

LFE Medieninformatik • Felix Lauber

Zoom & Pan with Head Gestures

Project Thesis

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In Cooperation with Siemens CT

Responsible supervisor at Siemens: Dr. Roman Vilimek





1. Application Scenario
2. Related Work
3. Zooming & Panning
4. Visual Feedback
5. Working Packages
6. Evaluation
7. Future Work



ApplicationScenario

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Idea: Physician can control display system without the need of using his hands

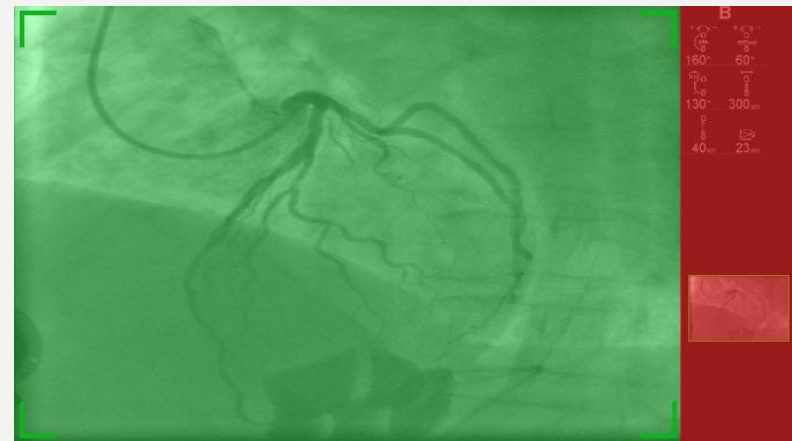
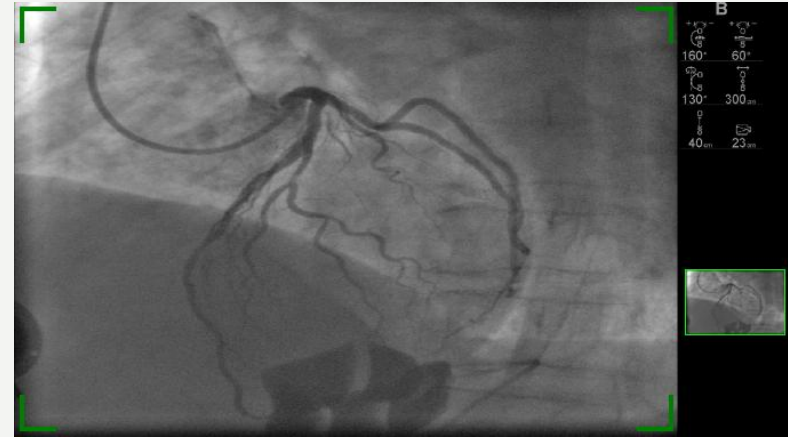
Head Tracking as an interesting approach (disadvantages of other contact free interaction technologies in this field of application)

User Interface consists of several Segments

Most important interaction: manipulation of the image representation in the image area

Interaction possibilities realized by head tracking technology:

