



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
CAMPUS DI FORLÌ

Dipartimento di Ingegneria
Industriale



Realtà Virtuale per la progettazione e il design di interni nel settore aeronautico

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CIRI Aerospace

Contenuti

-Il laboratorio di Realtà Virtuale

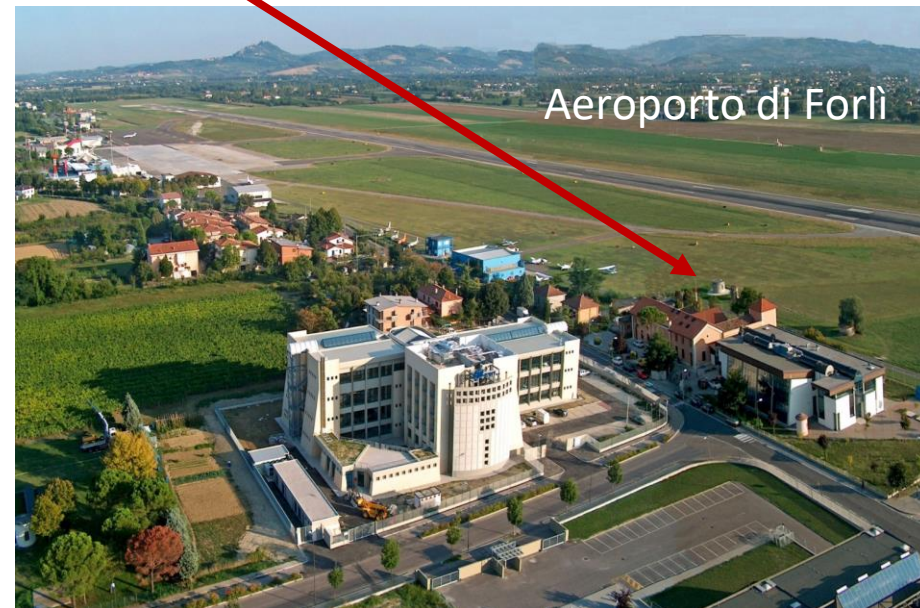
- Dove di trova
- Esperienze e Competenze
- Progetti di Ricerca

-Realtà Virtuale per la progettazione e il design di interni nel settore aeronautico – Il Progetto Europeo CASTLE

-Conclusioni & Domande



Il Laboratorio di Realtà Virtuale – Dove si trova



Centro Interdipartimentale di
Ricerca Industriale dell'Università di
Bologna

@Tecnopolo di Forlì

Per favorire lo sviluppo di conoscenze,
competenze e servizi di ricerca per
Aziende



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Il Laboratorio di Realtà Virtuale – Esperienze e Competenze

Simulation & Interaction

- Advanced visualization systems and interactive tools
- Human Machine & Brain Computer Interface Design

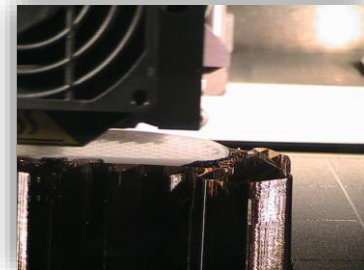
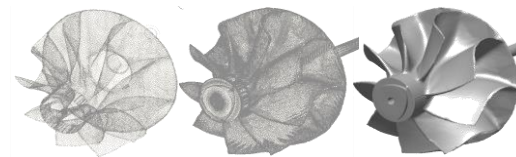


- Virtual and Augmented Reality environments for Industrial, Aerospace and Cultural Heritage
- Interfaces Prototyping: Air Traffic Management systems & cockpit infrastructures



Product Design and Manufacturing

- Rapid Prototyping & Additive Manufacturing
- Reverse Engineering and 3D modeling
- Design Methods and product development in Industrial and Biomedical Engineering



Past European Projects at V-Lab

- **FP7**

- CLEAN SKY Green Regional Aircraft Mission & Trajectory Management FP7
- ALICIA All Condition Operations and Innovative Cockpit Infrastructure FP7
- IN2SAI Increasing Young Women's Participation in Science Studies and in the Aeronautic Industry ERASMUS LLP
- SF-HEAT Sustainable Framework for Higher Education in the Aeronautical technology TEMPUS



