Final Project

GOAL CROSSING FOR ACCESSIBLE USER INTERFACES

INFO 498: Input & Interaction

PURPOSE

The purpose of the final project is to give you an opportunity to leverage what you have learned in this class in the creation of an interaction technique of your own. You can reflect on the techniques you have seen, the models of input and interaction, the underlying principles of human perception and motor control, and the clever design ideas that make a technique successful. You will bring all of this to bear in the development of your own interactive prototype demonstrating a solution to *the occlusion problem* in mouse-based goal crossing user interfaces designed to be accessible to people with poor motor control. You are creating the fundamental interaction design for zero-button mouse.

GROUP SIZE

This final project is to be done **in groups of three (3)**.

RELEVANT READINGS

Two readings shown below from May 8 are particularly relevant to this project. Also, the goal crossing slides from April 17 will be of use. You should be very familiar with both before starting your project. You will need to read these articles ahead of schedule so that you can begin.

Apitz, G. and Guimbretière, F. (2004) CrossY: A crossing-based drawing application. Proceedings of the ACM Symposium on User Interface Software and Technology (UIST '04). Santa Fe, New Mexico (October 24-27, 2004). New York: ACM Press, pp. 3-12.

Wobbrock, J.O. and Gajos, K.Z. (2008) Goal crossing with mice and trackballs for people with motor impairments: Performance, submovements, and design directions. ACM Transactions on Accessible Computing (TACCESS). To appear.

WHAT YOU'LL DO

Your objective is to devise an interaction technique that makes it possible for a mouse or trackball to acquire targets in a desktop user interface without having to click. The premise for your objective is that *goal crossing* can be an effective means of doing this. However, a noted problem with goal crossing in mouse-based user interfaces is that many unwanted goals may be crossed as the cursor moves about the user interface. Solving this problem without use of any mouse buttons is the aim of your work.

The readings above both contain design ideas for crossing-based widgets. However, the designs in Apitz and Guimbretière (2004) are for *pen-based* user interfaces, where "flying in, crossing, and flying out" is possible. The designs in Wobbrock and Gajos (2008) are just preliminary

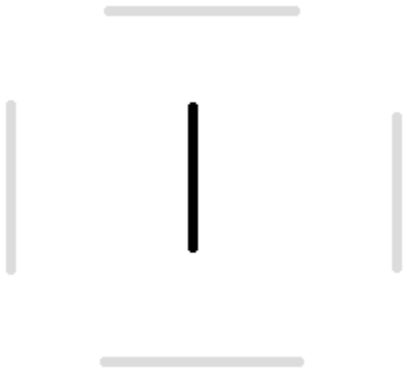
design sketches, which are untested and obviously present many tradeoffs. You can also look at http://www.dontclick.it/, which is an interaction design project from a Masters student in Germany. But this prototype requires fine positioning and would not be very accessible to people with motor impairments. Still, each of these sources may contain inspiration for your work. Of course, in any work you do, if prior work inspires or informs you, you must cite it appropriately.

You are first to develop **at least ten (10) design sketches** that go beyond those found in the readings. These can be entire new or *based* on design ideas from the readings. If they are based on those in the readings, they must go further. Your sketches can be in a tool like Microsoft PowerPoint or Adobe Illustrator, or just using pencil-and-paper. They should each have a short paragraph description saying how the technique would work, and its benefits and drawbacks. The sketches are intended to help your group brainstorm, so use them to think broadly about how to address the occlusion problem.

Next, take **the two (2) best ideas** and create flipbooks for them. A flipbook is a sequence of sketches that shows an unfolding interaction sequence. You can do this by making a series of images, or by using a tool like Microsoft PowerPoint. You could also use Adobe Flash to create an animation that is *not* interactive. The flipbook should show how the interaction works in detail, and should illustrate various possible outcomes depending on what the user does. A paragraph description should accompany each of the flipbook designs.

Next, take **the one (1) best idea** and create an *interactive* prototype. An interactive prototype is an application that allows a user to experience the design directly using the mouse or a trackball. To illustrate how your idea solves the occlusion problem, you should set up your intended target surrounded by *four (4) distractor targets*, one on each side. Your target should be approachable from any of the four directions, and the distractor targets should not be accidentally triggered. The objective is that the fundamental design you create could be taken into a future user interface and solve the occlusion problem for any variety of possible goal crossing widgets.

Arrange your targets something like this, where all are actual crossing widgets that will behave the same, but the center one is the one your user is intending to access (but they should all behave identically, since your program doesn't "know" that the center one is what the user wants).



You can build your prototype in any language you like. It must, however, run on a Windows Vista machine in the end (in a browser is okay). You might consider using Adobe Flex/Flash/ActionScript or Microsoft Silverlight with VB .NET or C#. You can also use Java. It is up to you, but your prototype should be stable and usable by anyone who might like to try it.

Finally, you will run a short informal **user study with two (2) users** who are not members of your project team. In your test, you should only explain that no mouse buttons are necessary to acquire the targets they see on the screen, just crossing over them. Then observe your users while taking notes about how they discover the functionality of your prototype. You should assign them to acquire each of the 5 targets, and have them do so 4 times each, once from each of the four cardinal directions (from north, east, west, and south) for a total of 20 target acquisitions. Compute the percentage of times they were successful. Graph these results however you feel is most indicative of their performance. How often were distractor target acquired? How often did they have to retry? Were your targets only accessible from one direction? Write up a 1-page report on the results of your two user tests.

CHEKCPOINT SUBMISSIONS

On **Thursday, May 20**, you will turn in your ten (10) design sketches and two (2) flipbook ideas. These will not be graded at this time, but they must be complete. If they are not complete and satisfactory at this time, -10% will be deducted from your final project grade. Each group will take a few minutes in class on May 20 to present their two flipbook ideas to the class.

A WORD OF WISDOM

Start now! Start now! Design and prototyping are not things that can be accomplished the night before a project is due. As the IDEO video said at the start of the class, "Fail often to succeed sooner," and "Enlightened trial-and-error succeeds over the planning of the lone genius." You can't fail often or have enlightened trial-and-error unless you start with enough time to do so. Also, you don't want to simply jump onto the first seemingly good idea that you have, because often, the best ideas are the ones you reach after trying the first obvious ones. To be a successful designer, a project must consume you, occupying your thoughts while you eat, on the bus, as you try to fall asleep at night… Dive in and get started!

FINAL PRESENTATIONS

During the final exam period at 4:30 pm on Friday, June 13, each group will give a **20 minute presentation** of their design process, from initial sketches to flipbooks to interactive prototype to user test results. Part of the presentation should include a live demo of the interaction technique. Groups that want to make a video similar to those we have seen in class are welcome to do so, but it is not required. The presentation should provide *design rationale* for the choices made during the design process. It should also highlight what *does not* work well (if anything).

WHAT TO TURN IN

At 4:30 pm on Friday, June 13, each group should turn in the following as a cohesive report on a well-organized and labeled CD-ROM or USB key:

1. Design sketches and early design concept descriptions
2. Flipbook designs with descriptions
3. Interactive prototype and README for running and using
4. User test results (1 page write-up)
5. Final presentation slides
6. Any other materials (e.g., videos)