- Selection of one segment
- Zooming operations
- Panning operations

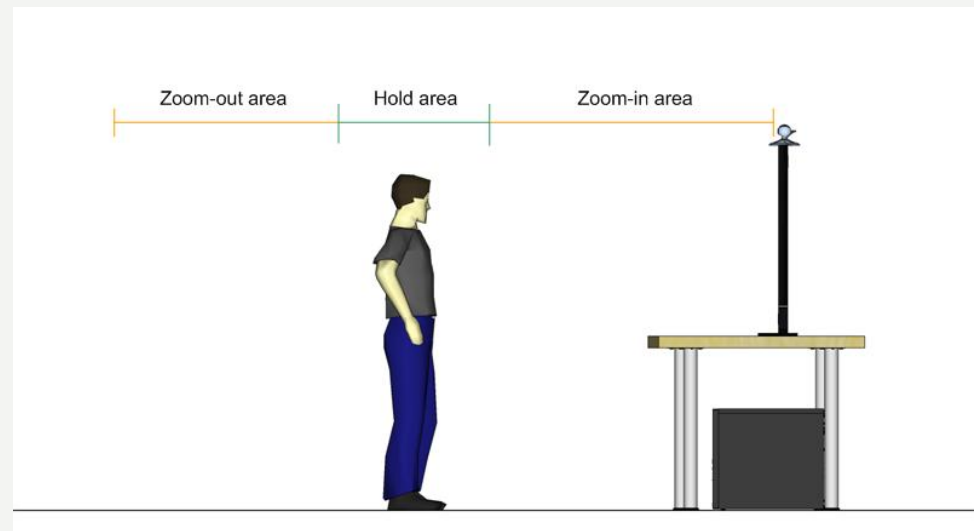


Idea: natural head movements to allow comfortable interaction

Segment selection – looking at the segment of interest

Zoom – leaning forward/backwards

Pan – gesture to perform mode switch





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Combining Head Tracking and Mouse Input for a GUI on Multiple Monitors (Ashdown et al.)

Idea: HT to select Desktop,
Mouse to interact with
selected Desktop

Gain of speed as distance
covered by Mouse is reduced



Ashdown et al., 2005 [2]

Lean & Zoom (Harrison et al.)



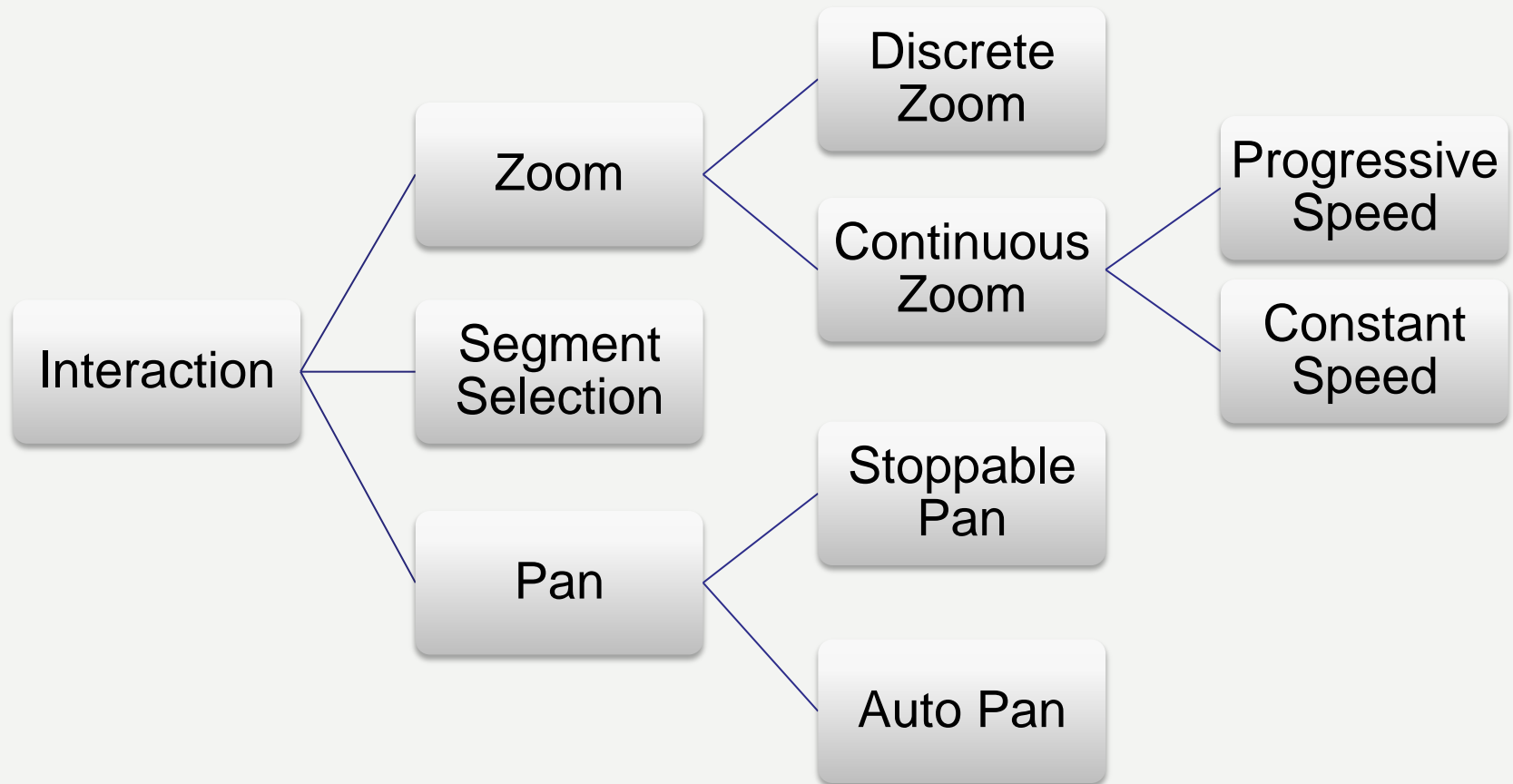
Harrison et al., 2008 [1]

Idea: On-screen content is magnified as a user leans closer to the screen.