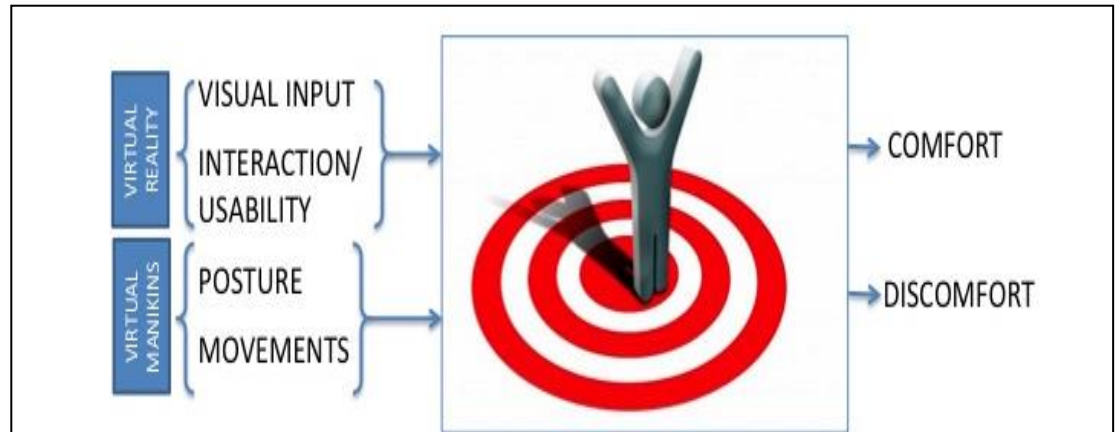
Horizon 2020 European Projects at V-Lab

- MINIMA (Mitigating Negative Impacts of Monitoring high levels of Automation) H2020 – SESAR
- RETINA (Resilient Synthetic Vision for Advanced Control Tower Air Navigation Service Provision) H2020-SESAR
- AUTOPACE (Automation Pace) H2020-SESAR
- **CASTLE (CAbin Systems design Toward passenger wellbEing) Clean Sky 2**



CASTLE Project – Human Centered Design

- **The study motivation:** aircraft requires continuous improvements in the **cabin comfort** to compete in the global market. As it concerns the area of comfort, airlines have also paid great attention over the past twenty years on the noise and vibration, all addressing the human sensations of comfort.
- **CASTLE aims at** answering to the following research questions:
 1. how to make future aircraft more comfortable?
 2. how to guide the design stages toward a **design for comfort** approach?



CASTLE Project – Main Objectives

Human Centered Interiors

- **Setting the standard** wrt human factors issues
- Design and Manufacturing of major cabin items
- Experimental test campaign
- Validation and **assessment w/ “full-scale” mock-up**



Environmental Friendly Materials

- Innovative thermoplastic materials
- Multifunctional materials with acoustic properties
- Integrated thermoset processes
- Bio-composite materials based on “green” technology
- Integration of new functions (easy-to-clean, anti-bacterial...)

Noise&Vibration

- Passive and Active N&V control treatments
- Psychoacoustics
- Acoustic Comfort Targets
- Novel NVH design
- Optimization of human-centered N&V



