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

<u>3d printing steps (simplest method):</u>
Beforehand / on your own computer:
1. Get an STL file of your object
2. Run it through Netfabb cloud (optional if it is a good mesh)
3. (optional) check it on your own install of Cura.

On the printer computer:
4. Make an optional donation
5. Transfer STL to the printing computer (in your own sub-directory, not the Desktop)
6. Turn on the solidoodle, make sure the filament is untangled
7. Run Cura (The C on the desktop)
8. Load the profile you want (File → Open file)
9. Load your STL object (File → Load model)
10. Make sure it is flat on the printing surface, check for overhangs and problem meshes
11. (optional) save your gcode (File → save GCode)
12. Start print dialog (File → Print)
13. If the filament is not set up, control the printer
    1. heat up by typing in temperature on the "temperature" tab
    2. Control location by using the "jog" tab
        1. Move off bed (z axis)
        2. retract while removing filament, secure roll
        3. insert new filament and extrude while collecting with tweezers
        4. home on all axes
14. Print
15. Monitor filament feeding, temperature, etc.
16. Let cool down before removing
17. Gently pry up your part
18. Home printerhead
19. Shut down programs, log out
20. Power down printer

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!

Dont'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

Software and sites for 3D design and printing

3d object design (CAD)

Places to download 3d models:
- Thingiverse.com
- Google.com/3dwarehouse
- Hangar.openvsp.org
- 123dapp.com/Gallery
- 3dvia.com
- ThePiratebay.se/browse/605
- Various people's github pages

Free Software to design objects:
- Shapesmith.net (open source)
    - Web-based, very easy to use
- 3dtin.com
    - Web-based, very easy to use
- tinkercad.com
    - Web-based, very easy to use
- Sketchup
    - good for architecture and CAD
- Blender (open source)
    - 3D modeler, large community
- Winds3d (open source)
    - full featured CAD
- FreeCAD (open source)
    - CAD, MCAD, CAx, CAE and PLM
- OpenSCAD (open source)
    - programmatic, fully parameterizable

Other generation methods:
- Scanning objects:
    - laser line and webcam-based
    - Kinect-based
    - picture knitting-based
- Mathematic software
- Processing-generated

Object Cleanup and repair:
- Cloud.netfabb.com
- Meshlab (open source)
- Blender (open source)

3D printing software (CAM)

Printer control
- Cura (for Ultimaker and others)
    - control, placement and slicing
    - uses heavily integrated SF
    - simplifies
- ReplicatorG (for MakerBot and others)
    - control, and placement, can call SF
- pronterface (part of Printrun)
    - control, part placement
    - can call SF (or Slic3r)

Object placement tools:
- Cura
- ReplicatorG
- placer (part of printrun)

Slicing programs
- Cura built-in
    - Uses SF, heavily modified
- Slic3r
    - standalone or run from Printrun
- Skeinforge
    - standalone or run from controller
- RepRap host built-in
- SFACT (mod of SF), SuperSkein, etc...