Discrete Zoom – No Pan

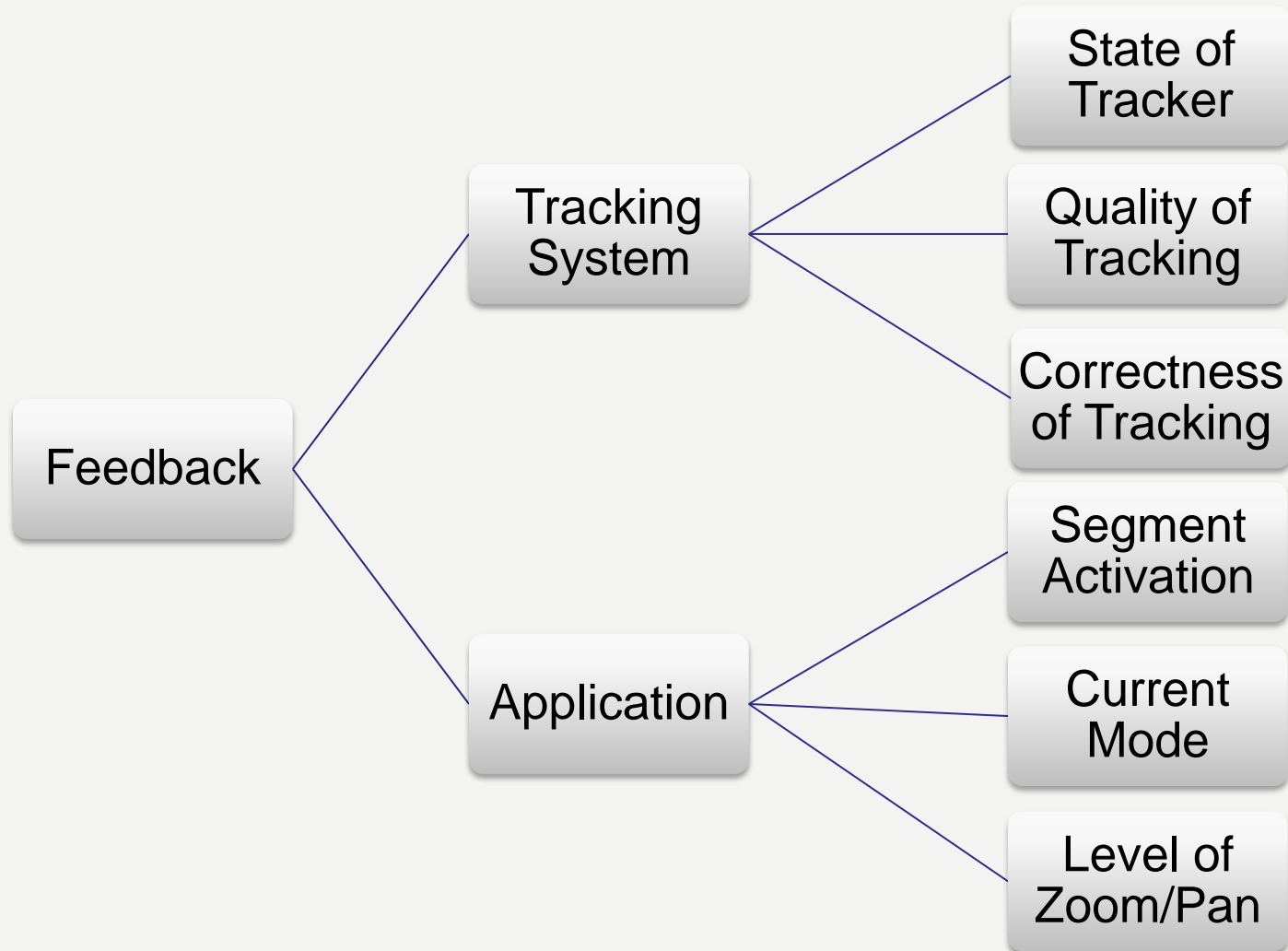


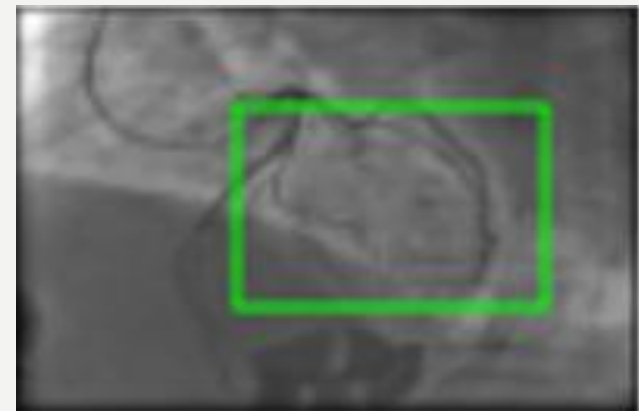
