VR/AR & Transportation – Examples from Industry

Human-Centered Development in Transportation

Need for new VR/AR tools!

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From Feature-Driven to Consumer-Driven

User Experience

Human-Centered
‘Affective’ & Safety Development
Human-Centered Development

- **Looking**
  - Observing Human Experience
- **Understanding**
  - Analyzing Challenges & Opportunities
- **Making**
  - Envisioning Future Possibilities
Focus on driver
Trends – Provide a User Experience

Perceived Value & Differentiators

Vision is 85% of Perception
Complete new driving experience
Ergonomics
Visibility
Readability
Reachability
Reflections & Glare Issues
Challenges – HUD & Augmented Reality inside the car

- Head-Up-Display
- AR Display
- Transparent pillars
- Transparent bonnet

...
Challenges – Stunning & Safety Interior Lighting

Ambient
- Homogeneous
- Adaptive

Efficient
- Weight
- Electrical Consumption
- Performances
Challenges – Acoustic ambient

Active Sound Design by GENESIS

New acoustic HMI spatialization

Custom sound engine

… and exterior sounds for electric vehicle!
Major Style impact
represent 25% of the style

Increase Vision by Night
poor road lighting is stressful for 50% of people

Enhance vision
Highlight POI
Guide the driver
Challenges – Voice of the Customer… but his Eyes and safety?

Studio vs. Real Context

Overall vs. Many Features
New Flight Deck Evaluation
i-VISION aims at supporting human factors design and validation activities in aircraft cockpits during the early phases of the product life-cycle through knowledge-based immersive virtual reality technologies.

The objective is to increase the flexibility and reduce the cost of aircraft cockpit design and evaluation.

It combines 3 distinct areas of research into a single advanced design and validation tool:

- Human-Cockpit Operation Analysis
- Semantic Virtual Cockpit
- Virtual Cockpit Design Environment
Cockpit layout and flight performance evaluations

Experimental cockpit geometry

Associated semantic information

Simulation scenarios

The i-VISION toolbox

Virtual reality

Human factors analyst

Engineer queries

Pilots in simulation

Flight simulation
How testing this?
Research/Engineering simulators

Usefull for driver performance and vehicle dynamics!

Not for new car concept.
To explore all new oncoming challenges early in the process development, we need:

**Simulator utilities:**
- Human performance
- Human limitations
- ADAS
- Road design
- Vehicle Dynamics
- Driver Training

Still need Driving Simulators for testing self-driving cars

**Immersive Driving Simulators**

*Including:*
- Immersive stereo visualisation
- Head, eye and finger trackers
- Complete multi-sensory simulation:
  - Visual with Physics-based lighting simulation
  - Sounds
  - Motion cues
Dynamical assessment of interior lighting:

- Check perceive quality
- Design theme
- Place lights
- Observe light and materials interaction
- Observe spectrum change
- Measure lighting performance and behavior

In static or dynamics conditions.

Applications

Immersive evaluation of ambient lighting
Applications

Immersive ergonomics evaluation
New trends and challenges require virtual testing to **keep the human in the loop**.

Virtual testing using « classical » DS / VR DS / AR DS

**Perspectives:**

- Use predictive VR with **certified simulation tools**
- Improve Realism & Presence by integration of:
  - Physics based light simulation
  - Acoustics simulation
  - Multi-sensory / Human perception models
  - Understanding of simulator sickness

- Improve simulation software:
  - More interoperability
  - More standards
  - Scenario & AI
  - 3D Maps
  - ADAS/Sensors

+ Price reduction for hardware… **will spread VR into the industry!**

**OPTIS Virtual Platform** provide solutions to assist you in each development phases: From User Experience study, through Engineering design to Manufacturing and maintenance operations, **keeping human factors in the loop** all along the development process.
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THANK YOU