CS 5984: Creative Realization Of Interactive Systems (aka "Gadgets")

INTRODUCTION
This class is intended to support interactive projects that explore new form factors or new genres of content or interactivity using specialized hardware. This course derives from the observation that the CS Department does not have design and implementation classes that address the need for unique hardware in interactive projects. It also comes from requests by students in the CyberArt class (CS 4984/5984, Fall 2006) to continue developing projects.

COURSE DESCRIPTION
Bring Your Own Project
This is a project-based class. It will be an intensive immersion in different approaches to interaction design and it will result in a working demonstration of an idea that requires new forms of interaction. However, it focuses on realizing projects that the students bring to the class. Most projects will come from begun in the Fall semester in CyberArts, Embodied Interaction, CVE, independent study, or even Design of Information.

In addition to working on team projects, there will be small exercises that will introduce the various kinds of hardware we will work with.

Building, Soldering and Programming
Projects will involve creating hardware and software. Sensors, displays, and/or effectors will be integrated in a physical embodiment that reflects the intended setting, use and content. We expect to work with Motes, single board computers, accelerometers, and other simple sensors. Students will be expected to participate in all aspects of projects. Sharing knowledge will be the primary means of learning.

Studio-Based
This class is not your usual interface design class or hardware/software integration class. It will be a studio class in that students will work in teams in a location where the project can reside during its development. This is in contrast to the HCI lab model where specialized equipment is time-shared or the distributed software development model where work can be carried out anywhere. Working in the studio also means learning from each other, whether on the project team or working on something else. We will emphasize the cycle of ideation/presentation/critique. Reviews will look at not only the inventiveness of problem finding and problem solving, but the quality of expression found in the concept, form, and behavior of created artifacts.

Studio space has been located in 133 McBryde and possibly in the Art Department's Armory Mezzanine area. Both are interim solutions which should be supplanted by the new CyberArt studio on the upper floor of the DAAS/Digital Music Studio on South Main Street sometime in mid-term. Some equipment, including plasma displays and computers acquired through SCHEV and other sources will augment equipment from projects.

Therefore, to the extent that there will be lectures, they will be informal and student preparation and participation is expected.

BACKGROUND

For the previous two academic years, CyberArt has been a two-semester sequence but did not have a studio in which to carry out work. Since the studio space has been delayed, it a one semester class (in contrast to prior years). At the same time, HCI Center faculty have been discussing the need to develop interaction hardware prototyping skills among our graduate students. Thus this class seizes the opportunity, melding those two on-going interests.

The CyberArts class is a multidisciplinary class drawing students and faculty from computer science, art and art history, architecture, music, communications, and related disciplines. Students self-organize into cross-disciplinary teams to create a large work of art over the course of two semesters. In the first semester, students explore directions for a large work of art for their team to create in the second semester. In the Spring, the student teams will realize the work of art conceived of in the Fall, making it robust enough for public display. The 05-06 website can be viewed at: http://courses.cs.vt.edu/~cs4984/fall_2005/tiki-index.php and Fall 2005 at: http://courses.cs.vt.edu/cs4984/cyberart_fall_2006/index.php/Main_Page

WHO SHOULD TAKE THIS CLASS

Students from the Fall 2006 CyberArt class are invited to continue their projects. Others may come from Embodied Interaction, independent study, or even Design of Information. Students should bring some patience as well as a clearly developed project since we will be refining the course as we go. (e.g. If you need lots of structure in your courses, this is NOT for you.)

GRADING AND ASSESSMENT

Students will be evaluated on the progress they make towards realizing an interactive system with robust hardware and software. Grading will be based upon:

- 50% - semester project completeness and robustness. Work will be assessed on the basis of degree they successfully extend the project. Thus, an embodied interaction project might be assessed on the degree that it makes the computer more invisible to the interaction or a CyberArt project assessed on the degree that its new form of interaction clarifies the message it is trying to convey.
- 25% - class participation. This is essential since the studio model depends on learning from each other. Students will assess each other.

25% - learning projects/sketch problems. Based on equipment availability, students will work in small groups to use single board computers, various interactors, and other computer interface technologies. Students will assess each other which will be augmented by faculty assessment of learning.

FACULTY

Steve Harrison has committed to organizing and teaching this class. His own expertise in this arises from building interactive science and technology exhibits for Xerox PARC's "XFR: experiments in the Future of Reading" traveling exhibition. He will organize the class and keep the projects rolling. Steve taught Design Realization (CS 5984) in the Spring of 2005 and a similar class at UC Berkeley (CS 294-12) in the Fall of 2002. Both classes focused on the end-to-end project realization (problem-finding, ideation, problem-solving, team formation and team process, and iterative implementation and analysis); in contrast, this class will use projects initiated elsewhere exploring various prototyping techniques using iterative methods.

In addition, other HCI Center faculty with more experience in particular hardware areas – notably, Francis Quek (an electrical engineer by education) and Dennis Gracanin (also trained as an electrical engineer and with experience with Motes) – have expressed interest in also participating with this class. Dennis will get students going on Motes and Francis will provide basic instruction on electrical considerations for connecting up single board computers. Others, like Ico Bukvic and Michael Dunston in Music are invited to coach as we move forward.

SYLLABUS

The course focuses on issues at the forefront of changes in the notion of human computer interaction as well as mundane issues of what leads to wire to make accelerometers work. Some topics – in no particular order -- are:

Input:
Accelerometers
Choosing sensors
Rotary shaft encoders
RFID
MIDI and other time-based interactive tools

Output:
Audio options for multi-track

I/O Management:
Single board computers (Motes, Basic Stamps, PICS, etc.)

Programming:
Programming single board computers for interactive control (TinyOS, C, etc.)
Methods of connection – serial ports, USB, keyboard and mouse hacks, etc.

Form factor:

Using the CCTAD rapid prototyping machine
Other forms of physical prototyping (foamcore, 8020, etc.)
Issues in physical robustness for public use