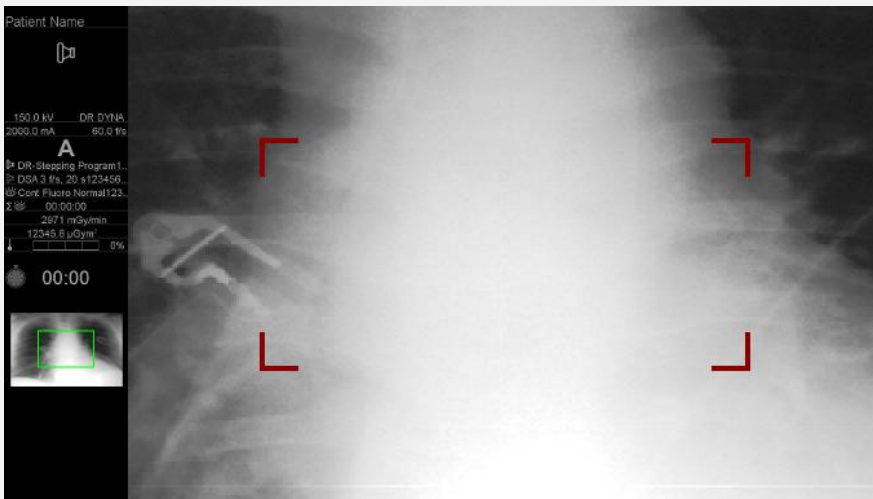
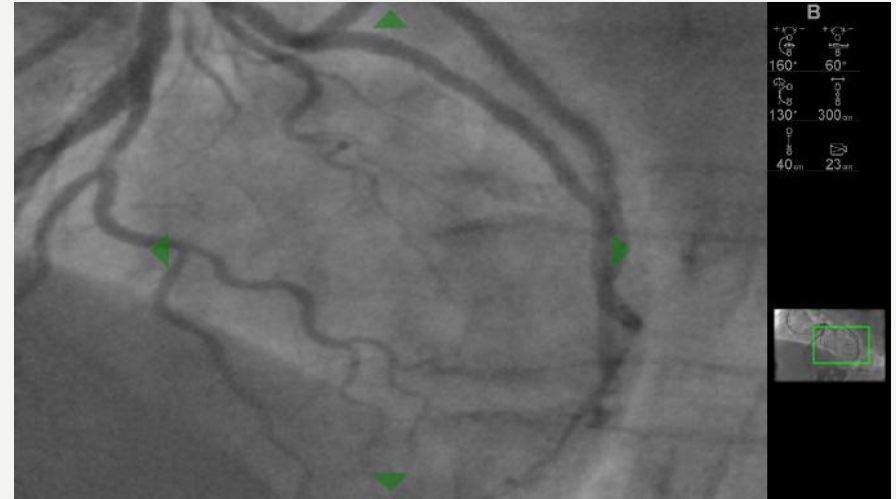
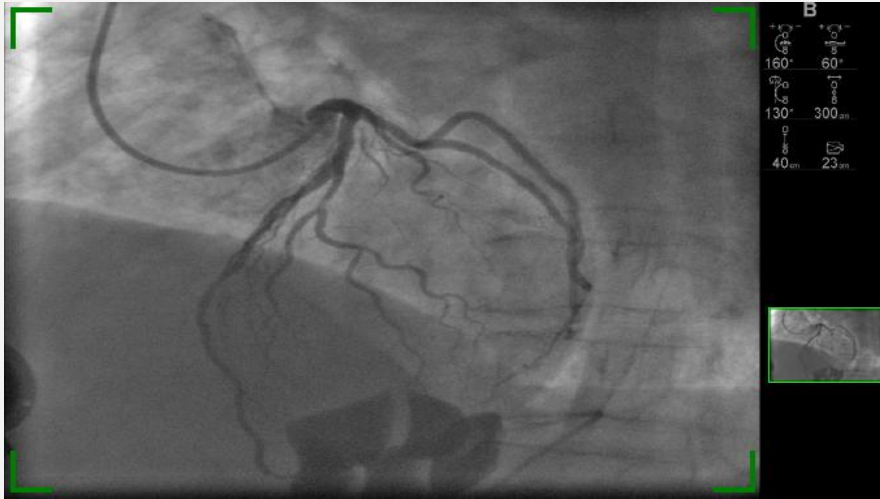
