WP3: Human-machine interfaces for controlling a PAV

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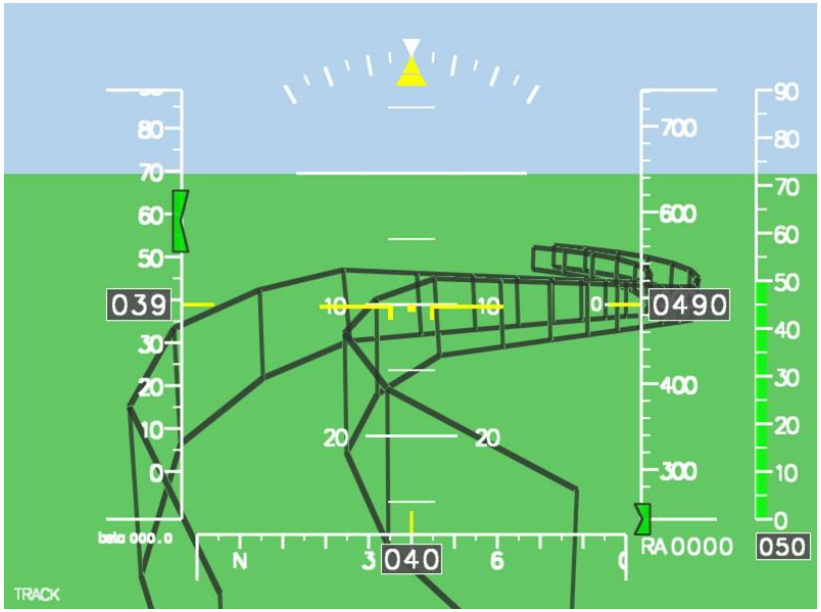
Intuitive displays and controls for PAVs

- Current flight displays are not usable by non-expert pilots
- Flight controls offer no task-related feedback

