

Digital Fabrication & Fablabs

What is Digital Fabrication?

- [Wired magazine](#)

WIRED

Technology

Digital fabrication is so much more than 3D printing

—
By OLIVIA SOLON

13 Mar 2013

- [Foreign Affairs Paper](#)

FOREIGN
AFFAIRS

NOVEMBER/DECEMBER 2012



How to Make Almost Anything

The Digital Fabrication Revolution

Neil Gershenfeld



Scientific American 50:
FP Top 100 Global Thinkers

What is a Fablab?

A Place filled with:

- Endless **Delights**
- Endless **Possibilities**
- Endless **Fun**

A Place where you can:

- **DREAM** it
- **IMAGINE** it
- **MAKE** it

A Place where you can...



The screenshot shows the MIT OpenCourseWare website interface. At the top, there is a navigation bar with the MIT OpenCourseWare logo and a 'Subscribe to the OCW Newsletter' button. Below the navigation bar, there are several menu items: 'Home', 'Courses', 'Media Arts and Sciences', and 'How to Make (Almost) Anything'. The main content area features a large image of a waterjet cutter in operation, with two people standing nearby. To the right of the image, there is a sidebar with course details: 'Instructor(s)' (Prof. Isaac Chuang, Prof. Neil Gershenfeld), 'MIT Course Number' (MAS.863), 'As Taught In' (Fall 2002), and 'Level' (Graduate). Below the image, there is a 'CITE THIS COURSE' button. The 'Course Description' section is also visible, providing a detailed overview of the course content.

MIT OPEN COURSEWARE
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How to Make (Almost) Anything

COURSE HOME <

SYLLABUS

CALENDAR

LECTURE NOTES

ASSIGNMENTS

RELATED RESOURCES

DOWNLOAD COURSE MATERIALS

Instructor(s)
Prof. Isaac Chuang
Prof. Neil Gershenfeld

MIT Course Number
MAS.863

As Taught In
Fall 2002

Level
Graduate

CITE THIS COURSE

Photo of the MIT Media Lab waterjet cutter at work. (Courtesy of Prof. Neil Gershenfeld and Prof. Isaac Chuang.)

Course Description

This course provides a hands-on introduction to the resources for designing and fabricating smart systems, including CAD/CAM/CAE; NC machining; 3-D printing; injection molding; laser cutting; PCB layout and fabrication; sensors and actuators; analog instrumentation; embedded digital processing; wired and wireless communications. This course also puts emphasis on learning how to use the tools as well as understand how they work.


The Fablab Network

- A Global network of more than 2700 Fablabs
- Started by MIT's Center for Bits & Atoms
- Open access workspace
- Standard inventory of digital manufacturing machines
- Principle 1: **make (almost) anything**
- Principle 2: **make here --> make anywhere**
- Fab Charter: sharing of knowledge & information
- Provide safe environment to explore & make



Neil Gershenfeld
Director of MIT's
Center for Bits & Atoms

Intellectual father of the
Maker Movement



Give ordinary people
the right tools, and
they will design and
build the most
extraordinary things

Neil Gershenfeld

PICTUREQUOTES.COM



How To Make Almost Anything?

Chinese Master Carpenter Makes Toys for His Grandson With Skills Used to Build the Forbidden City

Carl Samson · September 28, 2020



Differences (from Traditional Methods)

- Traditional

- Requires skilled craftsman
- Slow, labour intensive
- Not easily scalable
- Changes requires rebuild



- Digital fabrication

- Fast, convenient prototypes
- Lowers barriers to product development
- Easily scalable
- Production ready prototypes
- Easy path from prototype to production



Benefits of Digital Fabrication

- Pros

- Computer assisted, saving time
- Repeatability
- Changes are easy
- Personalized product
- Localized production
- Less wastage
- Complex products don't cost more
- Faster than regular manufacturing methods

- Cons

- No economies of scale, first product costs as much as 1,000th
- Not beneficial for mass production
- 3D printing takes longer
- Machines require maintenance & consume power
- Initial equipment cost

Benefits of Fablab/Digital Fabrication

What do people learn from using digital fabrication tools?



Fellow

by Erin Riley - Sat, 08/08/2015 - 20:39



Develop multiple skills



STEAM literacy



Creative thinking



Self-confidence



Future-proof skills

Fablab SKILLS

- Tech Leaders & Specialists in DF
- 21st Century fabrication skills:
 - Web development
 - Computer Aided Design
 - 3D Printing & Scanning
 - Computer Controlled Cutting
 - 2D CNC Machining
 - 3D Precision Machining
 - Electronics Design & Production
 - Embedded Programming
 - Applications Programming
 - Internet of Things



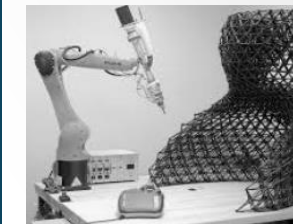
Manufacturing

Precision Engineering



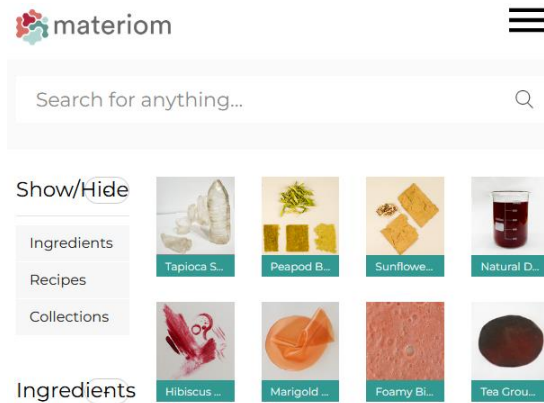
Electronics & Semiconductors

Telecomms & Industry 4.0



Architecture & Design

What Can You Make in a Fablab?



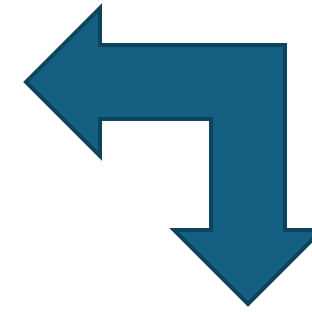
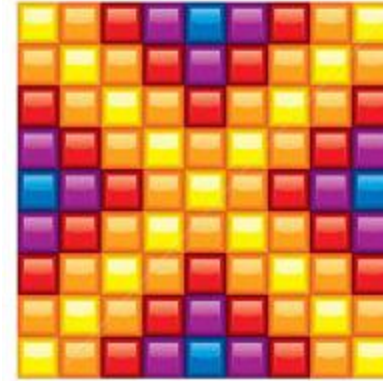
Applications & Implications

- [Medical](#)
- [Electronics](#)
- [Network](#)
- [Materials](#)
- [Machines](#)
- [Drones](#)
- [Microscope](#)
- [Environment](#)
- [Prosthetics](#)
- [Agriculture](#)
- [Houses](#)
- [Cities](#)
- etc



An Example of Digital Fabrication

- Empathy/Define
 - Create new market for onigiri
 - Not cocktail party friendly
 - cheaper than better, better than cheaper.
- Ideate
 - Cube shape onigiri
 - Variety of fillings
 - Graphical arrangement
 - Marketing strategy



An Example of Digital Fabrication

- Prototype
 - Design 3D object using tinkercad/123D
 - 3D print the object
- Testing
 - Prototype
 - Confidence testing
 - Market acceptance



Digital Fabrication is

- FUN
- Interesting
- Engaging
- Creativity
- Empowering
- Liberating