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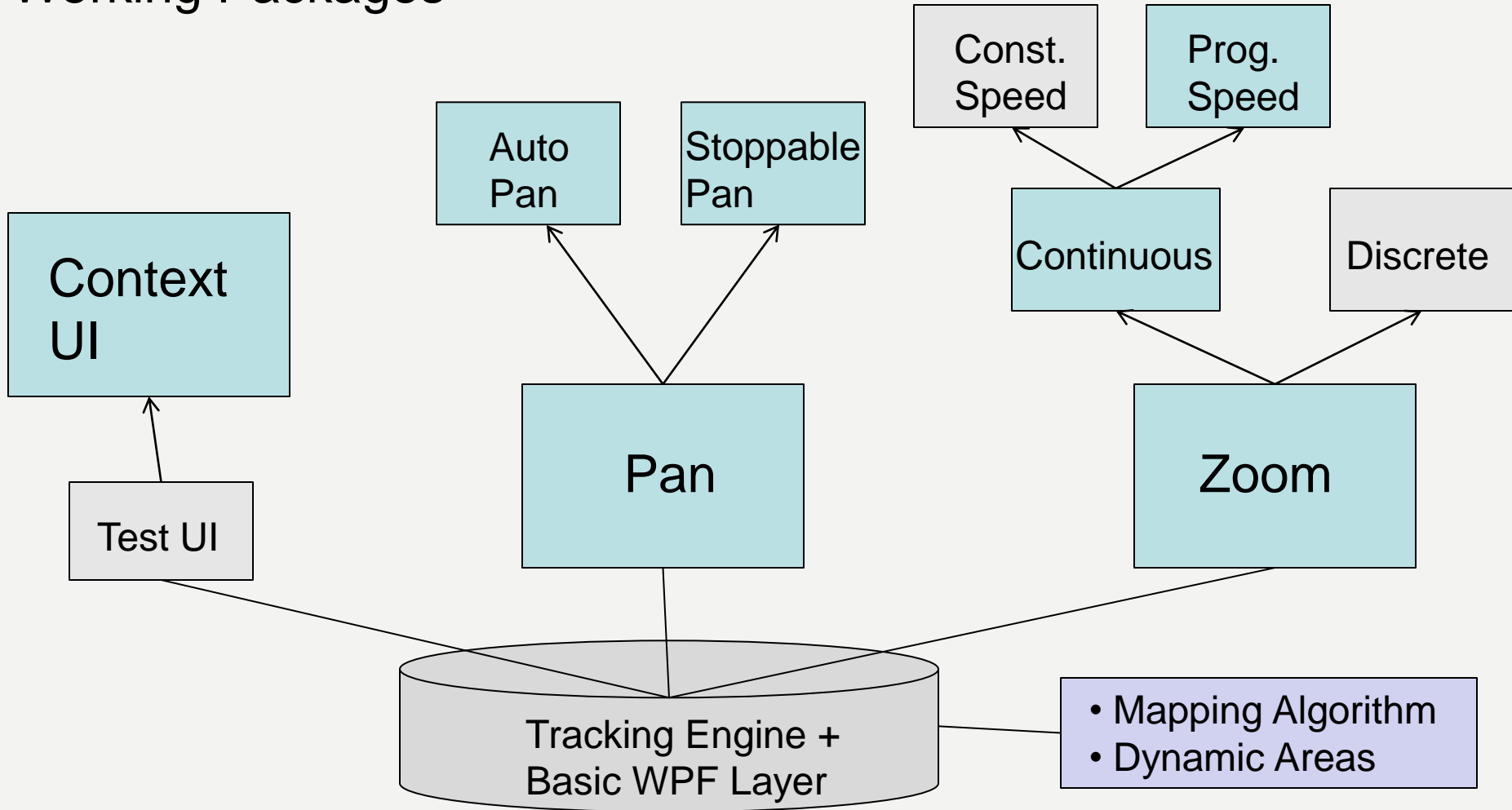




