

# Research Project Plan

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## Background

The "Wiimote", a game controller for the Nintendo Wii gaming console, has been adapted for use in "the Wedge", an immersive projection theatre in the Department of Computer Science. At present it is being used primarily as a pointing device to control an aiming cursor in a game-related environment.

## Problem/task description

Range and precision limitations exist in the current setup. An opportunity has been identified to exploit one of the consequences of Fitt's law to address these limitations, by dynamically adjusting the control/display (CD) ratio based on the user's hand speed. The reasoning behind the use of this method is explained in more detail by S. Frees et al[1] among others.

## Plan/schedule

- *Weeks 2-4 (28/7 - 15/8)*: Gain familiarity with existing system/code and access to required tools and rooms. Literature reading. Scheduling and planning of future tasks. COMPLETED.
- *Weeks 5-7 (18/8 - 5/9)*: Deeper code reading. Exploration and implementation of techniques and ideas, refining and expanding on the basic task description. Continued literature reading.
- *Weeks 8-9 (8/9 - 19/9)*: Informal user testing. Design formal user test, to be conducted as a scientific experiment.
- *Week 10 (22/9 - 26/9)*: Perform formal user test.
- *Lecture break (29/9 - 10/10)*: Analysis of results. Report writing.
- *Week 11 (13/10 - 17/10)*: Continue writing report. Optionally, perform a smaller-scale user test to refine results if desired.
- *Week 12 (20/10 - 24/10)*: Final report writing and delivery. Prepare for presentation.
- *Week 13 (27/10 - 31/10)*: Final presentation.

## Risk analysis

### Lack of usable implementation at end of exploration/implementation phase

I consider this unlikely as early results are promising. If despite this no workable technique is found during the exploration and implementation phase, there are two possible options. Either more time is taken to continue such exploration and hopefully find a usable technique (at the risk of creating a time issue, see below) or the user test is performed regardless, running the risk of producing uninteresting results.

### Lack of time, possibly due to illness

If necessary the user test could be scaled down, postponed, or even cut. If it was scaled down, results would be less certain. If it was postponed, the schedule would need re-evaluating at that time. If it was removed entirely then the report would be of a more purely technical and descriptive nature than otherwise intended.

### Results not interesting

If the project fails to produce any interesting results despite my best efforts, then I will try to explain why that was in my report. Certain categories of uninteresting results may in themselves be interesting; for example, if it does not seem possible to find a technique based upon dynamic CD ratio adjustment which improves the usability of the Wedge/Wiimote environment then it could be interesting to suggest why that might be. If on the other hand the results are truly uninteresting (for example, merely obvious) then there will be little to be done and the consequences must be borne. Re-scoping the project to address this should be considered but may not be feasible by the time this risk becomes apparent.

### Hardware failure

There are several categories of hardware failure to consider.

#### Sensor bar failure

There are five sensor bars used in the Wedge. They are custom-made and thus not easily replaceable. The system can operate in a limited capacity (reduced range) with only three or even one sensor bar, however this could impact on the ability to perform meaningful user tests and evaluation, and

does not help in the event of total loss. Therefore I intend to be extremely careful when handling the sensor bar hardware, both physically as they are somewhat fragile, and electronically as essential components might be damaged if connected in the wrong order (the correct order is obvious but the system may not be failsafe). This is a potentially significant risk.

### **Wiimote failure**

If the Wiimote being used for the experiments fails, another can be purchased quickly. Wiimotes are commodity hardware items available at any video games store.

### **Wedge system failure**

The Wedge system itself contains projectors, computers, and various connecting devices. Failure of any of these could render the Wedge inoperable. I believe they are all replaceable, as they are or were commodity hardware.

### **Computer difficulties**

If my home computer encounters technical problems, I will use my laptop and existing computers at university for the purposes of code writing/compiling and report writing. Except in the event of widespread catastrophic failure, it is almost impossible for all of these computers to be down, as they are managed separately from each other (home computer, laptop, Department of Computer Science lab computers, Department of Information computers).

### **Data loss**

Backups will be kept to avoid data loss. Code will be backed up in at least two locations simultaneously at the end of every work session (Subversion server and one client computer) and a recent version will exist in at least three places (Subversion server and two clients). All other data will be backed up on at least my home computer and USB drive at all times.

## **References**

- [1] Frees, S., Kessler, G. D., and Kay, E. 2007. PRISM interaction for enhancing control in immersive virtual environments. *ACM Trans. Comput.-Hum. Interact.* 14, 1, Article 2 (May 2007), 31 pages.