

3D Printing for Hackers

By: Dave Johnson





“Hello, world!” - I’m Dave.

- Cybersecurity practitioner for over 25 years.
- “What would you say you do here?”...
 - 2x Hacker/Makerspaces founded
 - 1x Cyber/Maker Conference (and another potentially in the works)
 - Former Code for America Chapter leader
 - Cyber Community Leader for DefCon and 2600 chapter groups in the late 2000’s and early 2010’s.
 - Cybersecurity writer.
 - Security Weekly guest host.
 - Public speaker (including SxSW)
 - Solve problems of all shapes and kinds.
 - Learn about and maintain functional knowledge of all different kinds of things.
 - I help people do better cyber.
- Collector of antique reference and sci-fi books
- Tiki aficionado
- Amateur Shantyman

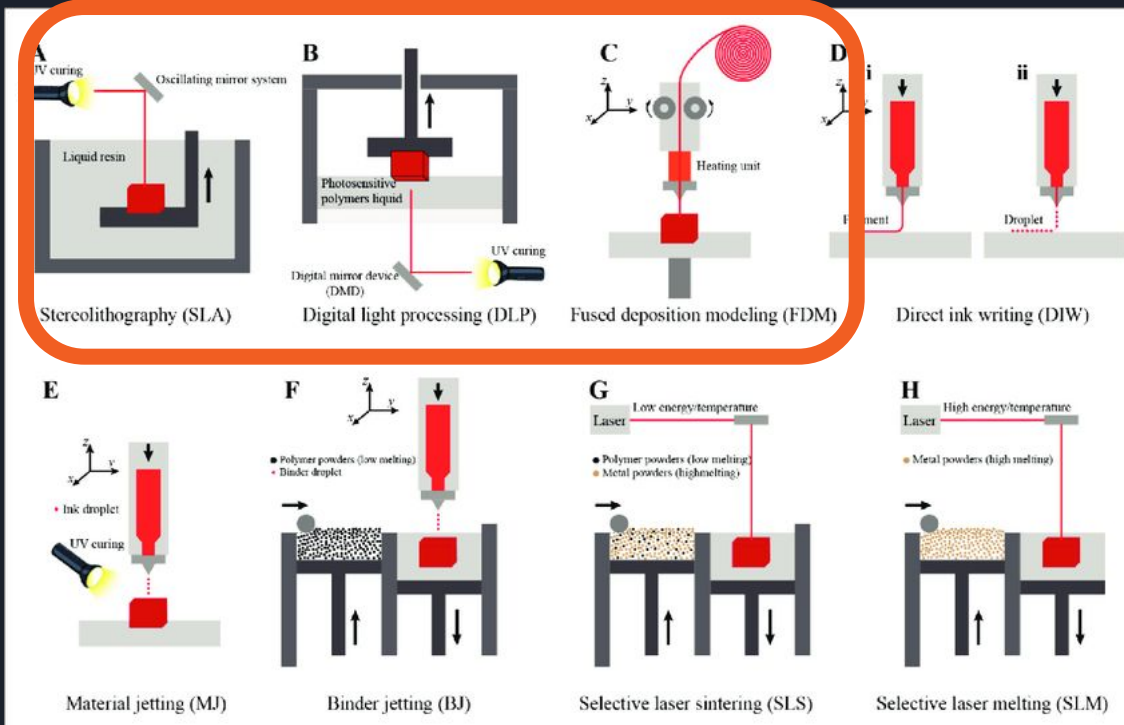


Agenda

- What it is?
 - Printer Types
 - How do they work?
 - Materials
- What it aint (yet).
- What do?
 - GET /3D Printer HTTP/1.1
- Will it Blend(er)?
- New printer, who dis?
- Hackability
 - GCode
 - Lasers
 - Privacy

What it is?