Intuitive displays and controls for PAVs

Highway-in-the-Sky display

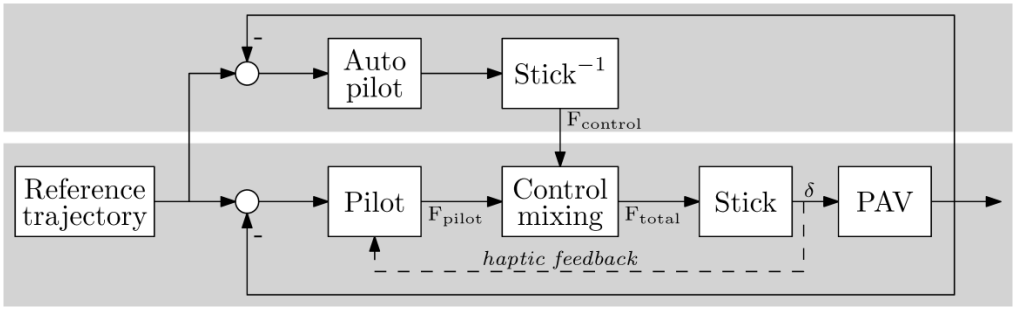


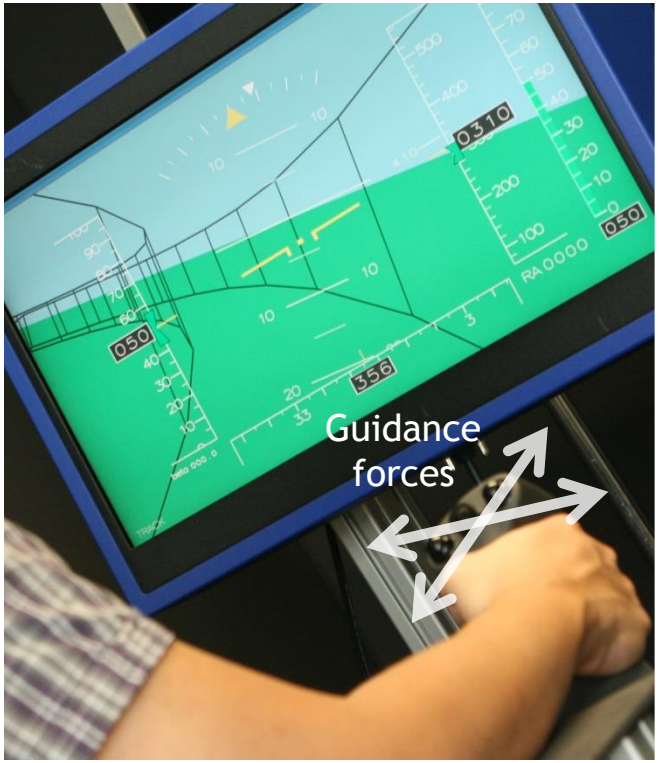
Guidance forces to feel the highway

Multi-sensory human-machine interfaces

Novel HMI: haptic shared control

- Combining the advantages of manual and automatic control
- The pilot remains in control and can overrule the automatic control system

