How 3D Printers Work

By

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EGR120

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# Initial OUTLINE

1. Introduction
2. Open w/ problem, “Broken appliance component, not sold separate” or other
3. Discuss Pre–3d Printer Options
   1. Buy new one (thousands)
   2. MacGuyver new one (has to be replaced often, unreliable)
      1. Show brief clip of MacGuyver making some crap
4. Discuss Post–3d Printer Options
   1. Show picture or scan of object Sam will print
   2. Show Sam’s printed object
      1. Make this whole section seem easy breezy
5. Survey – Quick Informal
6. 3d printing IS the future
7. Touch on usage by major companies, push for commercial market, etc
8. Despite that, it’s still treated like a novelty
   1. Survey question / humbling moment – “How many of you know how to configure a paper printer? Or how it works?” pause for affect, follow up “Yet how many of you know how to use/have used a 3d printer?”
9. Specific Purpose
   1. “When you leave today, you will know How 3D Printers Work” - - Quietly add “or be well rested from a 10-minute nap” (yay humor)
10. Hardware
11. Sam adds Hardware Outline here
12. [Detail of the information]
13. [Detail of the information]
14. [Second supporting information for the sub-topic]
15. [Detail of the information]
16. [Detail of the information]
17. Software
18. Since 3D printing is essentially the process of creating a physical object from a digital file, there are several steps that the file needs to undergo before it can be transformed into a tangible object; these steps are all performed via specific software.
19. The very first step in 3D printing is to create a digital model of the item to be printed.
20. This can be done by either creating the model in one of the many available 3D modeling applications, or by using a 3D scanner.
21. 3D modeling applications include computer aided design (CAD) and animation modeling software. Either can be used to create the “blueprint” for the object you want to print.
22. 3D scanners are used to make a 3D digital copy of an already existing object (*Citation 1*).
23. Alternatively, a pre-made 3D model can be downloaded from a repository (*Citation 3*).
24. Once the 3D model is created, the file needs to be converted into a format readable by the 3D printer.
25. The first stage in this conversion is a process called “slicing” or, less frequently, “cross-sectioning.”
    1. The process of slicing is completed by specific software, and involves dividing a 3D model into many horizontal layers that will define how the object is printed (*Citation 1*).
    2. The resulting “digital cross-sections” are used to help guide the printer as it builds the object layer by layer—“slice by slice” (*Citation 2*).
26. After your model has been sliced, the file is converted into G-code.
    1. G-code consists of the “commands your printer interprets and executes while printing” (*Citation 4*).
    2. Essentially, G-code is a set of instructions for the 3D printer, which tells it how to move in order to create the model.
    3. Finally, the file is in a format readable by the 3D printer, and can be uploaded via USB, SD, or wifi (*Citation 1*).
       1. After the file is uploaded to the printer, the object is ready to be printed.
       2. “The 3D printer reads every slice [as a 2D image] and creates a three dimensional object” by building it up layer by layer (*Citation 1*).
27. Uses
    1. Business uses
28. Makes detailed porotypes in house when needed
    1. Doesn’t need to be outsourced to be made
    2. Make as complex as need
    3. Make whenever in demand
29. Creation of Organs
    1. Made out of patient’s cells
    2. Doesn’t need to wait to be delivered off the transplant wait list
    3. Can make several various without wait
30. Printing in the aerospace program
    1. Printed an improved engine injector that improved the thrust ten fold
    2. Parts can be parted when ever need in space
31. 3d printed prosthetics
    1. Make customized to patients needed
    2. Is light weight compared to other prosthetics
    3. Is inexpensive and quicker in production
32. Printing things that help the senses
    1. Printing of a bionic ear with better hearing than a normal ear
    2. Allows the blind to print out objects from online
    3. Personal uses
33. Can make replacements for broken parts around the house
    1. No need to order out for the parts and wait for it to be delivery
    2. Don’t need to pay a large sum for a customized or unique part
34. The creation of tools and useful deceives
    1. Make specialize tools that would be hard to come by otherwise like a wrench
    2. Thinks like a SD card holder or wall outlet holder that make things easier to find and use
    3. Clever creations that make improvements on everyday objects like a plastic bag handle or an earphone holder
35. Cost Efficiency
36. Macro Cost
37. Still a misconception on cost
    1. List original prices for 3d printers
    2. List current prices for 3d printers of better quality
38. Compare to SSD Memory
    1. Original prices of SSD vs evolution prices
    2. Stats for lag on consumer purchases
    3. tShow similar stats for 3d printer purchases
39. Micro Costs
40. Show cost comps for each discussed scenario
    1. Introduction appliance scenario
    2. One of Megan’s more compelling or expensive uses
    3. One of Megan’s more fun uses
41. Large scale averaged cost of a perishable compared to re-purchases
42. Conclusion