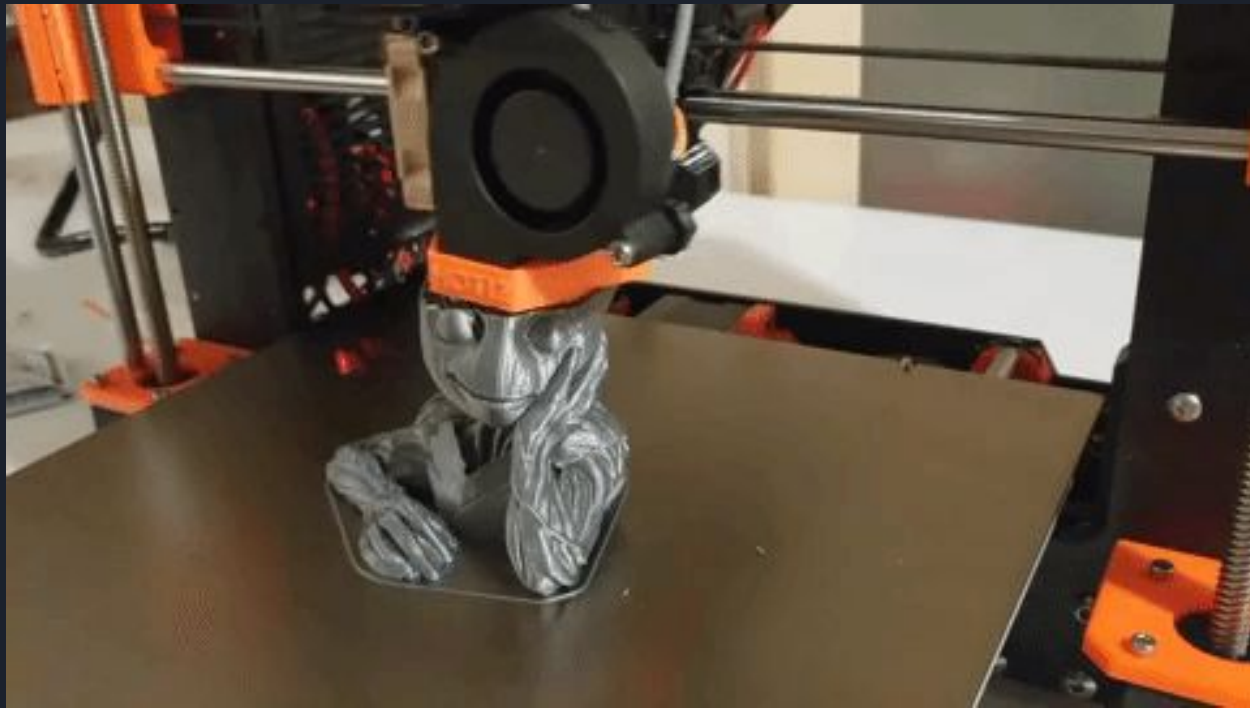
The process of making 3 Dimensional objects.



How does it work?



How does it work?

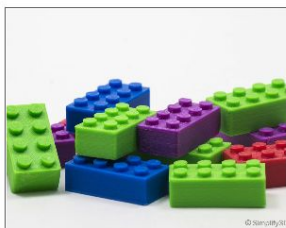


Printer Types





Filament Types



ABS

ABS is a low-cost material, great for printing tough and durable parts that can withstand high temperatures.



Flexible

Flexible filaments, commonly referred to as TPE or TPU, are known for their elasticity allowing the material to easily stretch and bend.



PLA

PLA is the go-to material for most users due to its ease-of-use, dimensional accuracy, and low cost.



HIPS

HIPS is a lightweight material most commonly used as a dissolvable support structure for ABS models.



PETG

PET and PETG filaments are known for their ease of printability, smooth surface finish, and water resistance.



Nylon

Nylon is a tough and semi-flexible material that offers high impact and abrasion resistance. It is an ideal choice for printing durable parts.



Carbon Fiber Filled

Carbon fiber filaments contain short fibers that are infused into a PLA or ABS base material to help increase strength and stiffness.



ASA

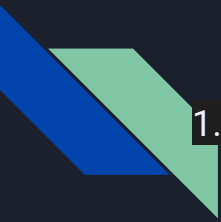
ASA is a common alternative to ABS and is great for outdoor applications due to its high UV, temperature, and impact resistance.



Printer Features (mostly FDM)