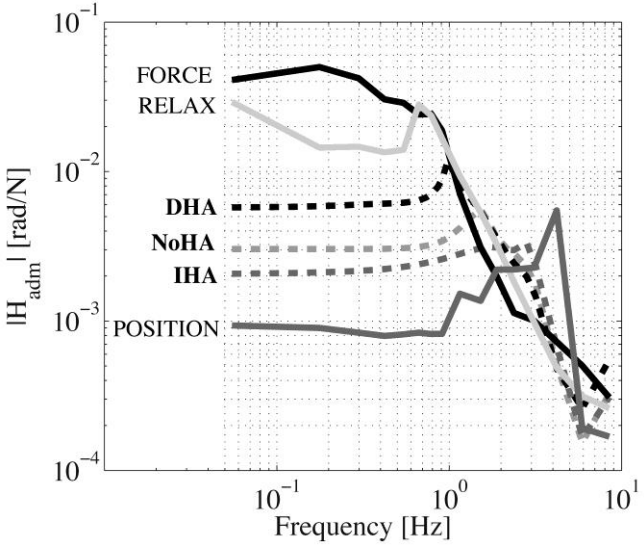


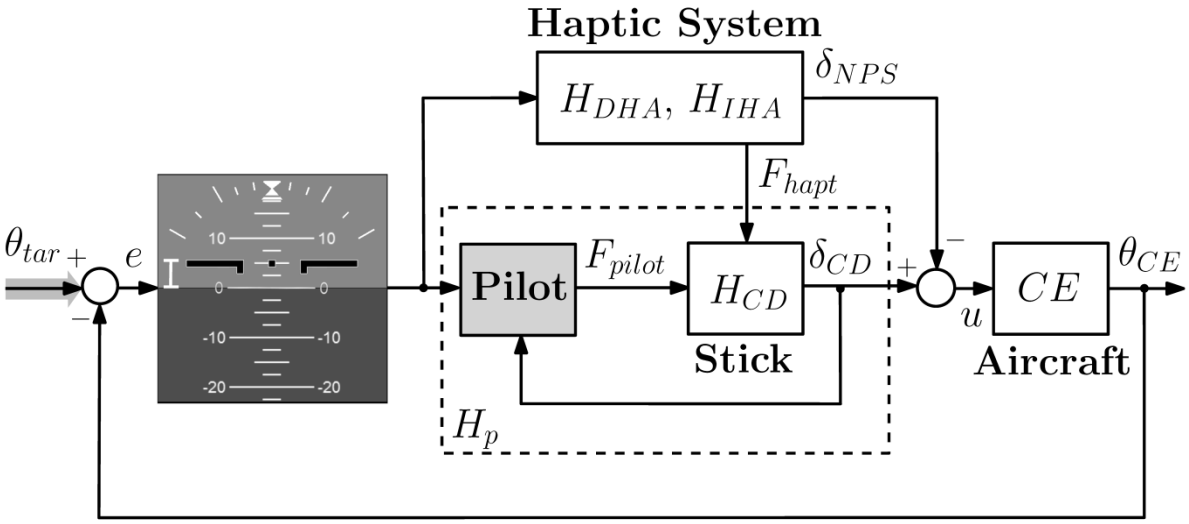


Assessing behaviour in response to haptic guidance

Haptic guidance cues can change a pilot's behaviour

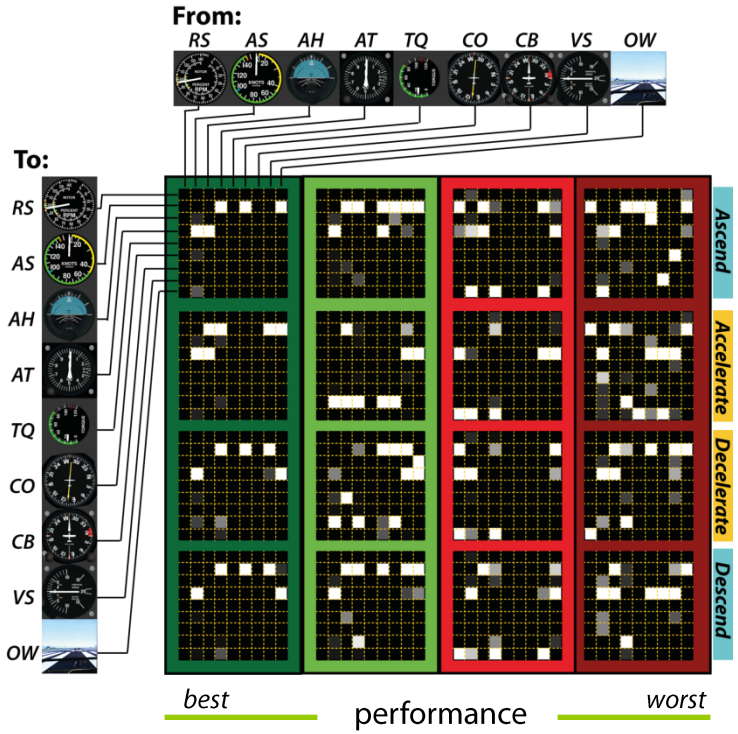
- Identification of arm admittance
- Real-time algorithms for realistic scenarios





