRISTINE HWANG
khwang@kennesaw.edu

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School of Art and Design | College of Arts
Kennesaw State University
Kennesaw | Georgia | USA