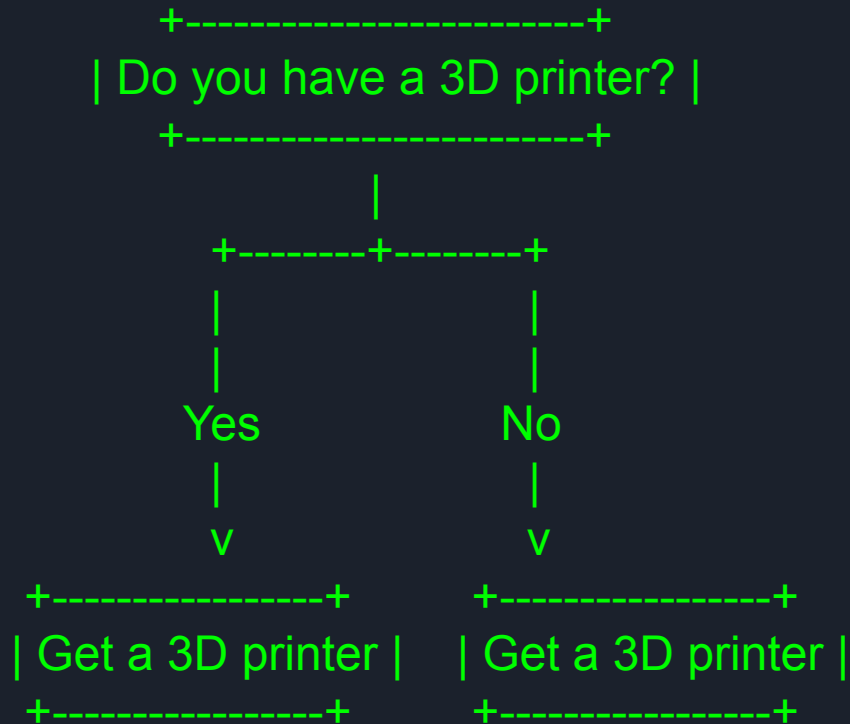
- Axis types
- Cameras
- Error Detection
- Vibration compensation
- Easy removal
- Speed
- Automatic feeding
- Auto-Leveling
- Multi-material handling
- Temp control
- Quick change nozzles

What 3D Printing ain't.

- 
1. 100% Safe
 - a. PLA and PETG aren't deadly, but we don't know the long term effects of 3D printing fume and particulate inhalation.
 - i. Most filaments and resins require sufficient ventilation to prevent **severe injury or death.**
 - ii. We don't know what producers put in their filaments.
 - b. Printers get hot. Fire risk is real.
 - i. Smart smoke detectors and auto extinguishers are popular choices.
 - c. What 3D printers produce are not suitable for small children.
 - d. Not suitable for long term structural parts (yet).
 2. Necessarily UV resistant or waterproof.
 3. Foolproof
 4. Food Safe!
 5. Cheap
 - a. There's always more filament you "need" for a project.
 - b. Some STL's cost money.
 - c. Printers themselves can be expensive.
 6. Portable (but that's changing).
 7. A way to avoid copyright law.
 - a. NAL - Don't make and sell copyrighted materials if you don't want to do crimes.



How to start?



New printer, who dis?

- Your local Library
- UPS Stores
- Maker spaces
- Friends with 3D Printers





Let's begin!

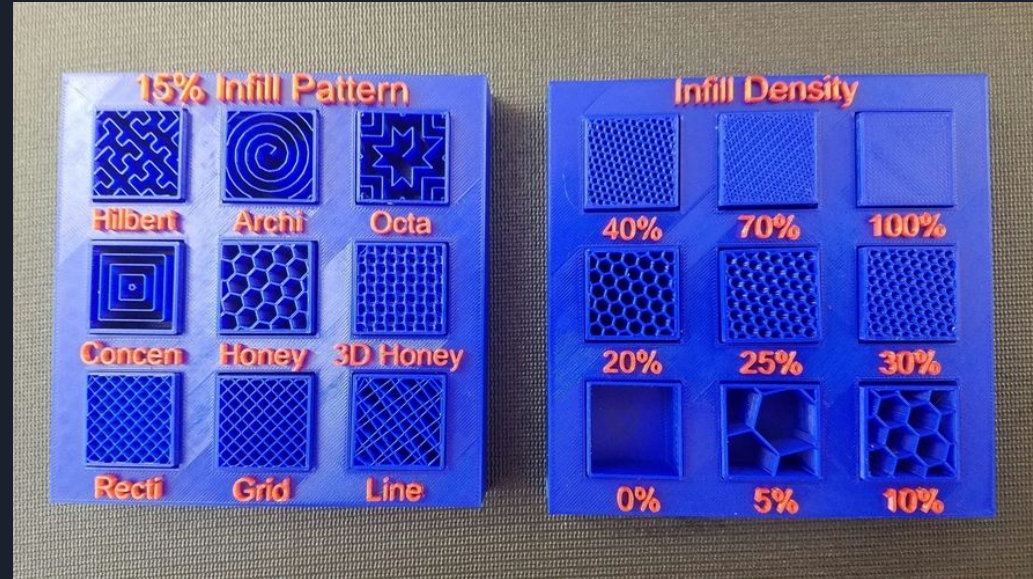
1. Get a 3D printer
 - a. Find a well ventilated space for it.
2. Install the slicer software
3. Choose a file (STL)
 - a. Layer height
 - b. Speed/Temp/Extrusion Rate
 - c. Walls
 - d. Infill style
 - e. Skirt
 - f. Supports
4. Send it to the 3D printer
5. Profit!