Evaluating and improving situational awareness

Map attention biases during flight control



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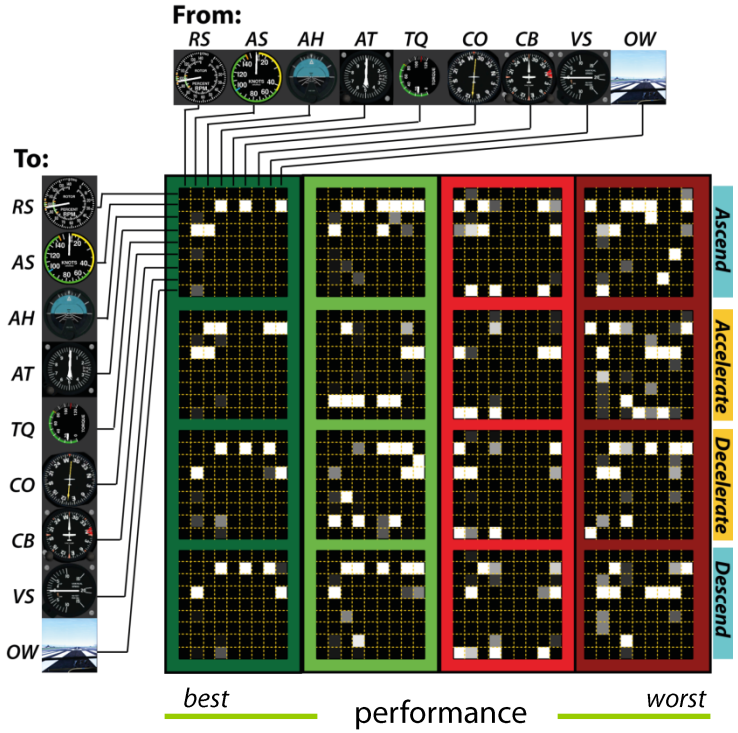
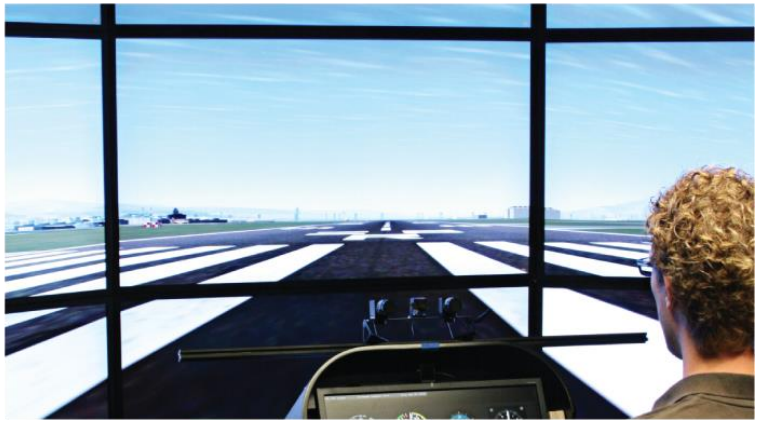
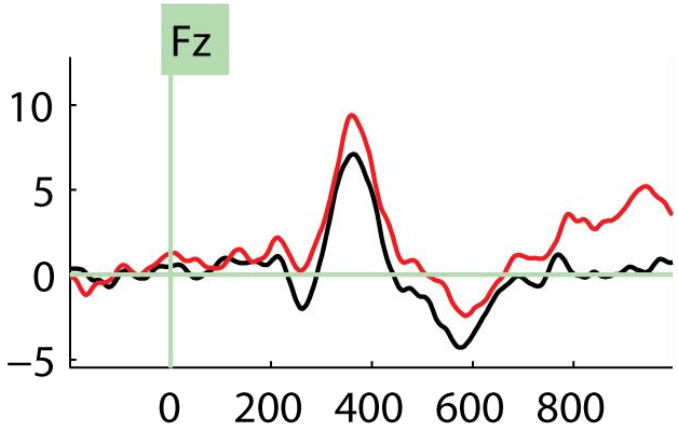
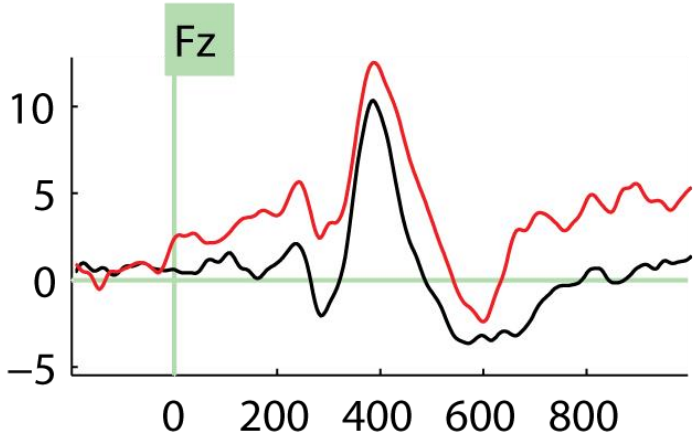


Online monitoring of operator workload

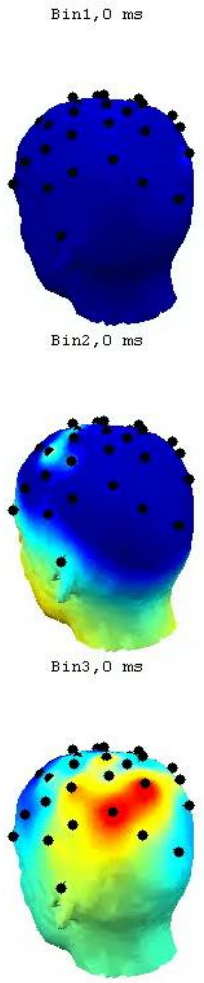
Neural responses are reduced when workload is increased





