

# Hardware Support for Digital Document Navigation

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# Navigation In Paper Documents

Imagine you have a large book

- Jump to any spot
- Read while turning pages
- Flip quickly to search



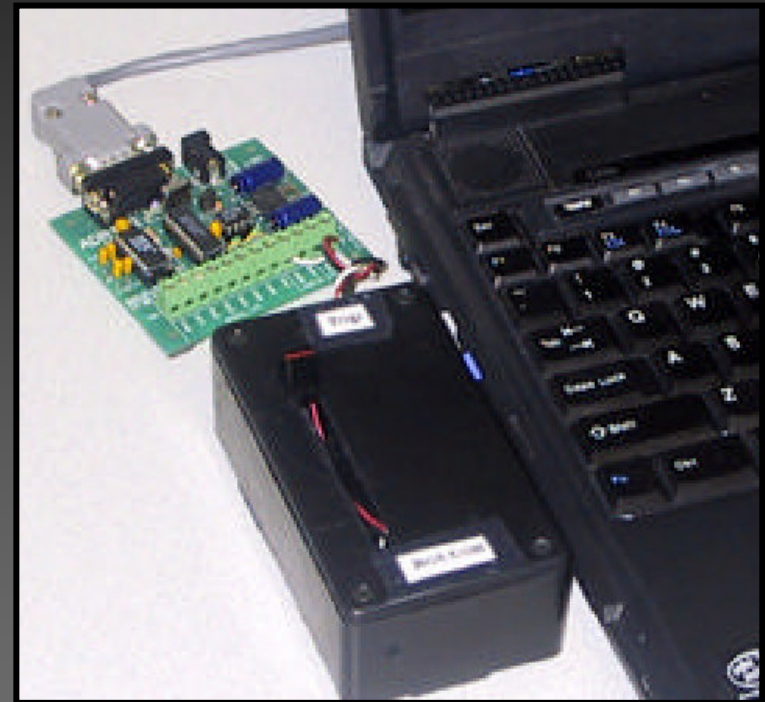
# Survey Of Navigation Techniques



# Bimanual Interaction



Buxton and Myers (1986)\*  
Two touch strips side by side.



Slide Bar (Chipman 2003)

\* Photo credit: Buxton, W. & Myers, B. (1986). A study in two-handed input. Proceedings of CHI '86, 321-326  
<http://www.billbuxton.com/2HandsNarrative.htm>

## Slide 4

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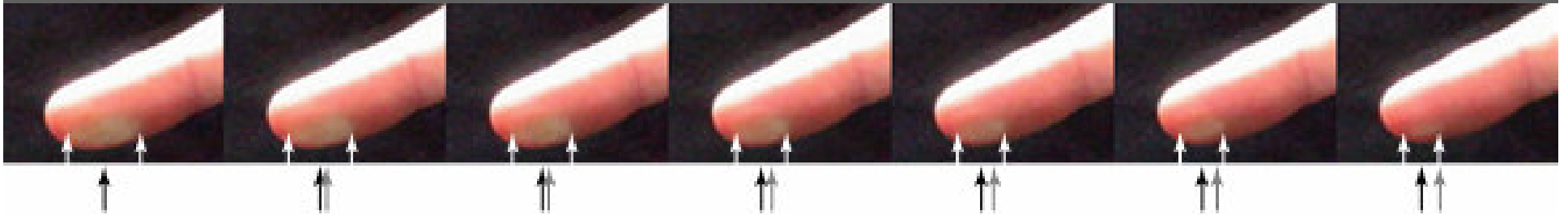
**FVG5**

and Myers

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# Times Have Changed

- Digital documents are much BIGGER
- Absolute navigation becomes harder
  - More pages mapped to an area
  - Finger tracking becomes an issue