CASTLE Project – The Partnership

Universities

Univ. di Bologna, **UNIBO**
Polit. di Torino, **POLITO**
Pininfarina

Research Centres

Univ. degli Studi di Napoli “Federico II”,
UNINA

CIRA

GEVEN

SMEs and Industries

ACUMEN

INVENT

PGA

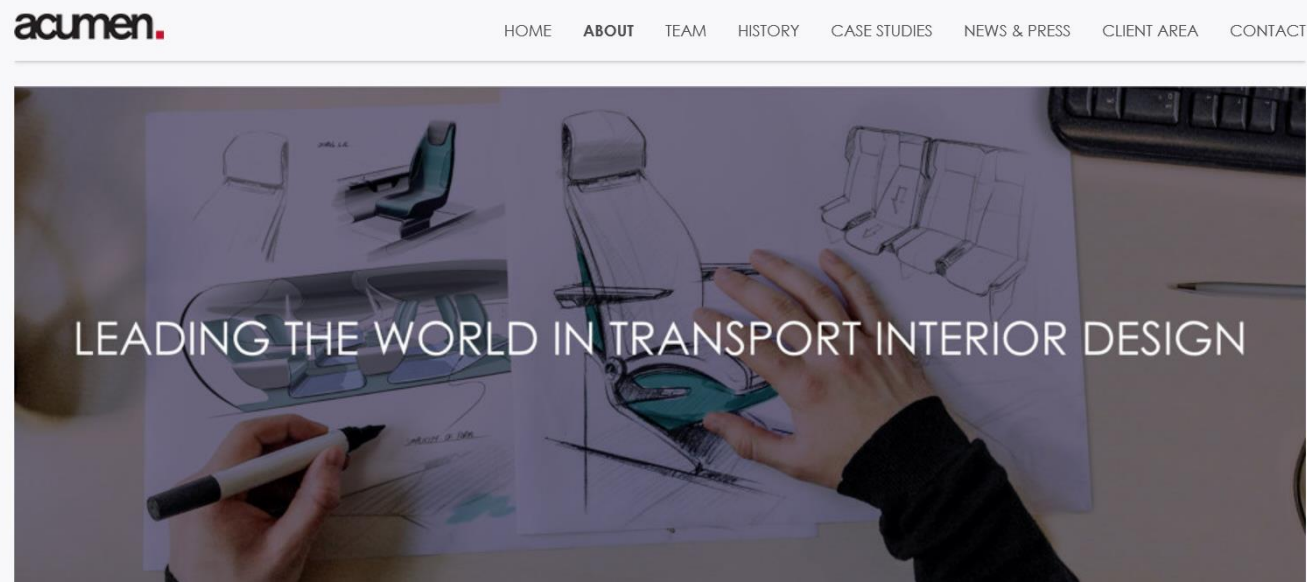
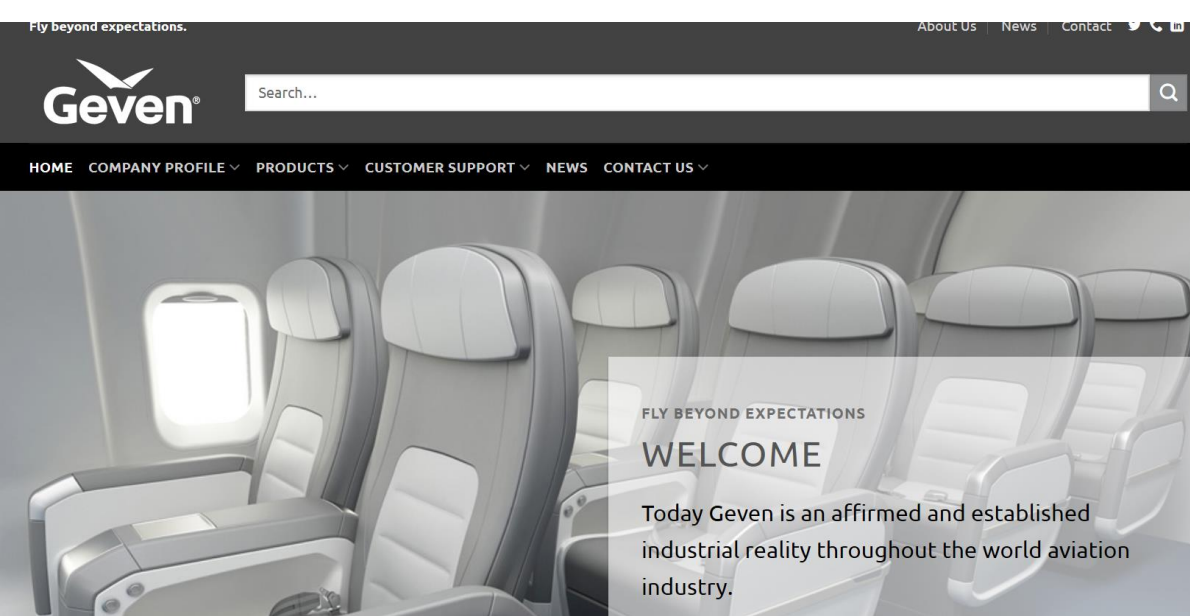
NOESIS

