



POLITECNICO
MILANO 1863

DIPARTIMENTO DI MECCANICA

Virtual prototyping & human modelling lab

State-of-the-art VR/AR, haptics,
3d human modeling technologies

Description:

The Virtual Prototyping & Human Modelling Lab is a research and teaching laboratory equipped with state-of-the-art technologies and tools for Virtual and Augmented Reality, Haptics and Digital Human Modelling. The Lab is focused on developing multisensory interactive virtual prototypes for design review, simulation and testing purposes, real-time rendering on high performing workstations, modelling of human body and organs for ergonomics, human-machine interaction, bioengineering and medicine.

Instruments & Facilities:

Immersive Displays:

- Cyviz - VIZ3D
- Large screen (3,4x2,1m) with Barco F80-4K12 4K UHD stereoscopic projector

Head Mounted Displays for Augmented Reality (AR):

- Microsoft HoloLens 1&2
- Magic Leap 1

Head Mounted Displays for Virtual Reality (VR):

- Oculus Quest 2
- HTC Vive Pro Eye
- Varjo VR1

Motion tracking systems:

- VICON 460
- A.R.T. Tracking System
- OptiTrack V100:R2
- OptiTrack V120:Trio
- Microsoft Kinect 1&2
- Microsoft Azure Kinect
- UltraLeap Leap Motion



Eye-tracking systems:

- Nvisor ST HMD
- Pupil labs Core
- Tobii Pro Glasses 3

Bio signal acquisition systems:

- ProComp Infiniti
- LWT3 Raw Power 0.9 surface ElectroMyoGraphy (sEMG)
- EMOTIV EPOC ElectroEncephaloGram (EEG) Headset
- ANTneuro eego sports 128 pro ElectroEncephaloGram (EEG) and ElectroMyoGraphy (EMG) headset

Haptic Systems:

- Haption Virtuouse 6D35-45 (6 DOF device)
- MOOG Haptic Master (3 DOF robot)
- 3D Systems PHANTOM desktop (6 DOF device)
- Manus VR (glove)
- WeArt Touch Diver (wearable)
- Ultraleap Stratos Explore (mid-air haptics)

Equipment for physical prototyping:

- Ultimaker S3 (FDM 3D Printer)
- Ultimaker S5 (FDM 3D Printer)
- Delta Wasp 4070 (FDM 3D Printer)
- Formlabs Form 3B (SLA 3D Printer)
- Laser Engraver and Cutter

In-House Developed Systems:

- Multi vehicle virtual simulators (car, excavator)
- Spatial Augmented Reality (SAR) system - SPARK
- Multi-camera recording system for design activities monitoring

Activities:

Interactive Virtual Prototyping

- Product design review.
- Multisensory virtual prototypes.
- Interactive prototypes of industrial products.
- Haptic interaction with virtual products.

Monitoring and Maintenance

- Augmented Reality for diagnostic and prognostic.
- Augmented Reality for remote product maintenance.

- Haptic-based simulation and training of maintenance operations (assembly/disassembly).

Digital Human Modelling

- 3D models of organs or systems from .dicom files
- VR/AR applications for diagnosis/simulations of surgeries, prosthesis design
- VR/AR for ergonomics, human-machine interaction
- 3D segmentation.