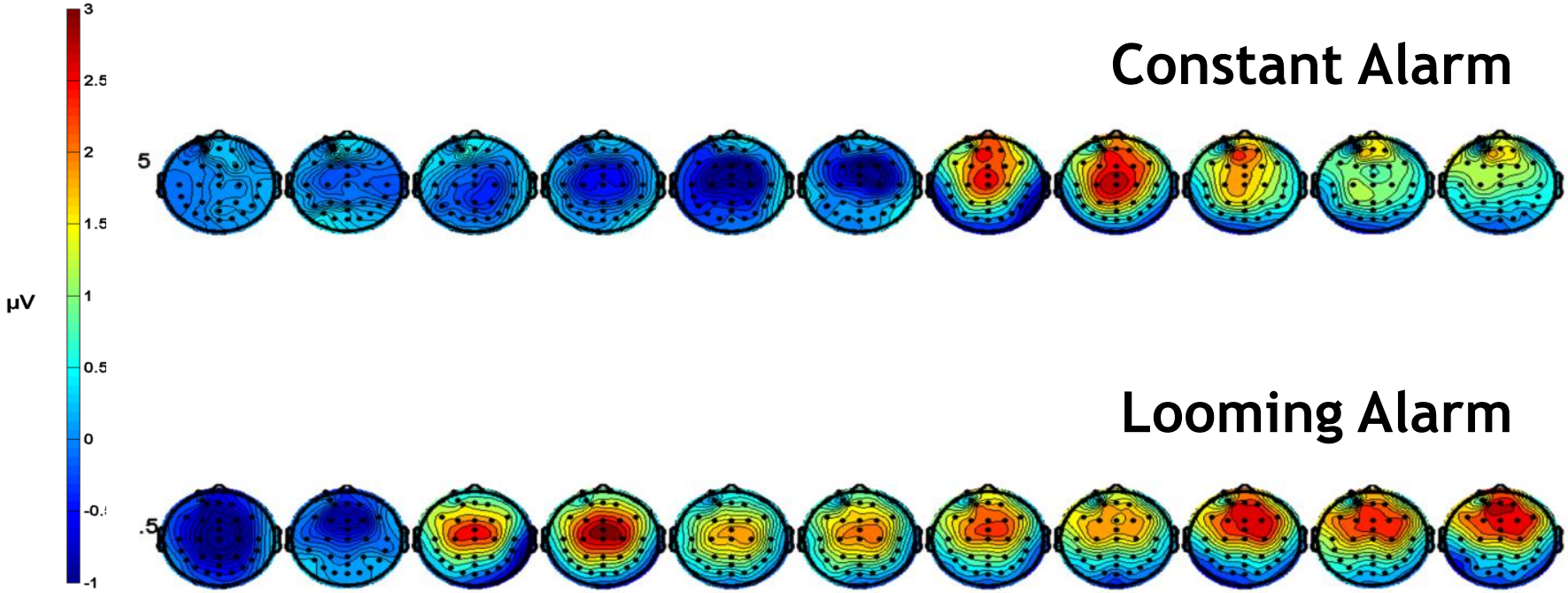


EEG measurements in realistic environments



Assessing efficacy of non-visual warning signals

- Incorporate ecologically intuitive cues to facilitate saliency
- Earlier detection and deeper processing in the brain



Key results

Haptic shared control combined with a Highway-in-the-Sky

- Intuitive and and easy-to-use control interface
- Pilots with limited flight experience fully exploit haptic cues

Human factors research

- Eye tracking reveal how information is accessed and processed
- Physiological measures (e.g., EEG) guides system evaluation and design