Will it Blend(er)?

 Blender	 SketchUp	 Tinkercad
 Meshmixer	 Fusion 360	 Cura
 FreeCAD	 PrusaSlicer	 3D Slash
 Sculptris	 SOLIDWORKS	 SelfCAD
 OpenSCAD	 Wings 3D	 ideaMaker
 Leopoly	 MeshLab	 3D Builder
 OctoPrint	 Vectary	 ZBrush
 3ds Max	 Lychee Slicer	 Introduction To 3d Printin...

WTF is “infill”?

“Infill is the internal structure of a 3D printed object, and it's made of plastic. It's created using a pattern in the slicing software that's used to prepare parts for printing. The infill's purpose is to improve the part's strength, weight, and printing time.”



What do?...

ME EVERY 10 SECONDS

**SPOTTING A PROBLEM AROUND THE
HOUSE THAT NOBODY KNEW OR CARED ABOUT
THAT I COULD NOW SOLVE WITH MY 3D PRINTER**

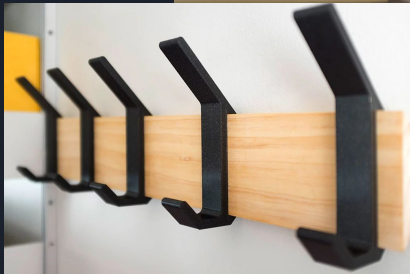
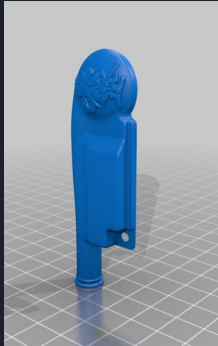
imgflip.com

What do?...

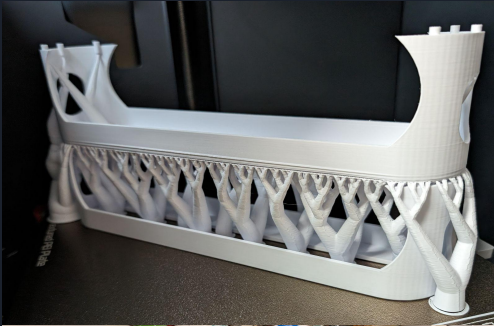


The Internet (from "The IT Crowd")

RobTFirefly August 18, 2013



What do?... pg2





Where to get 3D files to print?

(you can also design your own)

1. [Thangs.com](https://www.thangs.com) (search engine)
2. [Cults3d.com](https://cults3d.com)
3. [Thingiverse.com](https://www.thingiverse.com)
4. [MakerWorld.com](https://makerworld.com) (Bambu Lab)
5. [Printables.com](https://www.printables.com) (Prusa)
6. [MyMiniFactory.com](https://www.myminifactory.com)
7. 3d.si.edu - Smithsonian Institute
8. [SketchFab.com](https://sketchfab.com)
9. AI image generators*



Hacking stuff

Hack-atunities?

1. GCode
2. Lasers
3. Privacy
4. Printed circuitry
5. Embedded electronics
6. Drones and Robots
7. AI 3D model generation
 - a. Meshy
 - b. Tripo
 - c. InstantMesh (HuggingFace project)
8. Physical object scanning
 - a. Luma Labs

```
M140 S60 ; Set bed temperature to 60°C  
M104 S210 ; Set nozzle temperature to 210°C (for PLA)  
G28 ; Home all axes  
G1 Z5 F5000 ; Raise Z axis  
M190 S60 ; Wait for bed temperature  
M109 S210 ; Wait for nozzle temperature  
G92 E0 ; Reset extruder position  
G1 F1500 E-4 ; Retract filament to prevent oozing
```



Gimmie the links!!!

1. Hackaday.com
2. Simplify3d.com/resources/materials-guide/
3. Formlabs.com/3d-printers/
4. Prusa3D.com
5. Thangs.com
6. Cults3d.com
7. All3dp.com
8. Thingiverse.com
9. Printables.com
10. Yeggi.com
11. MyMiniFactory.com
12. 3d.si.edu - Smithsonian Institute
13. SketchFab.com
14. CdC Challenge Coin - thingiverse.com/thing:4649703
15. Cap'n Crunch Whistle - thingiverse.com/thing:2630646



Gimmie the links!!! (part deux)

1. Youtube
 - a. CnC Kitchen
 - b. The Edge of Tech
 - c. Uncle Jessy 3D
 - d. Maker's Muse
 - e. The Next Layer
 - f. 3D Printing Nerd
 - g. Teaching Tech



Thank you!

<https://www.linkedin.com/in/DavidJohnsoninfosec>