# CS191 AND CS191W
## CS SENIOR PROJECT
## INDEPENDENT STUDY  PROPOSAL

This form should be submitted the quarter before work on the project is begun. Completion of 135 units is a prerequisite for CS191 and CS191W. In the space below briefly describe the directed independent study project you plan to complete in order to fulfill the Senior Project portion of the CS program requirements. Discuss your proposal with the faculty member sponsoring and grading your project, your advisor, and the CS senior project advisor (Patrick Young). Submit completed proposals, including required signatures listed at the bottom of this form, to Meredith Hutchin in Gates room 160.
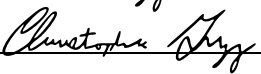
Name:_____Jenny Vo-Phamhi_____Date:__1/28/20____

Email address:_____jennyvo@stanford.edu_____Faculty Sponsor:___Dr. Christopher Gregg___
                                                                      (Please Print)

**Project Proposal:**

    Please refer to the attached page

**Approved By:**

Advisor:__Chris Gregg _Christopher Gregg_____Date:__1/29/2019_____

Faculty Sponsor:__Chris Gregg _Christopher Gregg_____Date:__1/29/2019_____

Senior Project Advisor:_____Date:_____
   (Patrick Young)

<div align="center">**CS 191W Senior Project Proposal**
**Jenny Vo-Phamhi**</div>

**Overview**

I have been writing some analysis methods for computational shape analysis of pre-modern ceramic jars. For my CS Senior Project (CS 191W, 3 units), I seek to organize and package the analysis methods into an actual pipeline/toolkit and develop a user-friendly interface that users of all background, especially archaeologists without extensive technical experience, can easily use. It will include sample datasets that users manipulate to learn how to use the tool.

**Why do archaeologists need this tool, and why will they use it?**

This tool would enable archaeologists to perform effective measurement and comparison of complex shapes using data from entire point clouds. Analysis of ceramic standardization and variation provides a powerful tool for evaluating the scale, organization, and technological practices behind pre-modern production and for gauging the coordination and complexity of past economic systems. The systematic study of jars (amphoras) is required to answer archaeological research questions about standardization. However, the current methods of performing measurement and comparison of complex shapes that are common in archaeology – linear measurements of diameter and height – are limited in their ability to encapsulate jar shapes, which often vary in ways that cannot be captured by those simple linear measurements. Developed entirely with open-source Python libraries, this tool would be free for all to use. This removes the cost barrier is often a problem for many archaeological projects, many of which work with limited funding. They would simply input their point clouds and generate a suite of analyses. Already, archaeologists in Sicily, Naples, Turkey, Canada, and the U.S. have expressed interest in using this tool for their projects once it has been built in a user-friendly way.

**Plan and deliverables**

The user interface will take the form of a Jupyter notebook, for maximum readability and for easy publication of an analysis set. The ease of transferring analysis work to a publishable form is a priority for archaeologists, and archaeologists with whom I have collaborated have expressed that they like the fact that would be able to simply PDF the notebook or include a link in their publications. This also helps to facilitate transparency in archaeological research and analysis.

I will develop a workflow for analysis, involving intake of point clouds of jar fragments to be compared, cleaning the point clouds, visualization of point clouds (in a window where the point clouds can be manipulated and inspected), execution of shape comparison analysis, and presentation of plots and figures. There would be an option for users to easily save the plots and figures and control the look/visual details of the plots and figures so they can include them in papers. There would be clear guidance and emphasis on user friendliness at every step.

For the writing in the major component, I also seek to develop a comprehensive set of documentation and example analysis datasets, like a user manual / user guide. This documentation will walk the user through several different use cases and examples and show the results that the user should get with different manipulations of the data. It will describe the insights one might be able to get from the results of the analyses. It should be thorough but concise wherever possible, keeping in mind the varying technical abilities of the users, and non-intimidating to read and reference.

I plan to test the program by developing a test which will help check whether the tool is running analyses as they should. I will improve the usability of the program by asking archaeologists to use the software on their data and provide feedback about how the tool can be more usable and helpful.

My hope (depending on the timeline of the archaeologists with whom I have been collaborating) is that the tool will be published along with an upcoming paper this year.

I am very excited to work on this project.