In the introduction, we discussed how common the knowledge of paper printer usage is versus it’s more dimensional successor. Some of you (or all of you) may have thought, “Well duh! Of course we know how to use printers! We need them every day!” without considering something. We live in a digital age, where the desire to be unencumbered with hard copy prints is only surpassed by the desire to be green and overpay for effective marketing at Whole Foods. Yet we’re still using paper printers! The incredulity shown toward 3d printing should really be directed at its predecessor, which has been rendered moot by technology but still [somehow] holds sway. Sure, this is partially due to aging University Professors who tout Academia and how smelling paper somehow helps them grade more efficiently [wink at Prof. Scalea], but it’s mainly because we don’t like to ask questions. We don’t like to upset the status quo because it’s easy. Despite the fact that 3d printers no longer cost much more than paper printers, or that they are eminently more useful, their eventual acceptance will be delayed because we are afraid of having to learn something new. Our genuine hope is that our presentation today will shed some of the misconceptions, and teach you enough to be excited to learn more.

[Your Name]

Instructor: John Scalea

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Click here to type the body of your report. All paragraphs are indented and double-spaced.

# Works Cited

**Citation.** The text begins at the left margin of the paper. Lines are double-spaced. When the entry is longer than one line, the second line is automatically indented.

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# Checklist

1. The outline
2. The introduction states the main topic or idea of the outline, and the conclusion summarizes it.
3. Each sub-topic describes the main idea for a paragraph.
4. Supporting information and details for a sub-topic are listed under the sub-topic, with each piece of information listed separately.
5. When supporting information is listed under a sub-topic, there are at least two pieces of information listed. If there is only one piece of information to support a sub-topic, the information is included in the sub-topic.
6. The paper
7. The paper follows the organization of the outline.
8. Each paragraph in the paper matches a sub-topic in the outline, and presents the information and details listed under the sub-topic.
9. Each paragraph includes a topic sentence that summarizes the main idea of the paragraph.
10. Every sentence begins with a capital letter.
11. Every sentence ends with a period, question mark, or exclamation mark.
12. All words are spelled correctly.
13. There are no missing words.
14. Works cited
15. Every source has a specific reference in the paper. Include only the sources that are mentioned in the paper.
16. Each entry follows the correct format for the type of reference.
17. Entries are listed in alphabetical order, according to the author’s last name.

# Tips for Writing Your Report

1. Create a schedule
2. Identify the tasks you need to do.
3. Arrange the tasks in the order you’ll need to do them.
4. Estimate how long each task will take. Be sure to allow enough time for editing and making changes.
5. Identify the date the report is due, and then set a schedule showing what work you’ll need to do each day in order to have your report ready on time.
6. Add interest
7. Use graphs and charts to illustrate an idea.
8. Add a picture, photo, or drawing.
9. Include a map.
10. Find a quotation and use it to make your point.
11. Make every word count
12. Choose words your reader will understand. Remember that you want to communicate your ideas to the person reading your paper.
13. Avoid clichés.
14. Use a thesaurus to replace overused words and find new ways to express your ideas.