Dedicated to innovation in aerospace

Virtual Cockpit
Making Natural Interaction Possible in a Low-Cost VR Simulator

NATO MSG symposium 2021 | Jeanine Vlasblom

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"Towards Training and Decision Support for Complex Multi-Domain Operations"
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Making Natural Interaction Possible in a Low-Cost VR Simulator

Photo: NLR

Live training

High-fidelity simulators

- Expensive
- Location-bound

Photo: NL Defensie

The promise of VR

- More accessible
- Small footprint
- Numerous visualization possibilities

The challenges regarding VR

Sense of presence

Natural interaction

Resolution & FOV

The Virtual Cockpit

- The concept explained
  - Physical layer
  - Virtual layer
  - Sensor layer
- The concept discussed
  - Evaluation
  - Discussion of results
  - Next steps

NLR uses advanced wireless tracking technology
which enables pilots to experience

Physical layer

- Wooden panel
- 3D printed products
    - MPD buttons
- COTS products
    - Turn knobs
    - Toggle switch
    - Flight controls
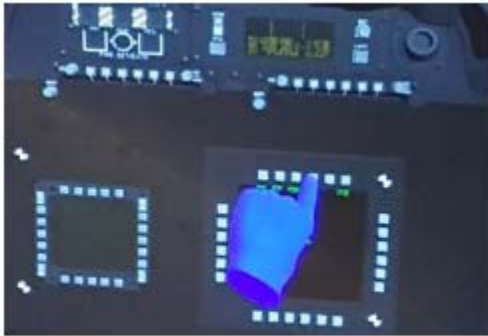- Real products
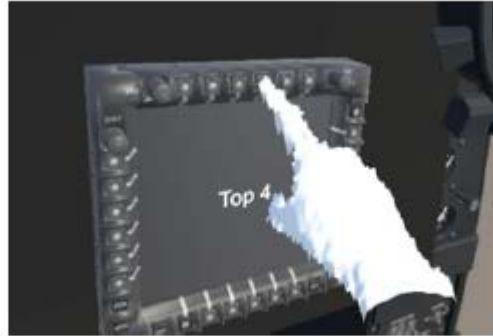   - MFD screen F16
- External screen

Virtual layer

Virtual layer – improving the sense of presence

Figure 3-1: Virtual hand.

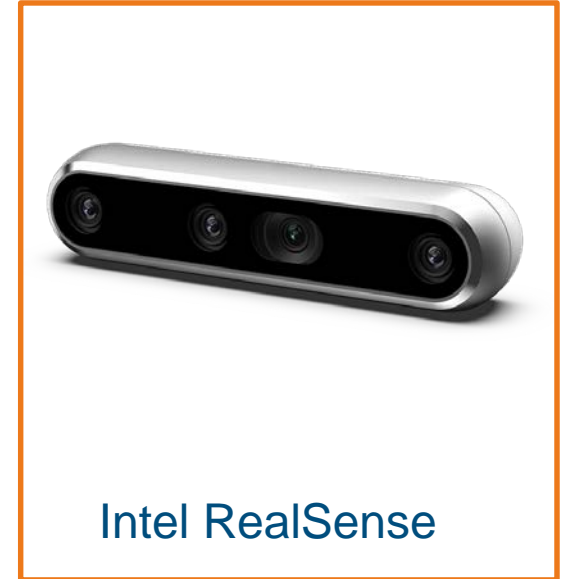Figure 3-2: Camera-based.

Figure 3-3: Colour image.

