

SPU 26 Final Project Fall 2012

The primitive navigation final project will involve researching a topic that requires data gathering and analysis, along with research into the history associated with that topic. The final presentation will take the form of a video that will be posted online.

Structure

The SPU 26 final project will be done either solo or with one to two other people. If you want help finding partners, we have a matchmaking service using an online form. All members in a group will receive the same grade

Timeline/Project Components

Week of Oct. 29th, teams formed

Week of Nov. 5th Topics selected

Weeks of Nov. 19th (Thanksgiving) and Nov. 26th , meet with Prof. Huth

Dec. 11th rough draft of video due

Dec. 16th final version of video due (uploaded to course website)

Project evaluation

The projects should have the following elements:

- 1.) Ability to form a hypothesis and means of testing it by gathering data
- 2.) Historical research. Even recent history is fair game (e.g. satellite dish orientation)
- 3.) Data analysis (using statistical techniques)
- 4.) Conclusion relative to initial hypothesis
- 5.) Presentation – coherency, production values
- 6.) References

While all of these factors are important, they are not all given equal weight. The primary focus of the video should be the content rather than video skills. A well-researched and presented video might receive a higher grade than a video demonstrating superior video production skills that lacks in content. While this project should introduce you to video as an academic medium, it has other parts. The weighting of the grade will be:

25% Historical research, and references

25% Hypothesis design, execution, and analysis

25% Video production value

25% Coherence and thoroughness.

Project-Specific Resources

Harvard is rich in resources that you can and should take advantage of. As you develop your project, please see Prof. Huth of the TF's for help. Obvious resources

include the extensive libraries on campus and computing help.

Most students use software that they already own, such as iMovie for editing. A higher-level software package called Final Cut was used by one group last year. Final Cut is a bit cumbersome but has more flexibility. Most modern digital cameras can take videos, although you may want to find or borrow a higher-end camera.

Some things you might want to consider which you may not be aware of include:

- 1.) Lamont Library has extensive resources in video production, Kevin Guiney there is an expert and has a site license for Lynda.com, an excellent tutorial resource, including video making.
- 2.) Video cameras can be borrowed from Lamont.
- 3.) The Harvard forest can be used as a resource, although transportation will have to be arranged.
- 4.) The roof of the Center for Astrophysics or the Science Center can be made available for studies
- 5.) Sara Schechner, curator of the Museum of Historical Scientific Instruments has agreed to allow students to work with some instruments in the collection
- 6.) Wolf Rueckner, director of labs and laboratory demonstrations in the Science Center has agreed to work with some students and help setup apparatus – e.g. ripple tanks and strobe lights to study waves around islands
- 7.) There may be local researchers who can help out.
- 8.) Many techniques are possible that can enhance your project, such as time-lapse photography, or image stacking. Prof. Huth and the TF's can help with these. We're also fairly adept with computers, and can help projects that require these.
- 9.) Some equipment can readily be obtained at places like Radio Shack, hardware stores and online sources.

Topics

Below is a list of topics. Some of them may require explanation, and I'm happy to go into more depth on any of these. In some cases (e.g. the Museum), you may want to consult with others. In addition to these topics, we're open to others, but discuss them with us beforehand. The lectures, notes, books, or other sources can provide inspiration. I'd be happy to meet with people about potential topics.

We would like to avoid duplicate topics, if at all possible.

Here is a partial listing.

- 1.) Orientation of religious architecture
- 2.) Moss on the north side of trees
- 3.) Satellite dishes as direction finding tools
- 4.) Wave patterns around islands – can use ripple tanks in science center
- 5.) Work with one of the instruments in the Museum of Historic Scientific instruments –

this requires coordination with the curator

- 6.) Growth patterns on trees – windblown, or effects of sun.
- 7.) Sail shapes and performance (using models)
- 8.) Boat stability (using models)
- 9.) Sun compasses
- 10.) Viking sun stone
- 11.) Walking in a straight line/circles
- 12.) Telling time from the stars (also a nocturnal – in item 5)
- 13.) The “lunar method” for finding longitude
- 14.) Determining ocean currents (could use ripple tanks)
- 15.) Latitude from length of day
- 16.) Latitude and longitude from sunrise or sunset
- 17.) Analemmatic sundials
- 18.) Construct a classic navigational instrument and test it (e.g. back-staff)
- 19.) Find the curvature of the earth – (e.g. dip angle?)
- 20.) Estimation of distance from distinguishing features (e.g. eyes on a person)
- 21.) Precision of sound localization (angle)
- 22.) Constructing a local area map by primitive means, compare to precise map
- 23.) Implementation of a navigational scheme in a new environment (with safety plans etc)
- 24.) Precision of wrist watches
- 25.) Effect of solar activity on long distance radio reception (e.g. radio triangulation)
- 26.) Test weather forecasting augury (e.g. coffee cup forecasting).
- 27.) Build a water-clock and test it
- 28.) Wind compasses
- 29.) Longitude from lunar occultations
- 30.) Heliacal risings
- 29.) Surveying a local area/map making