

**6.S196: Principles and Practice of Assistive Technology**  
**Lab 5: Alternative Pointing Devices**  
**3PM, Wednesday, November 16, 2011**

**Objectives:**

- Experience different adaptive pointing devices used by people with motor disabilities
- Discuss the characteristics of successful and unsuccessful assistive technology

**Activities**

- Lab session with laptop computers (bring your own computer if possible).

**Deliverables**

- Write a brief (1-2 pages) reflection on this activity.

You should do the “Mainstream Pointing Devices” activity first on a laptop; afterward, you can do the other activities in any order depending on equipment availability.

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## **Mainstream Pointing Devices**

For this exercise, you should use the pointing device on your computer and operating system to which you are most accustomed.

1. Access the Fitts’s Law demonstration at <http://fww.few.vu.nl/hci/interactive/fitts/> and do the first three experiments(up to the end of slide 13) with your typical pointing device. Make a note of your average times for the targets with different travel distances (experiment #2) and different target sizes (experiment #3).
2. Start an on-screen keyboard – most operating systems should have one built in, or you can access an online on-screen keyboard at <http://www.vkeyb.com>.
3. Try to type the following passage of text using the on-screen keyboard letter for letter, i.e. without any errors:

All this happened, more or less.

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## **Adaptive Mice and Trackballs**

This section of the lab focuses on adaptive mice and trackballs, which you will try for different kinds of fine motor issues. **From the list below, choose three of the following devices:**

- Big Track Trackpad
- 3M Vertical Mouse
- Evoluent Vertical Mouse
- Kensington Slim Blade
- Roller Mouse
- Foot Mouse

For each of the three devices:

1. Plug in the device into your computer.
2. Get familiar with using the device. **Then, form your hand into a fist (thumb in hand)**

**and flex your wrist, and keep your hand in this position while using the device.**  
(People with cerebral palsy or who have had a stroke often present with significant wrist and finger flexion.)



*Figure 2: Wrist and finger flexion*

3. Open the Fitts's Law demonstration page and do the first three experiments. Make a note of your times and experiences for question #1 of the reflection.
4. Of the three devices, select the two that you thought worked best for this physical impairment and do experiment #5 on the Fitts Law demonstration page (slide 20). Compare the results, take a screenshot if possible of the resultant graph, and use your experiences to answer question #2 of the reflection.



*Figure 2: Slide 20 from Fitts's Law Demonstration*

5. Write the sentence from the “Mainstream Pointing Devices” section of the lab using two of the devices and use your experience to guide your answer to question #3 of the reflection.

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## Camera and Infrared-based Head Trackers

For this part of the lab, you will test out vision-based pointing devices. **You should try using the free CameraMouse and one of the other devices that require special hardware (the SmartNav or the TrackIR).** These devices may be used by people with physical impairments that prevent them from using any hand- or foot-based pointing device. To “click”, the user might “dwell” on an area of the screen for a certain period of time. For this lab, however, we will just focus on the pointing function of these devices.

1. Start Dasher, which we used in Lab #4. (If you do not have Dasher installed, download and install it for your operating system from [www.inference.phy.cam.ac.uk/dasher/](http://www.inference.phy.cam.ac.uk/dasher/).)
2. Imagine you are a computer user who relies on a head tracker pointing device. Think of

useful success metrics for evaluating the three different head trackers. This may include words-per-minute, number of mistakes, or other Dasher-specific measures.

3. Make sure that the language is set to English and the speed is set at an optimal rate, then try typing, with the CameraMouse head tracker, the following sentence:

All the world's a stage, and all the men and  
women merely players.

4. Repeat for one of the other two other head-tracking devices and use your experiences to answer question #4 and #5.
5. (Optional) Compare your words-per-minute rate with Dasher and with the onscreen keyboard using a headtracker and use it to discuss question #4 of the report.

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## Reflection

After completing the three exercises, write a brief reflection about what you learned. It should be roughly 1 to 2 pages long. To get you started, you might think about these dimensions, as noted throughout the lab instructions.

1. How did your times compare with these alternative pointing devices and the mouse/trackpad that you typically use? Comment on the design of these products and any difficulties you faced.
2. Which pointing device worked better, according to the data? Does your data correspond well to Fitts's Law? If not, speculate why you got the results that you did.
3. Discuss the challenges you faced with these devices for the high-precision/high-accuracy task of using an on-screen keyboard. How might you tweak or re-design the pointing device to best suit this particular physical impairment?
4. Discuss your experiences with the three different head-based pointing devices (TrackIR, SmartNav, and CameraMouse). Compare the ease of hardware and software setup, its robustness when you used it, and its overall performance.
5. The retail prices of these three devices are as follows:

CameraMouse: \$0  
TrackIR: \$150  
SmartNav: \$499

Based on your experiments with the three pointing devices, would you pay the higher prices for the TrackIR or SmartNav? Why do you think some assistive technology users adopt one of these devices instead of the CameraMouse?

6. (optional) How successful were you with Dasher versus the onscreen keyboard? What might prevent someone from adopting Dasher even if it has the potential to be faster for them?

Optionally, please also discuss how this lab exercise might be improved.

Your written report should be submitted electronically in your Dropbox, using the name:

PPAT\_Lab05\_*LastName\_FirstName*.pdf