

[CSCI 2240] Final Project

Released: 1/27/20

Proposal due: 4/6/20

Final presentation date: 5/15/20

This open-ended, group final project gives you the opportunity to more deeply explore an area of computer graphics that you find interesting. You have a lot of flexibility. One possible avenue is to choose a recent research paper in computer graphics, implement the techniques presented in it, and attempt at least one new extension of the work presented. You can also propose a project that involves a combination of ideas from multiple papers, or a new idea altogether.

Project Groups

The final project must be done in groups of 2-4. The reasons for this are:

1. Working in a team allows your group to tackle more challenging, interesting projects than would be possible working alone.
2. Real-life research projects are typically undertaken by teams--doing the final project in a group helps prepare you for this.

If you have an idea for a project and are looking for like-minded fellow classmates with whom to start a group, try posting to Piazza.

The size of your group should be appropriate for the project idea you've chosen, i.e. a 4 person group will be expected to undertake a more significant implementation challenge than a 2 person group. If you have a question about whether a particular project is right for your group size (or vice versa), ask the instructor or a TA.

Note for graduate students: We understand that graduate students have busy research schedules outside of class. If you are a graduate student working on a graphics-related research project, you may use this project as your 224 final project, provided the following conditions are all true:

- It is a group project (i.e. at least one other Brown student is involved in the project). You are welcome to invite other 224 students to join the project, if you like / to meet this requirement.
- You are not already using this project as a final project in another course for which you will receive credit (i.e. no "doubling up"). CS 2980 "Reading and Research" does not count.

Project Scope

Because of the flexibility allowed for this project, it can be difficult to know whether any particular idea you may have is sufficient. When in doubt, ask the teaching staff.

[Here](#) are some examples of final projects from past offerings of the course.

If you choose the path of implementing a research paper, you can keep the following guidelines in mind:

Recent paper: Your group should choose a recent graphics research paper to implement. A paper from the last 10-15 years counts as “recent.” Older papers may also be acceptable; if you find an older work that you’re really interested in, talk to the instructor or a TA about whether it’s sufficient for the final project (and for your size of group).

Paper venues: Your group should choose a paper from a top-tier graphics conference or journal. Anything from the following venues is definitely acceptable:

- SIGGRAPH and SIGGRAPH Asia (or their journal, Transactions on Graphics)
- Eurographics (or its journal, Computer Graphics Forum)

Papers appearing in other venues may also be acceptable; if you have a question about acceptability, ask the instructor or a TA.

Ke-Sen Huang maintains [a helpful list of papers from recent graphics conferences](#). This is not complete, but it’s a great place to start.

How much to implement: Graphics papers sometimes describe large, complex systems with many new algorithmic components. As such, we don’t necessarily expect you to implement the entirety of what’s proposed in your chosen paper, especially if you are working in a smaller group. For smaller groups interested in large system papers, you should identify a reasonable subset of the paper to implement. If you need help with doing this, ask the instructor or a TA.

Extensions: Once your group has implemented your chosen paper, you will also need to do something new on top of it. This could take many forms--here are a few high-level ideas:

- Add a new feature to the system you’ve built. This could be something mentioned as a possible extension by the authors, or something new that you come up with.
- Try a different approach to solving a problem / implementing a component that’s part of the paper. This could be something the authors considered and rejected, or something different that you think up.
- Attempt to address something mentioned as a limitation in the paper.

This doesn’t have to be extremely involved, and it doesn’t have to be strictly speaking “successful” (i.e. it’s fine to try a different approach and find that it does worse, as long as you understand and document why that’s the case). The point of this part of the project is to get you thinking about how to evaluate and build on the work of others.

Grading

This project is out of **100 points**.

To get full credit (i.e. a grade of A), you will need to do the following:

- Project proposal (**15 points**)
- Midpoint check-in (**15 points**)
- Final implementation (**50 points**)
- Final presentation (**20 points**)

See the sections below for more information about the proposal, midpoint check-in, and final presentation

Project Proposal

The project proposal is a short document that lays out your group's plan for the final project.

This helps you to organize your group's efforts, and it helps us (the teaching staff) keep track of your progress and whether your group is on track.

Your project proposal should include the following:

- What are you proposing to implement? If you're implementing an existing paper(s), which parts of it are you planning to implement? What are some ideas for extensions / new things you could try in addition to the basic implementation?
- Do you need any resources to complete this project (e.g. data)? If so, how will you obtain them?
- A rough "timeline" breaking down the project into subgoals that you plan to accomplish on a weekly basis.
 - This should include a list of goals to have accomplished by the three-week mark (the **midpoint check-in**). We will hold you to these (i.e. as part of your grade), so be realistic. Some good things to propose having done by this point: data pre-processing, figuring out to build and link necessary libraries, getting "dummy/placeholder" versions of pieces of the system in place, etc.
- How will you divide the work between project group members?
- The final project is an opportunity for you both to exercise your strengths and also to push yourself a bit out of your comfort zone. Each group member should include a brief description of:
 - The skills/knowledge they have that their part on the project leverages
 - The new skills/knowledge they expect to acquire when completing their part of project

The teaching staff is available in office hours to work with your group to help you put together an appropriate project proposal (i.e. please don't write your proposal alone, submit it to us, and hope we approve of it).

Final Presentation

To cap off the semester, your project group will give a short presentation about your project to the rest of the class.

If you implemented an interactive system, a live demo is encouraged. Otherwise, offline-rendered images and/or videos are fine. It should go without saying, but you must present visual results of some kind.

To get full credit on the final presentation portion of the project grade (**15 points**, see above), you should answer the following questions in your presentation:

- What did you set out to do, i.e. what problem are you solving and why do we care? This should be accessible for a general CS undergrad audience.
- What makes this problem difficult?
- What approach did you take to solving it? Talk about the paper(s) the approach is based on. Don't get too deep in the weeds of technical details; a CS 123 student should be able to follow most of what you talk about here.
- What worked and what didn't? Talk about challenges and obstacles, and any ways you worked around them.
- What did you do / try that was new? How well did it work?
- What do your results look like?
- Who did what what in the project? One slide is fine for this.

You *must* participate in the final presentation in order to receive a grade for the final project.

We want the final presentation session to be a celebration of all the hard work you've put in to the project (and the class!) over the semester---have fun with it!

Submission Instructions

Submit your project proposal (in PDF format) by running `cs224_handin final_proposal` from a CS department terminal.

After your presentation, submit your slides and your code (or a link to a Github repository) by running `cs224_handin final_final` from a CS department terminal.

If your presentation includes large video files, please upload those elsewhere (e.g. Youtube, Dropbox) and submit links to them.