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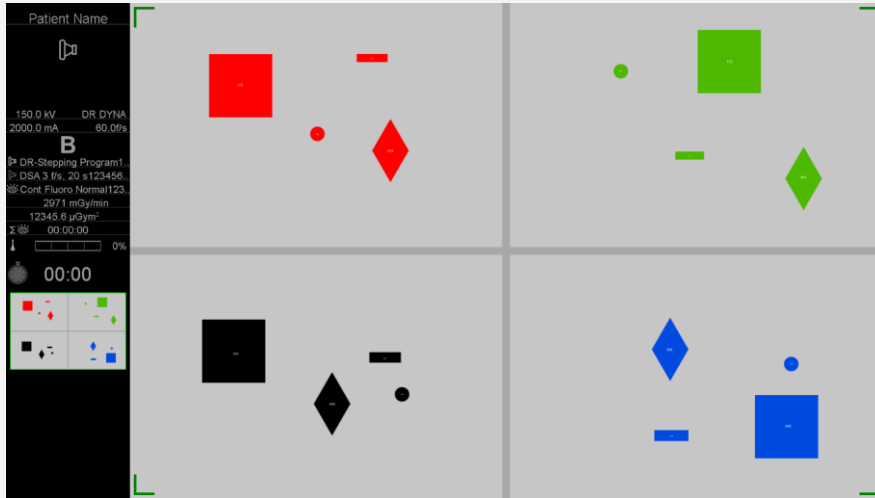
Working Packages