DEMA

SIEMENS Industry Software NV, SISW



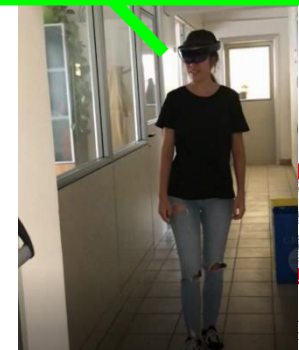
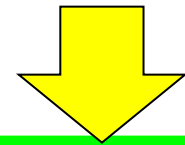
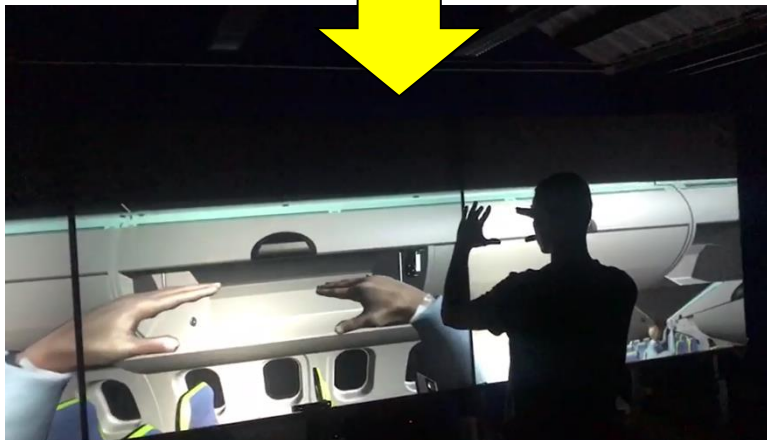
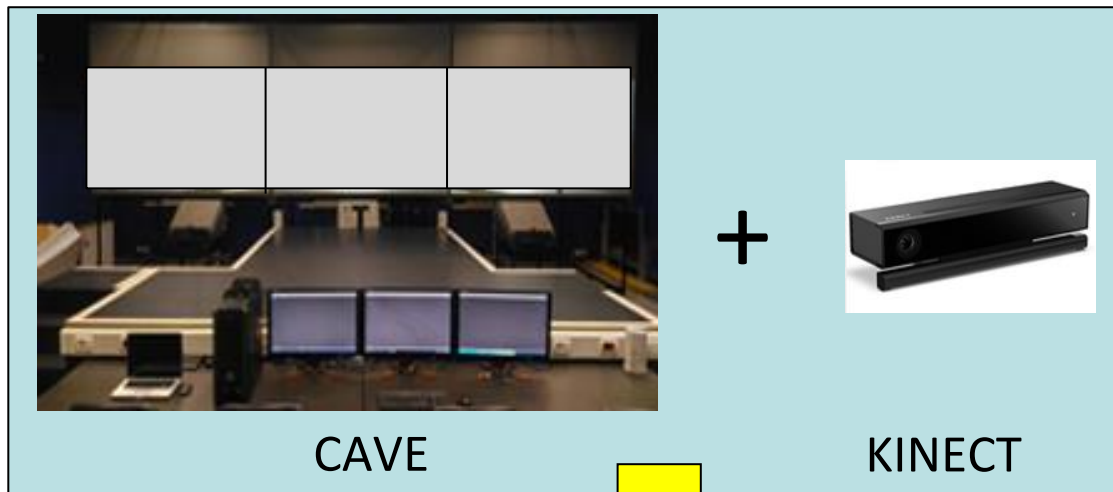
CASTLE Project – The Partnership

