

Senior Design Project Description

Company Name	<i>Industrial Solutions Laboratory</i>	Date Submitted	<i>6/10/2020</i>
Project Title	<i>Investigation, Selection and Commissioning of a 3D Printing Capability for the CAB Lab (ISL CAB)</i>	Planned Starting Semester	Fall 2020

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	4	Electrical	
Computer		Systems	
Other ()			

Company and Project Overview:

The Industrial Solutions Laboratory (ISL) works with Industry partners to develop Capstone projects for the Engineering Senior Design program. The projects are intended to give the students a first experience with engineering projects in an industrial setting, within the bounds of the two semester academic class. ISL staff perform tasks to support the Program for events (Kickoff Breakfasts and Expos), Purchasing for industry projects, 3 labs for project work and a variety of support tasks for the academic aspects of the class.

As the Senior Design Program has grown, ISL has been working with Academic Affairs to secure expanded lab space for our students to use to construct their project work. In January of 2019, ISL was successful in securing additional lab space for approximately 16 teams in the building that is known as the CAB lab. Since that time, ISL has been working to enhance the capabilities of the lab to assist the students in completing their projects. ISL has added many tools and capabilities for student use and this project has a goal to increase that by adding 3D printing capability to the lab. In addition, ISL has funded the development of the UNC Charlotte Engineering Tool Kit. Which is a reference website developed to capture learning on common technologies that are used on Senior Design Projects. See the Tool Kit here:

<https://eng-resources.uncc.edu/unccengkit/>

This project will also make a contribution to the website for 3D printing to aid future Senior Design students to use this technology and the resultant lab equipment.

Project Requirements:

3D printing is a tool well suited to Senior Design. Teams frequently use 3D printing to quickly build models for their proof of concept and prototyping applications. As this has become more popular, the other labs in the College of Engineering can become overwhelmed with demand from Senior Design on top of class and research obligations. The purpose of this project is to bring 3D printing capability to the CAB lab and contribute new content to the UNC Charlotte Engineering Tool Kit.

As 3D printing has become more popular, prices have come down and the amount of choices has gone up dramatically. For this project, the team will analyze the needs of the Senior Design Program and thoroughly research all possible printers which could be used by the Program. This should involve analysis of past and future usage and result in a very detailed recommendation for the most appropriate printers for recommendation to ISL.

Once recommendations are thoroughly discussed and challenged, a purchasing authorization will be made. The students will design a space for the operation of the 3D printers in the CAB lab. This space will provide all needed capability for continuous student usage and maintenance. Students should survey current COE 3D printing labs and develop improvements to current practices based on feedback from current users.

The team will bring the unit/space into operation and test all functionality through sample part design and build. These sample parts should be demonstration parts that show the full capabilities of the machine(s). These parts will serve as examples for future lab students and exhibits for lab visitors, so the examples should be creative and visual.

Team should procure supplies and maintenance items for continued operation and train ISL personal in the maintenance and operation of the machines.

For the Tool Kit, the team will prepare and add content additions regarding 3D printing under the “Mechanical” tab of the website. This will include information for how to design parts for 3D printing and video tutorials for how to use the CAB lab printers.

Expected Deliverables/Results:

- Comprehensive survey of past and future applications which define the capabilities of a target machine
- Industry survey of latest technology price/performance combinations.
- Recommendation presentation for the best options to consider.
- Downselect with mentor and ISL Director for chosen option to implement
- Design of lab space area for 3D printing based on experience of other COE labs
- Purchase selected 3D printer(s) and implement 3D printing station in CAB lab
- Design and print 5 lab samples which creatively demonstrate the full capability of the machine
- Define and document operations/maintenance and re-supply procedures and train ISL to enable them to provide the capability to future students.
- Develop and add content for Tool Kit website tab: “How to Design for 3D Printing”, including video tutorials.



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Disposition of Deliverables at the End of the Project:

Print a part during the Expo and have sample parts on display. Posters to detail the process followed to demonstrate the professional process followed for the capital acquisition and why this printer was the best choice for Senior Design. Equipment returned to operational status in the CAB lab after the expo and demonstrated to be successfully operating within 5 days after the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Interest in 3D printing
- Ability to conduct extensive research which leads to selection of the best price/performance recommendation.
- Interest in developing technical tutorial web content.