Make-a-tion:
3D Printing Workshop
July 13 2013

James H. & Jeff P.
w/ help from Brian W.
The 3D printing revolution is now!
How does it work?

http://www.youtube.com/watch?v=nhULZQaT-Hs
What is needed to be a 3d maker

- Motivation, willingness to learn
- Consideration and patience
- Use of free, open source software
- Your object in STL format
- MU's 3D printer (Solidoodle)
- Plastic (ABS or PLA)
- $1 suggested donation
- Tweaking of object, setup and profile
Object design & post-processing (CAD)

Slicing & printer control (CAM)
• Create a 3-Dimensional drawing
• Export to standard 'STL'
• Check Dimensions and placement!!!
• Examples:
  • Shapesmith.net / Tinkercad.com
  • SketchUp
  • Blender
  • OpenSCAD
  • Wings3d
Alternatively, find ready to print 3D models.

**thingiverse.com**

- Look at “Featured” for ideas
- Some are customizable (web-based)
  - OpenSCAD under the hood
- Social media features
- Anyone can upload, remix, and share
Showing things containing the words: bottle opener

Search Results (93 things)

Pocket Coin-Op Bottle Opener by br3ttb
(Note: There's now a better, tapered version. I recommend that you print this instead: http://www.thingiverse.com/thing:12346 I was ashamed Thingiverse. So ashamed. I presented the Mighty Bottle Opener as the pocket equivalent to Starno's Coin-Op. It wasn't. It isn't. I just wasn't able to find a reliable way to protect the plastic....
Published: Aug 25, 2011 on Aug 25, 2011
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Luther College Norse Bottle Opener by smb1985
This is a bottle opener that uses a penny, and it has the shape of the Luther College Norse logo!
Published: Sep 2, 2012 on Sep 2, 2012
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Mighty Bottle Opener by br3ttb
UPDATE: I've been unable to find a reliable way to protect the plastic with this design. If you're using PLA, keep reading; people have had good results. If you're printing with ABS however, I recommend using this updated design: http://www.thingiverse.com/thing:11025 The Coin-Op Bottle Opener ( http://www.thingiverse.com/thing:1842 ) is awesome....
Published: Jun 16, 2011 on Jun 16, 2011
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M8 washer-operated Bottle Opener by Erik
I spent my last penny, so I needed to (pi)prrove this thing :D No seriously, the penny is the most expensive part of this bottle opener. So I decided to reduce its cost drastically. Well, actually, I simply didn't have any US coins at my disposal and even a penny makes for a pretty bulky bottle-opener, so I decided to use what every Mendel hacker...
Published: Feb 24, 2011 on Feb 24, 2011
License: Creative Commons - GNU GPL
Your Idea → 3D Modeling Software → 'STL' File → Slicer → G-code → G-code Sender → Printer → Final Product
Generate your own STL

1) Log in or register at Thingiverse.com

2) http://www.thingiverse.com/thing:60770
   1) “Open in Customizer”
   2) Suggested settings
      1) 1 badge, 20mm
      2) Your name, date, UM, whatever you would like
   3) “Create Thing”

3) Wait for it to finish (few min.)
   or edit OpenSCAD file of the same design
   or pick out from the selected objects
   or use your own (<5 min print time please)
STL file format

- STL = STereoLithography
- Define a surface with triangles (3 points)
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http://code.google.com/p/gcode2vtk/
Cura Demo
Print your object

From steps listed on handout:

7. Run Cura
8. Load the profile you want
9. Load your STL object
10. Make sure it is flat on the printing surface, check for overhangs and problem meshes
11. (optional) save your gcode
12. Start print dialog
G-Code

```plaintext
G1 X5.62 Y38.68 Z0.6 F750.0
G1 X8.4 Y38.68 Z0.6 F750.0
G1 X8.4 Y38.68 Z0.6 F750.0
G1 X11.2 Y38.68 Z0.6 F750.0
G1 X11.2 Y38.68 Z0.6 F750.0
G1 X14.0 Y38.68 Z0.6 F750.0
G1 X18.0 Y38.68 Z0.6 F750.0
G1 X16.8 Y38.68 Z0.6 F750.0
G1 X19.6 Y38.68 Z0.6 F750.0
G1 X19.6 Y38.68 Z0.6 F750.0
G1 X22.4 Y38.68 Z0.6 F750.0
G1 X22.4 Y38.68 Z0.6 F750.0
G1 X25.2 Y38.68 Z0.6 F750.0
G1 X25.2 Y38.68 Z0.6 F750.0
G1 X28.0 Y38.68 Z0.6 F750.0
G1 X28.0 Y38.68 Z0.6 F750.0
G1 X30.8 Y37.0 Z0.6 F750.0
G1 X30.8 Y38.68 Z0.6 F750.0
G1 X33.6 Y38.68 Z0.6 F750.0
G1 X33.6 Y33.64 Z0.6 F750.0
G1 F600.0
G1 E146.0219
G1 F750.0
G1 X-33.6 Y-34.48 Z0.6 F3000.0
G1 F600.0
G1 E146.0219
```

Layer 10 - Going Up - Z = 2.15 mm
Heated stage is critical for print quality!

Let stage cool to remove sample

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STL problems:

Fix with original program, netfabb, meshlab, blender, etc.

http://www.netfabb.com/stl_repair_fixing.php
Automated Repair with Netfabb

http://cloud.netfabb.com/

new age fabbing software

netfabb Cloud Services
1) Problems with STL files
   - File formats and meshes
   - Automated repair (Netfabb cloud)
   - Remeshing, editing, resizing (Blender)
   - Manual editing (Netfabb basic, Meshlab)

2) Physical problems / additive printing limitations
   - Splitting up (Blender)
   - Placement (ReplicatorG, Plater)
Finishing your print

- Sanding
- Acetone
- Polishing

http://solidoodletips.wordpress.com/2012/10/24/diy-smoothing-station/
Reminders

Do's:
• Ask questions if you aren't sure
• Be considerate of others
• Emergency power-down if it makes awful noises
• Keep an eye on the printer while running, especially the filament feeding
• Double-check that you are using the profile you want
• Donate to keep the space and printer sustainable
• Share what you print!

Don't's:
• Extrude or retract without first heating up the printhead
• Print objects that are too big for the bed, or too tall
• Move the printhead past it's range of motion
• Scrape the printbed, or pry up hot prints
• Leave the printer on, or keep it hot unnecessarily
• Make a tangle of the filament
Suggested practice:

www.thingiverse.com/apps/customizer/run?thing_id=116042
What do you want to make?
Learn More – meetings on:

- Pronterface howto
- Slicing tips and progs.
- Cleanup and fixing
- Downloading & sharing
- Sketchup, Blender howto
- CAD programs howto
- Firmware and Gcode
- Pictures → 3D models
- 3D scanner build
- Casting from prints
- Building your own printer
- Many many more . . .
Other upcoming Make-a-tion Workshops

July 27
  11am Soldering I/II + Post-It speakers
  3pm AdaFruit LED Clothing/Glowing Chuck Taylors

Aug 10
  11am Pewter casting
  3pm DIY BrewYOBeer

Aug 24
  11am Home Router Hacking
  3pm Arduino Robotics

Aug 31
  End of Summer Make-a-tion Party