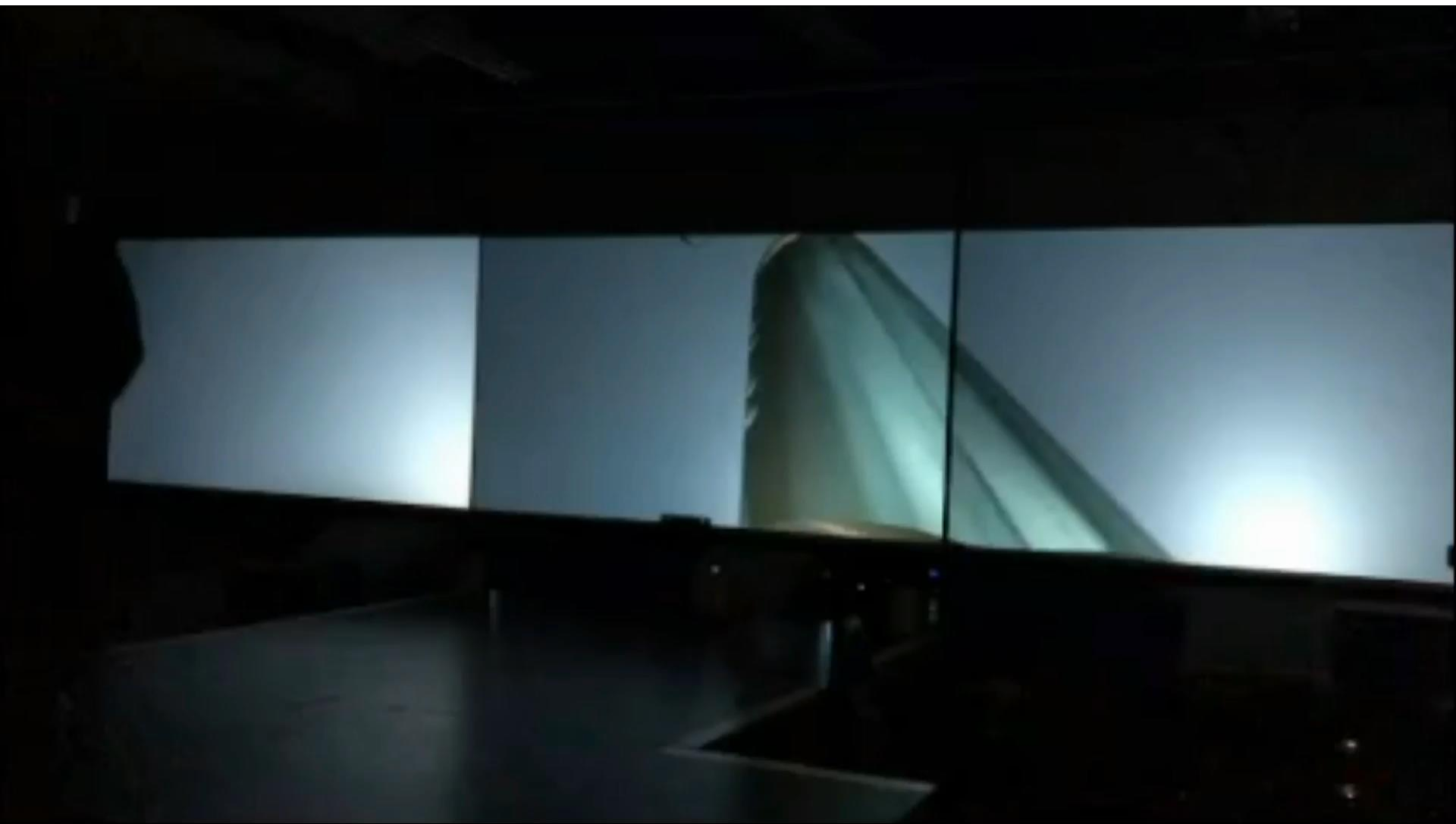


CASTLE Project – Experiments at V-lab

The experiments were performed by means of **human-in-the-loop simulations** carried out through the **first-person perspective navigation** of two different **Virtual Reality** domains:

1. **CAVE** (CAVE Automatic Virtual Environment)
2. **See-Through Head-Mounted Display**.





