ME 411 Mechatronics @ UIC

3D Design and 3D Printing

This lab is to be done individually and at home

The design is due by March 16, 2023 via TinkerCAD (Thu).

The 3D print is due by April 4/5, 2023 (during lab hours).

1 Prelab (not graded)

1.1 Motivation

The goals of the lab are as follows: (1) Introduction to 3D design (2) Introduction 3D printing

1.2 Assigned Reading/Coding

1. **3D Design on TinkerCAD:**. There are many videos on how to design on TinkerCAD. Here is just one of many videos. Feel free to use other videos: https://youtu.be/gOs6Mdj7y_4.

2. **Using the slicer program:** Slicer is needed to convert the 3D design into machine understandable code. There are many slicers. Here is a video of Prusa Slicer: https://youtu.be/SyZkFBEVcpY?t=31. Usually you can go with the default settings on the slicer, 3D print the design, and change the settings based on the quality of the 3D print.

3. **Importing designs from other sources:** For this lab, it is OK to use design on the web and modify them to suit your purposes. One example is https://www.thingiverse.com/. Here is a video that shows how to import designs from thingverse. https://youtu.be/El8p0YT6Tes. You dont have to be limited by thingiverse; feel free to use other resources.

2 Labwork (graded)

Equipment list

1. 3D drawing software Tinkercad.com
2. Slicer programming to convert 3D drawing into machine code for 3D printing https://www.prusa3d.com/page/prusaslicer_424/ (Prusa Slicer)
3. 3D printers (Makerspace at the Roosevelt Road Building or ME250 Lab at the SELE 3294)

2.1 (50 points) 3D Design

You are working for a company that makes custom keychains. Your goal is to make prototype design for future mass production. The keychain would have two customized items: (1) It should have the name of the person, and (2) It should serve one more utility (besides having the flat key ring to slip the keys). Examples of utility functions are a bottle opener, utility knife, belt strap, etc.

Create a prototype design. You can use any name of your choice. You can make your own design from scratch. You can also taken an existing design from the web (e.g., https://www.thingiverse.com/) and modify it to suit the requirement.

Before you can print the design you need to use a slicer. The slicer converts the design into 3D printing instructions and also indicates the print time. These instructions can then be used by the 3D printer to print the design. Here is a slicer that you can use. There are others too. Prusa Slicer https://www.prusa3d.com/page/prusaslicer_424/. **Ensure that your design prints under 1 hour before you submit it to us for grading.**

You will be provided with one flat key ring with 25 mm diameter. See this link for specs: Keychain on amazon

How to submit: On TinkerCAD please submit as part of "Lab9_KeychainDesign" by March 16 (Thu). Your final design should be easily viewable (pan/zoom/rotate) by the instructor/TA.

2.2 (50 points) 3D Printing

You can 3D print the design at the Makerspace at the Roosevelt Road Building or ME250 Lab at the SELE 3294. Both services are free.

Makerspace: You will need to submit the jobs and a form online. Please see instructions here: https://makerspace.uic.edu/project-submission/.

ME250 Lab: Please go to the SELE 3294, T/R/F from 9 AM to 6 PM and M/W 4 PM to PM. Please avoid Friday as the lab is under-staffed. Meet with and schedule a time to the 3D print the part with an undergraduate TA. Please let the TA know that this is for ME511 Mechatronics class. The TA might tell you to modify the design as needed.

How to submit: Please get your 3D printed keychains to the lab on April 4 or April 5. These will be graded by the instructor/TA and returned back to you.