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Study Design



10 candidates, 5 male, 5 female; age 24 – 36

Task: read numbers in shapes

Exclusion of segment selection and Discrete Zoom

Two runs per version, alternating order, questionnaires

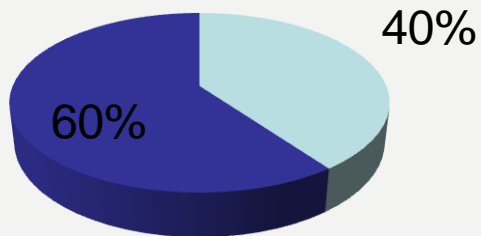


User Interface Elements

- Meaningful and not distracting
- Intuitive

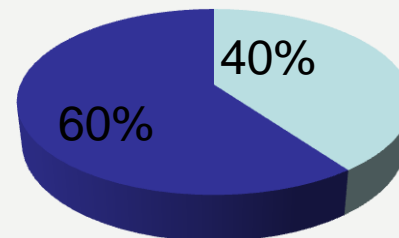
Overview

■ Meaningful ■ Indispensable



Frame Control

■ Recognized something
■ Recognized perfectly

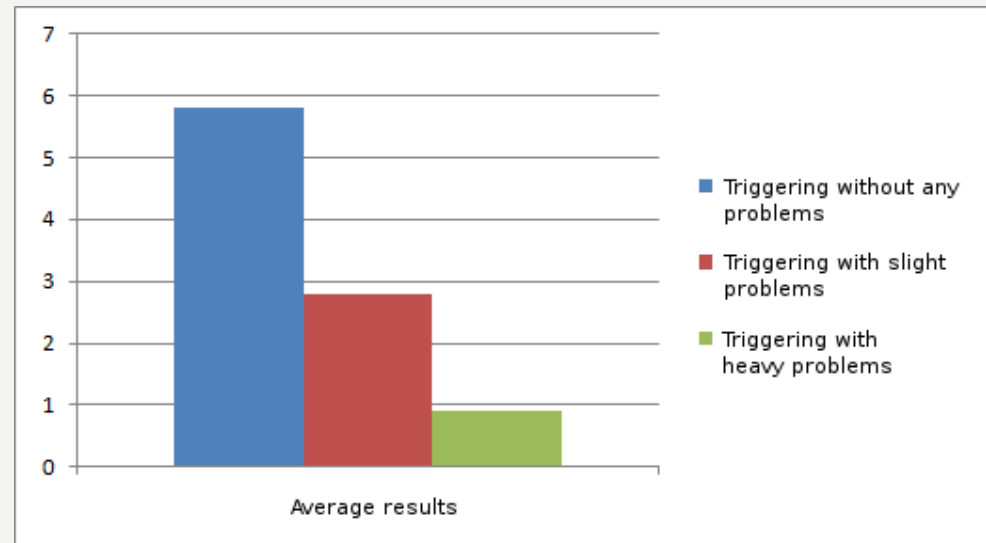
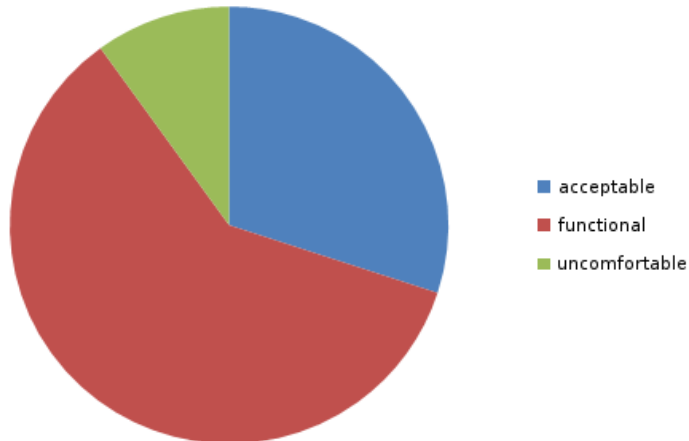




Gesture for Mode Change

- High acceptance for our gesture
- Little amount of errors

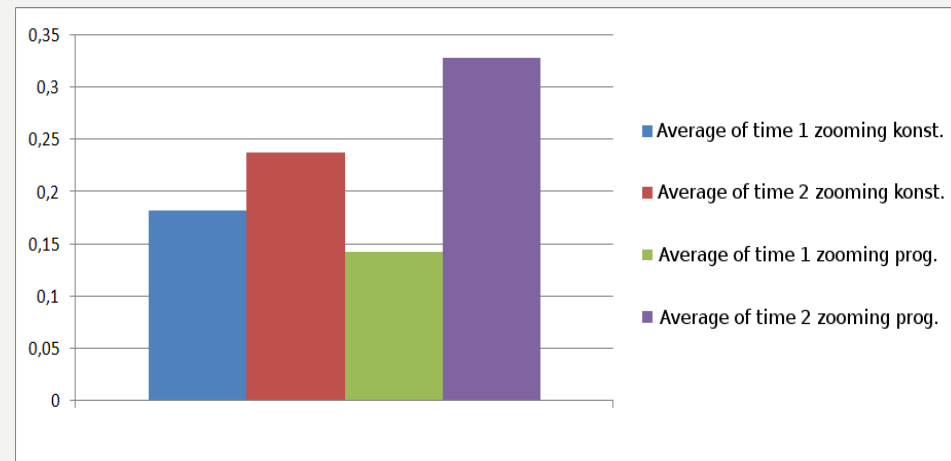
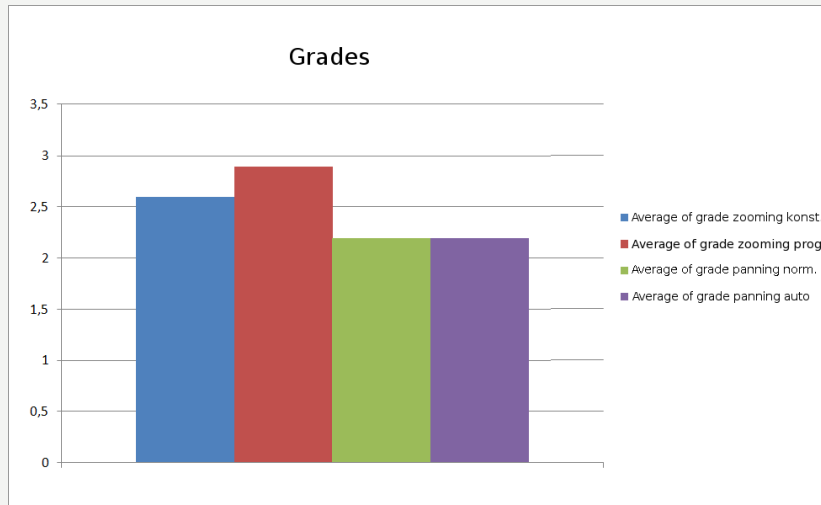
Evaluation of gesture