*Notice how the bottom arrows diverge*

## Slide 5

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**FVG6**

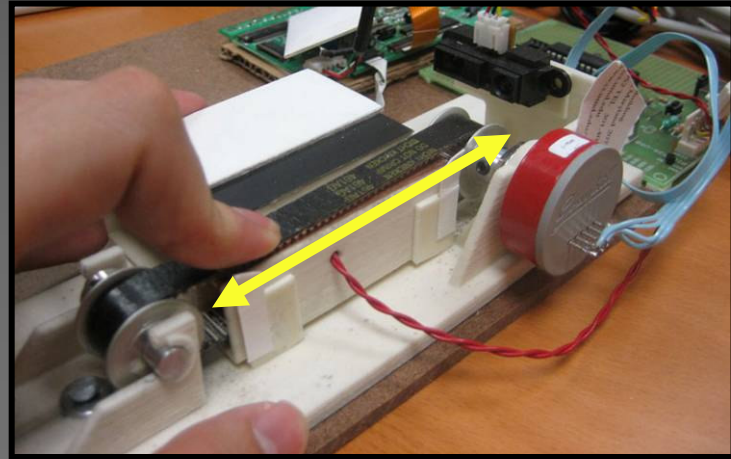
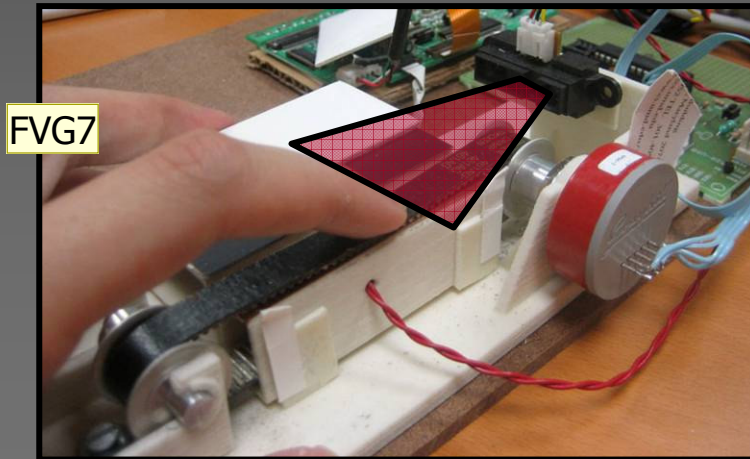
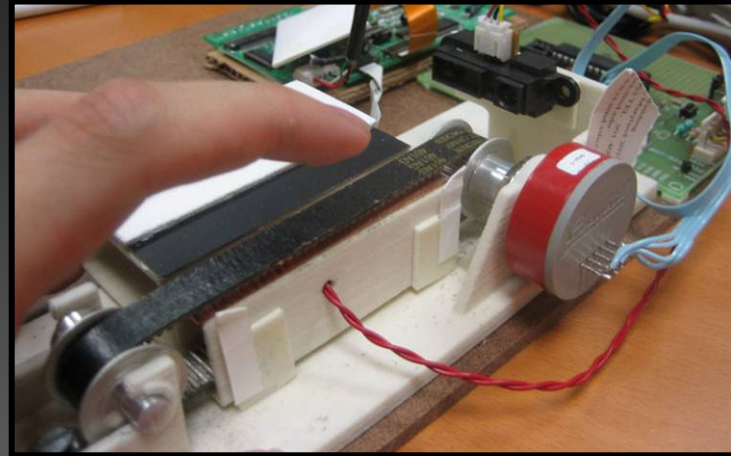
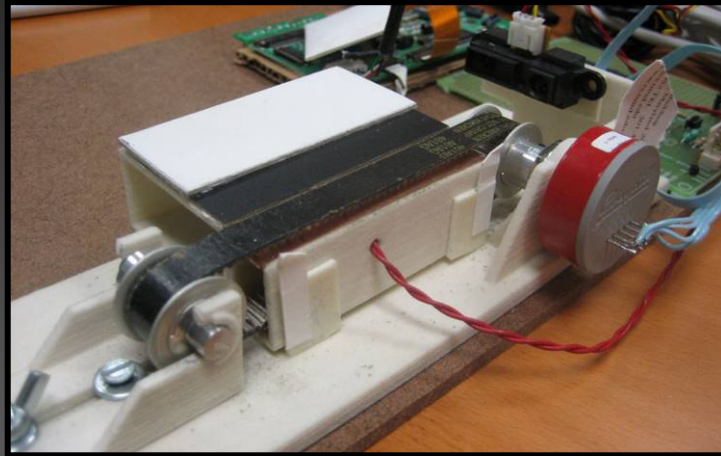
I like this slides.