Sensor layer – interaction detection devices

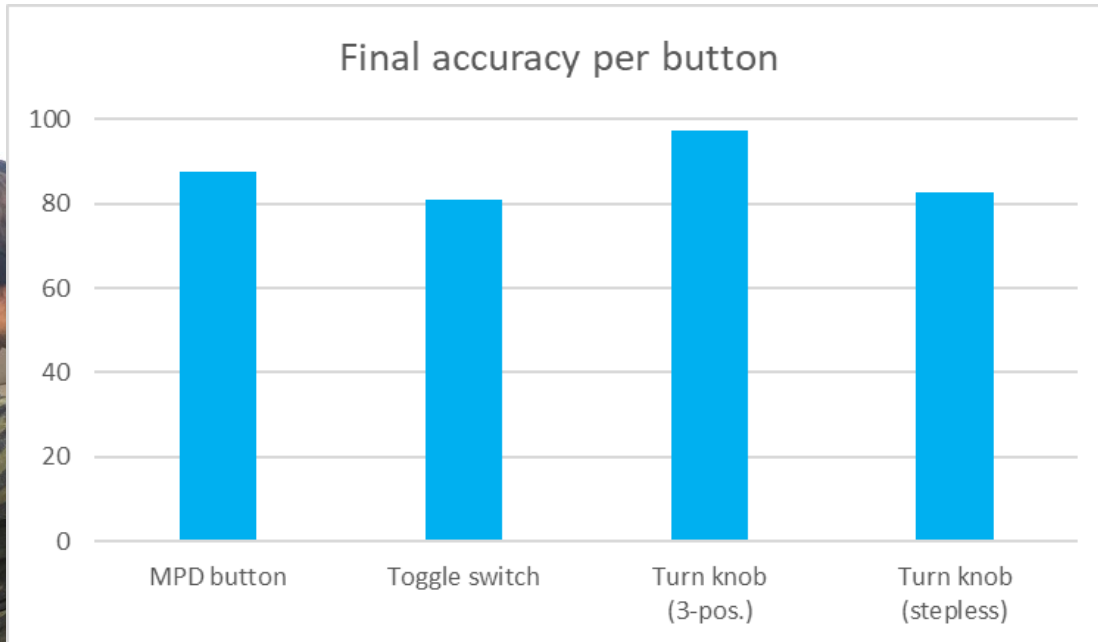LeapMotion

Manus VR Glove

Intel RealSense

Sensor layer

Alignment
physical & virtual layer

Evaluation method

- Subject Matter Experts (AH-64)
- 3 evaluation moments

- Semi-structured interviews
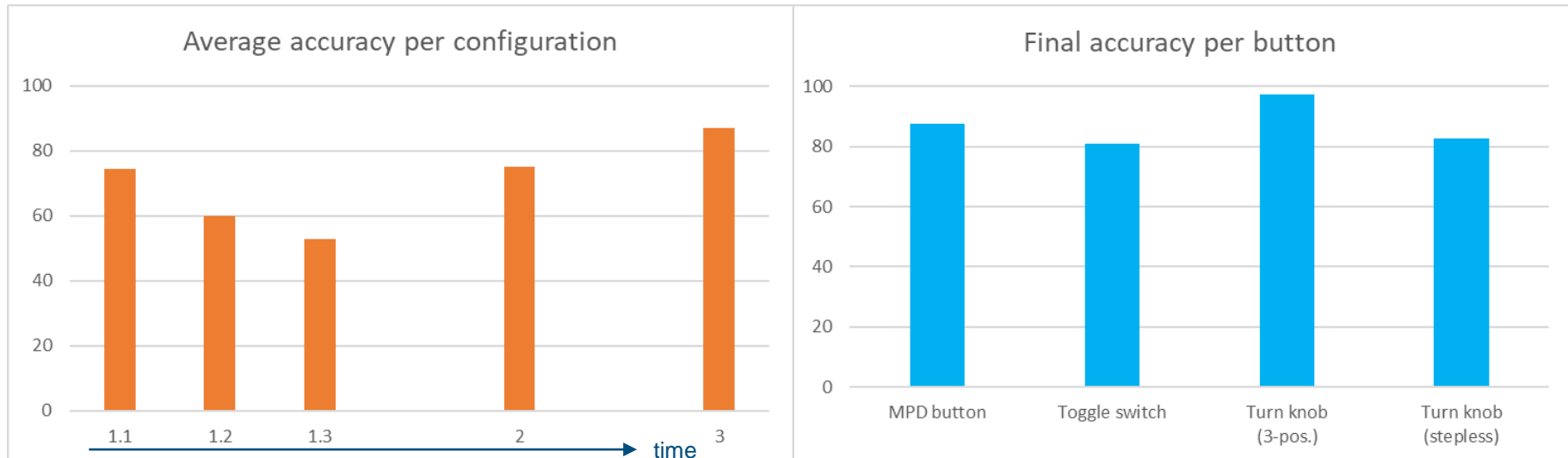- Accuracy of interaction detection
  - Hit-miss ratio

Results

Final accuracy per button

- High accuracy (> 80%)

- Natural interaction *"identical to the actual helicopter"*

- Sense of presence *"You see your hands and the cockpit around you"*

Discussion

- Progress in time (due to choice of sensors)
- Turn knobs & 3D printed buttons > toggle & MFD buttons

The challenges regarding VR

Sense of presence   **Natural interaction**   **Resolution & FOV**

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Next steps

- Get ready for training
- Use cases on other platforms
- Military mission rehearsal
- CD&E

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in a low-cost VR simulator

Bijzonder betrokken

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Photo: NL Defensie