

*Well textured objects*

- Augmented Reality (AR) has proved to be an effective tool in creative industries:

Architecture    Design    Visual Arts    Television    Publishing

- Technical challenges:

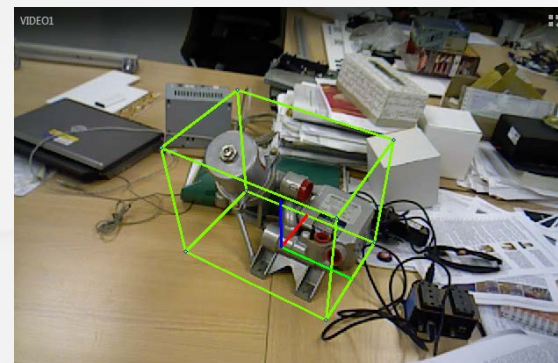
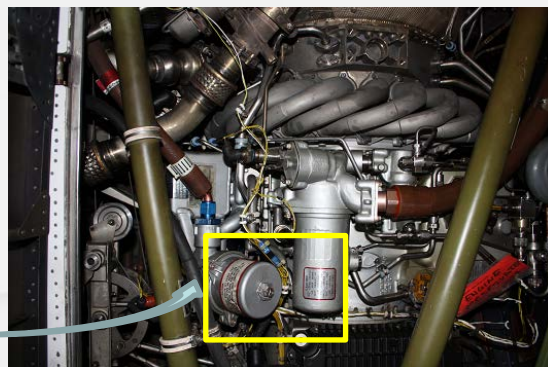
- Usually, AR needs to identify and to estimate the pose (position and orientation) of objects in **real-time to augment information**.
- Generally, daily objects in indoor/outdoor environments (lamp, chair, cup...) are: **3D, textureless, partially visible** and could have **complex shapes**.
- Outdoor/indoor environment:
  - Varying **lighting conditions**.
  - Heavy **cluttered**.



*Almost textured objects*

Non closed problem  
in AR field!

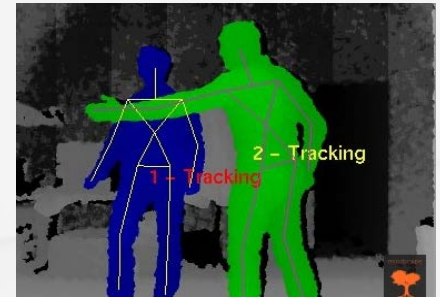
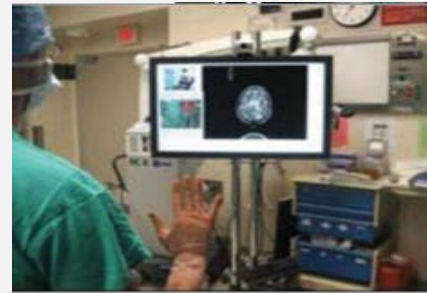
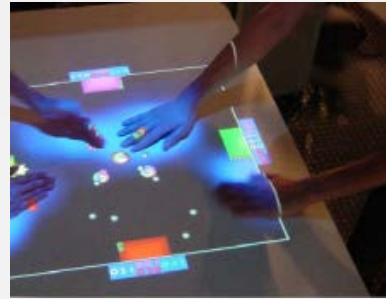
# Textureless 3D object recognition and pose estimation



- Our approach permit detect and **estimate pose for 3D textureless/textured objects.**
- **Features:**
  - Real time (>20 fps).
  - Robust detection under varying lighting conditions, heavy cluttered scenes and partial occlusion.
  - Detect, track, and pose estimation several 3D objects simultaneously.
- **Additional features:**
  - Spatial Augmented Reality support (use of digital projectors to display graphical information onto mobile physical objects in real time).
  - Application area: Video Art, Cinema, Advertising.
  - Graphical engine plugin (Unity3D).
  - Realistic augmentation (Real-time occlusion handling).



# Natural User Interfaces (NUI)



The biggest benefit in natural user interfaces is the ability to attract and captivate users with responses that are organic with minimal learning.

## Labhuman Multi-touch tabletop technology

### ▪ HumanTop

- Multi-touch tabletop system.
- Implements a **stereo camera vision** subsystem
- Recognition and tracking of **textured planar objects**.
- Tracking of sheets of **paper** and **ID-code markers**.
- LabHuman Patent.

### ▪ HumanDepthTouch

- The interactive surface **need not be instrumented**.
- Robust to environment light conditions.
- This approach allows touch sensing on **non-flat surfaces**.

## Labhuman NUI technology

- Robust, automatic hand and finger tracking.
- 6DOF face tracking.
- Automatic human location and tracking.





# LabHuman outline

What is LabHuman?

- **Human Centered Technology Laboratory**
- **A public research laboratory of UPV** with strong relationships with private companies.
- Our objective: Development **of technology that supports human actions** in several contexts (health, well being, education) with special emphasis in interactive computer media.
- In particular high expertise in **Natural Interfaces, Computer Vision Based Augmented Reality**
- **Multidisciplinary team:** computer science, mathematics, physics, engineers, psychologists, ergonomists
- Facilities: 2600 m2, 400 m2 VR laboratory, 4 side CAVE



**Thank you for your attention**

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