Please use better version of the pictures.

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# Treadmill Navigation Device





## Slide 6

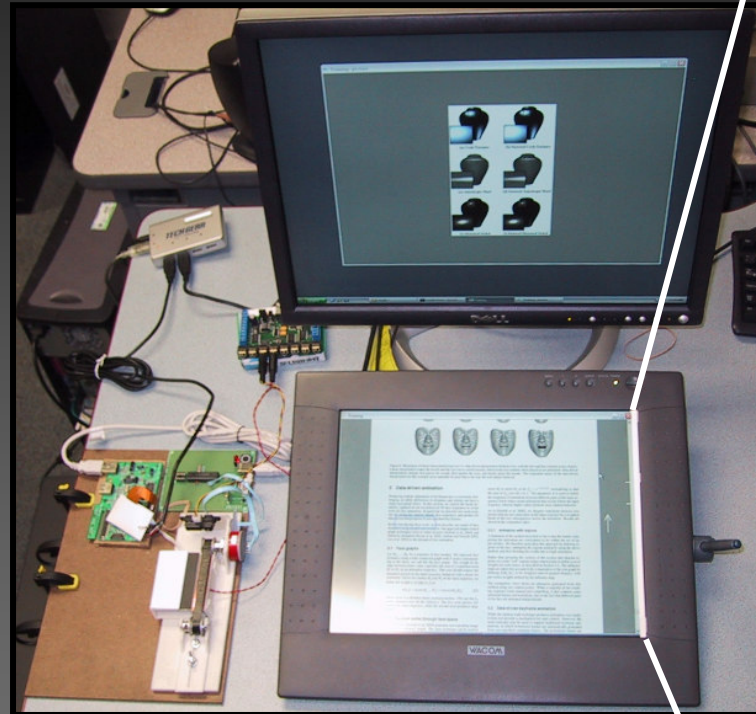
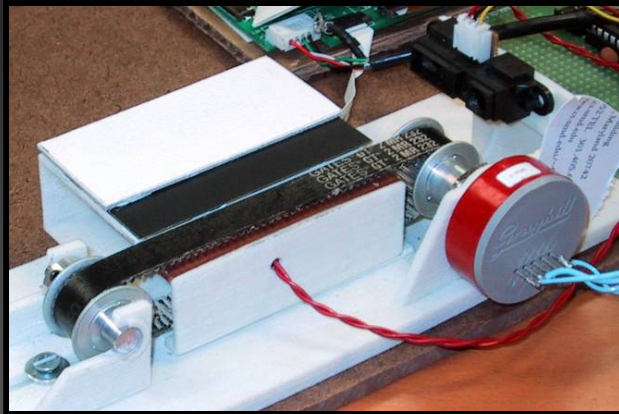
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**FVG7**

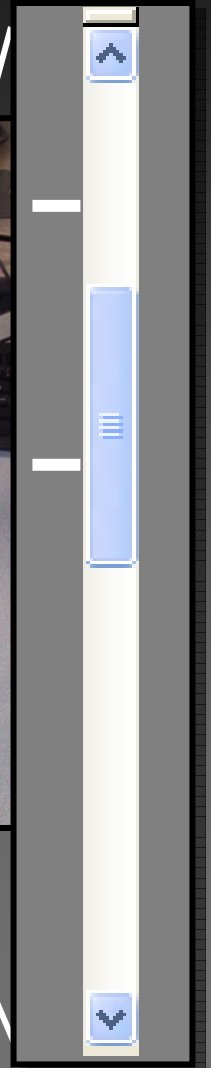
I will combine this abstract description with the real system picture on the next page.