Zooming

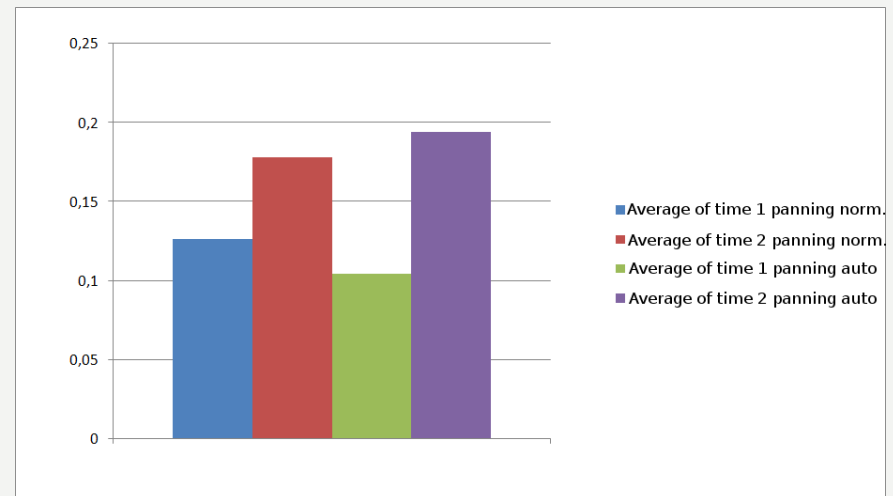
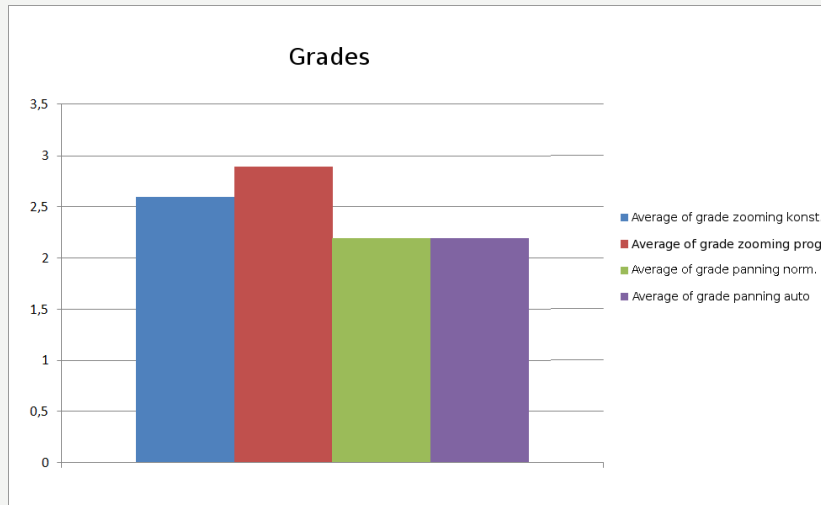
Progressive Zoom	Constant Zoom
More training needed	
Harder to control	Higher acceptance
Better for rough zooming	Better for careful zooming





Panning

Stoppable Pan	Auto Pan
Focus outside the screen	Focus at the region of interest
Stopping possible	Mode change for stopping





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Future Work

- Improvement of Tracking Engine
- Research in field of human behavior and ergonomics
- Auto Panning mode which is stoppable
- Diagonal Scrolling
- Dynamic zooming center
- Alternative concept for zooming corrections



References

- [1] C. Harrison and A. K. Dey. Lean and zoom: proximity-aware user interface and content magnification. In CHI '08: Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems, pages 507–510, New York, NY, USA, 2008. ACM.
- [2] M. Ashdown, K. Oka, and Y. Sato. Combining head tracking and mouse input for a guion multiple monitors. In CHI '05: CHI '05 extended abstracts on Human factors in computing systems, pages 1188–1191, New York, NY, USA, 2005. ACM.