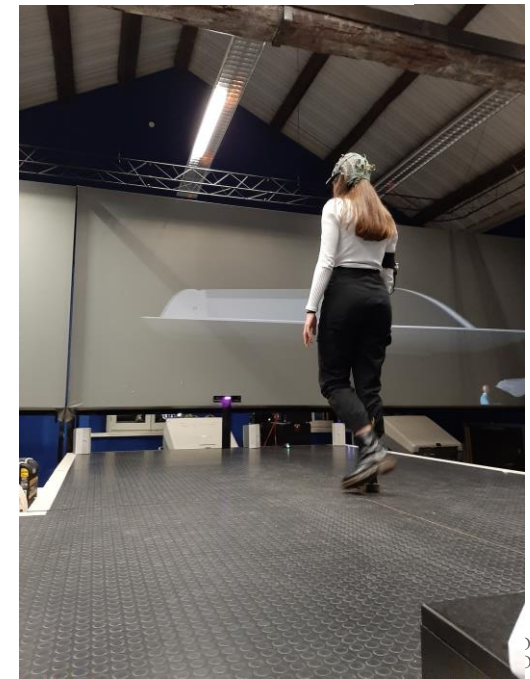
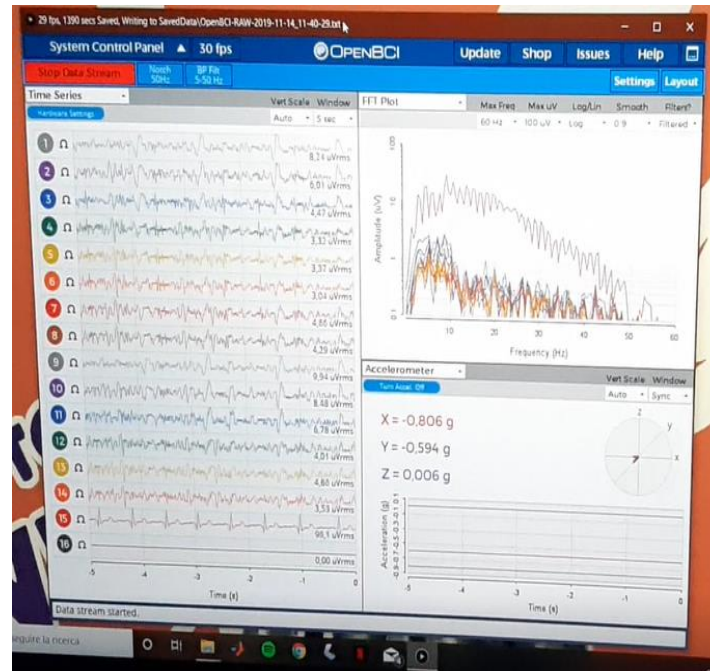
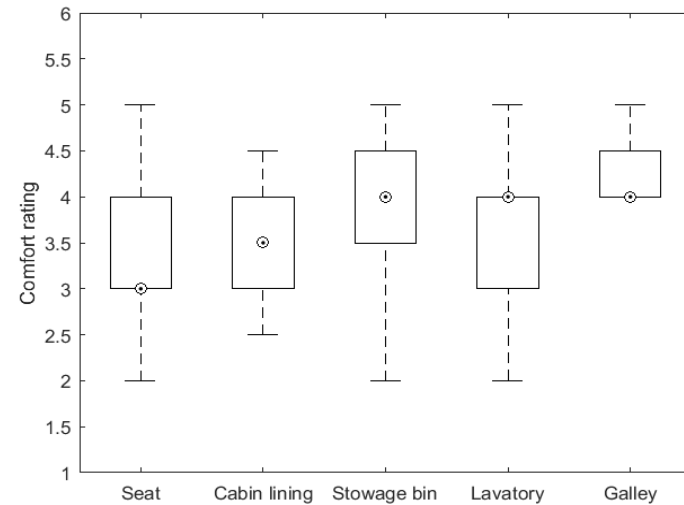
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CASTLE Project – First Results

Questionnaire + EEG





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