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# Evaluating Our Changes



Users interact directly on  
touch screen



## Slide 7

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**FVG9**

I am not sure we will need the experimental setting here.

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# Experiment #1

- Between-subjects
- Find a picture within the document
- Starting location at different distances from target image
- Treadmill provided feedback about where document would jump to



## Slide 8

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### FVG10

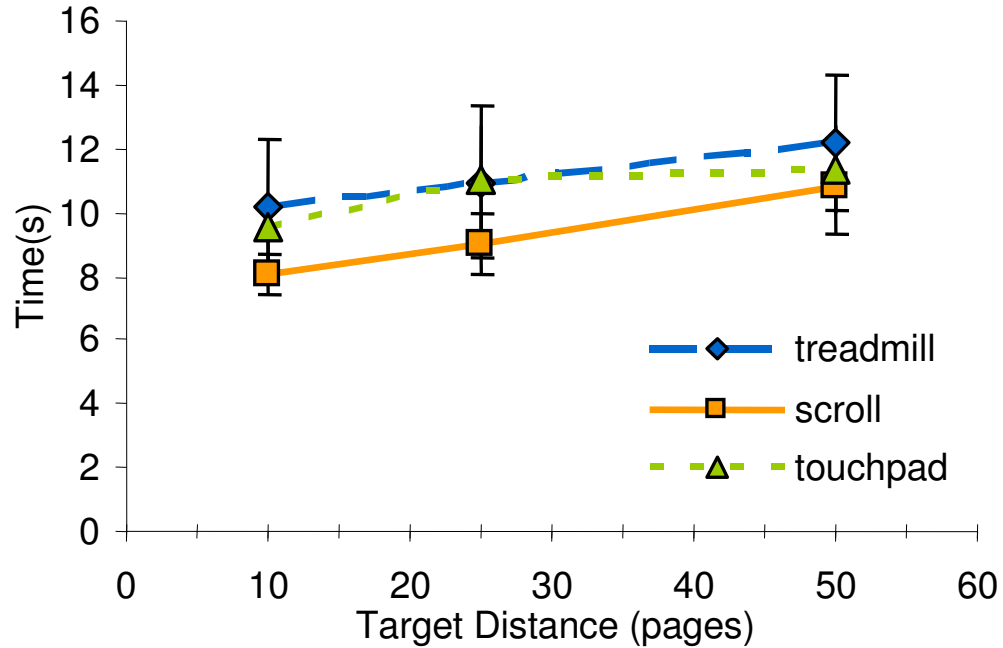
Present one experiment at a time (present the first experiment completely first, then looking at this results present the second experiment)

Also your should mentionned the between/within aspect of the experiment.

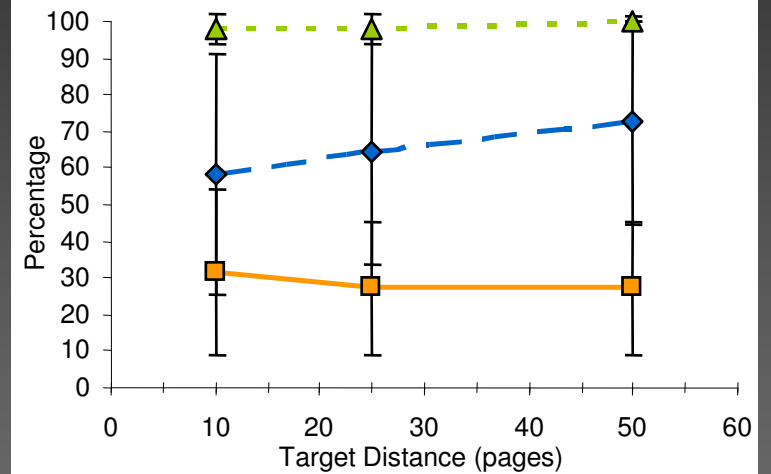
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# Experiment Results

