2018 Spring: BCT 420 / ECO 620 - Designing with 3D CAD & BIM

Project 2 - Digital Fabrication (3D Printing) with SketchUp

In this project, you'll use SketchUp for the design and fabrication of a physical object. This will give you the opportunity to practice your digital design skills but also lets you work through design-to-fabrication steps by designing and pre-fabricating an object in SketchUp and then creating a scaled or full-scale model. Think of this assignment as a smaller version of assembling buildings. After all, the Design Building has many digitally-fabricated structural components.

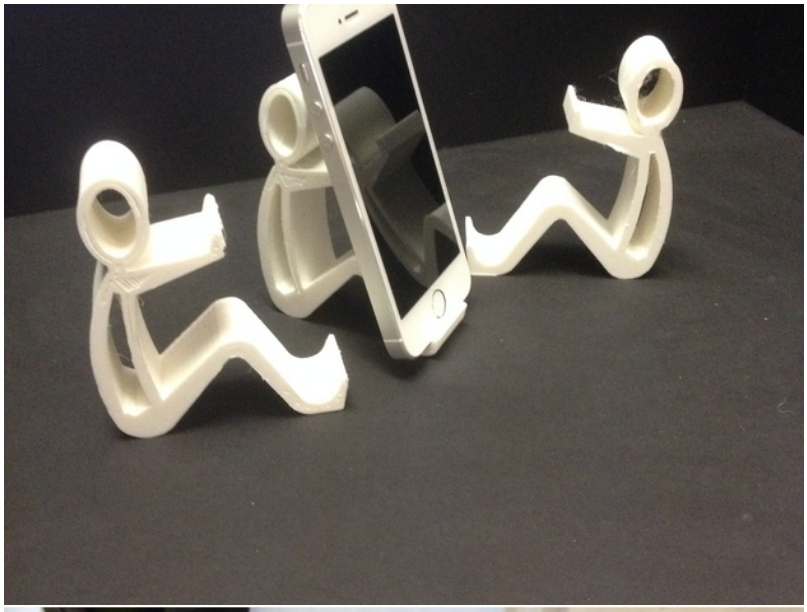
Please note: The library will provide free 3D printing up to a maximum value per person. You may be required to pay any difference above that.

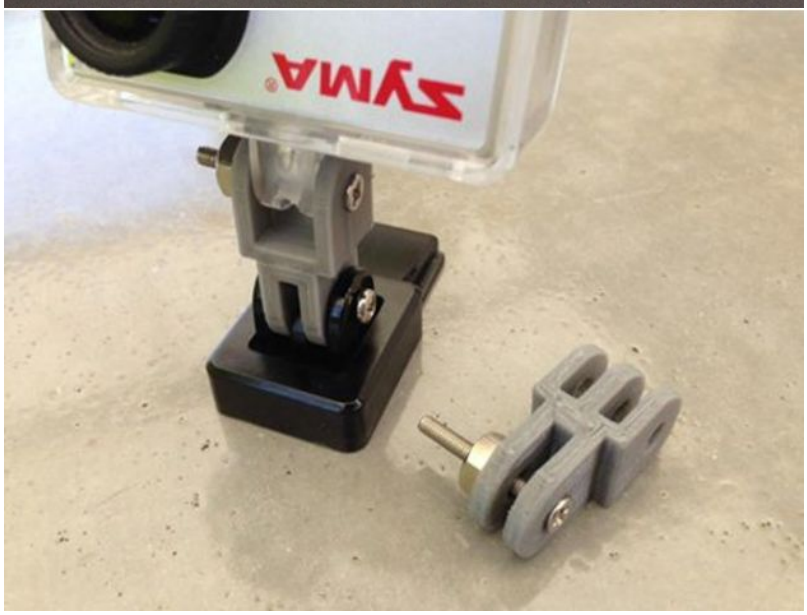
A Useful 3-D Printed Fixture/Object

For this exercise you are asked to create an attachment part or a useful tool with 3D printing. This object does not need to be too complex but has to be something that "fits with something else", i.e. you will need to know exact measurements of another object to be able to correctly design this object. Good examples are the ones shown below (e.g. a phone stand).

Design the part using SketchUp, export the file as an STL and then print it on the library's MakerBots. Your design should be unique but it absolutely MUST be modeled by you!

Some examples for inspiration (not for copying!):

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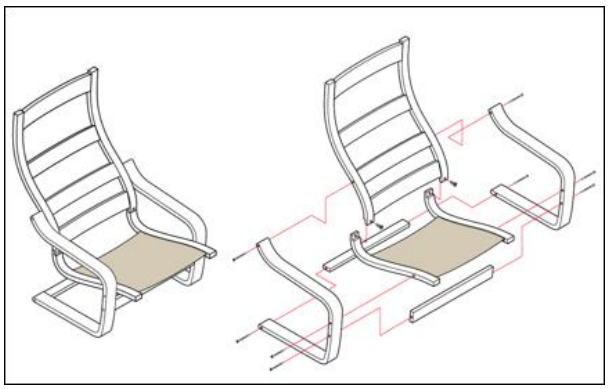
Instructions:

1. **Come up with a design** for your object. You may combine other materials with the 3D printed part (e.g. machine bolts). Make sure the actual size is "doable" with the means at hand and during the allotted timeframe. It shouldn't be too large or require too much plastic. A minimalistic design is best!
   Is teamwork allowed? Of course, you can work with classmates on this project, however, you must be designing, creating and handing in your own object.
2. **Design it so that it can be produced** and assembled using 3D printing. Make sure you model each element at a detail level sufficient for manufacture. Carefully consider tolerances for any mating parts! It might be helpful to imagine the parts like the exploded view shown lower on this page.
3. Once the 3D SketchUp model is complete, **prepare all the parts for fabrication**. E.g. make a copy and take it apart like an exploded view drawing or show all of the pieces lying on the ground so that you can use this as preparation for manufacture.
4. For 3D printing, **export all parts separately as STL files** and submit them to the DML in the library for printing.

Please Note:

- Check the Moodle site for **instruction videos** for all of the manufacturing techniques. There are also additional videos available on the companion site for the SketchUp book (2nd Edition).
- 3D printing is available at the **Digital Media Lab (DML) in the UMass library** (3rd floor) where they can also provide help with your files.
- Consult the instructor if you need **hand-tools** (box cutters, tape measures, glue guns etc.). Those shouldn't be necessary for the 3D printed objects, though.



Submit:

- The **SketchUp SKP file(s)** (remember: NOT the backup SKB!).
- A **PDF report** containing:
  - 2 perspective views of your model (exported from SketchUp)
  - 2 photos of the completed model
  - Any 2D manufacturing plans or an exploded view, as appropriate
  - A 1-page description of the manufacturing process (include your concept, as well as any lessons learned, e.g. when things didn't turn out as expected)
- **Bring your physical models/objects to class!** Some models will be exhibited in our classroom!

Grading Base:

- A well thought-out and creative design that considers the manufacturing steps.
- A well executed and precise 3D model. Cleanliness of model and geometry.
- A thorough documentation that could actually serve as instructions for someone else to build the object.

Visible groups All participants ▼

Grading summary

Participants	27
Drafts	0
Submitted	0
Needs grading	0
Due date	Sunday, February 25, 2018, 11:55 PM
Time remaining	14 days 1 hour

View/grade all submissions

Submission status

Attempt number	This is attempt 1.
Submission status	No attempt
Grading status	Not graded
Due date	Sunday, February 25, 2018, 11:55 PM

Time remaining	14 days 1 hour
Last modified	-
Submission comments	Comments (0)

Add submission

Make changes to your submission