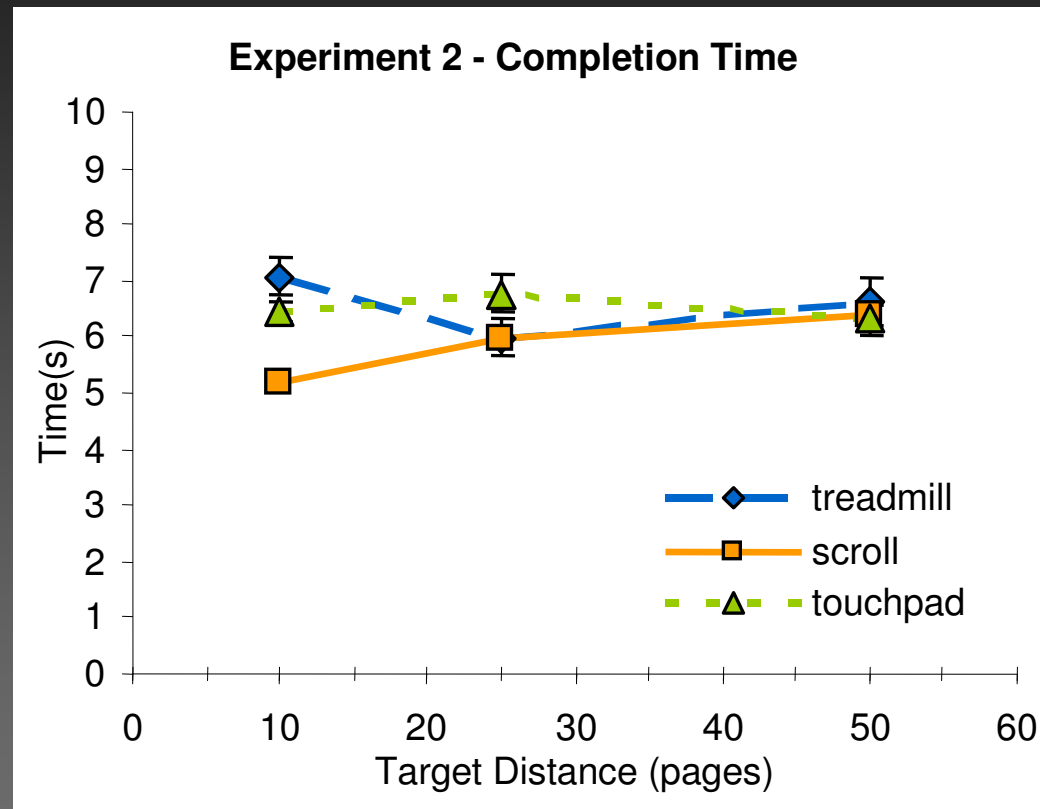
Experiment 1 - Total Completion Time



Experiment 1 - Percentage of Trials Using Relative Navigation



# Experiment #2



- Within-subjects
- Find a simple target
- No treadmill feedback



# Surprising Discoveries

- Scroll bar is surprisingly fast
- Keys to its performance
  - Familiar
  - Stable
  - Reliable and predictable
  - Leverages hand-eye coordination

## Slide 11

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### FVG12

You introduced two experiments but only presented one. You should present the new experiment (including the simplification)

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# Next Steps?

- Cost and complexity an issue
  - At the moment the solution & improvements are not practical
- Other avenues to explore
  - Only use relative navigation (have fast and slow touch strips)

# Big Lessons

- Scrollbar has many good properties
  - Updates to previously held beliefs
- Hardware solutions are hard to justify
  - Cost of hardware means the device must significantly outperform software solutions

## Slide 13

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**FVG13**

Hum, that does not seems like a big finish to me. What about providing stronger conclusions?

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# Acknowledgements

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FVG1
- Corinna Loeckenhoff
- Andy Cockburn
- John Stasko

## Slide 14

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**FVG1**

Do not forget to acknowledge people who helped us and our sponsor.

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