

# Augmented Reality Interface for free teleoperation

LE LIGEOUR  
OTMANE  
MALLEM

# Table of content

- Introduction
- The ARITI System
- The new platform : Evr@
- Mixing new ways of perception and interaction
- Experiments and results

# Introduction

- Computer Assisted Teleoperation (CAT)
- Operator interface improvement
- Teleoperation to improve performances

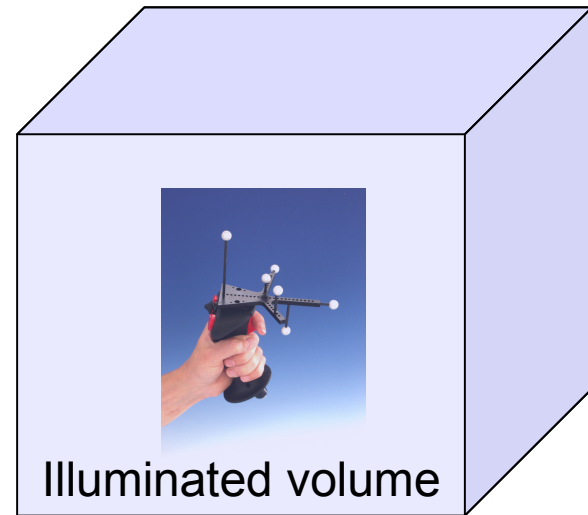
# The ARITI System

- ARITI : Augmented Reality Interface for Teleoperation via Internet
  - Enhance environment perception
  - Enhance robot control
  - Enhance execution checking

# The new platform : Evr@

## ■ Tracking system

- IR flash
- 6D positionning volume
- Flysick
  - 3D position
  - 3D orientation
  - 8 buttons



# The new platform : Evr@

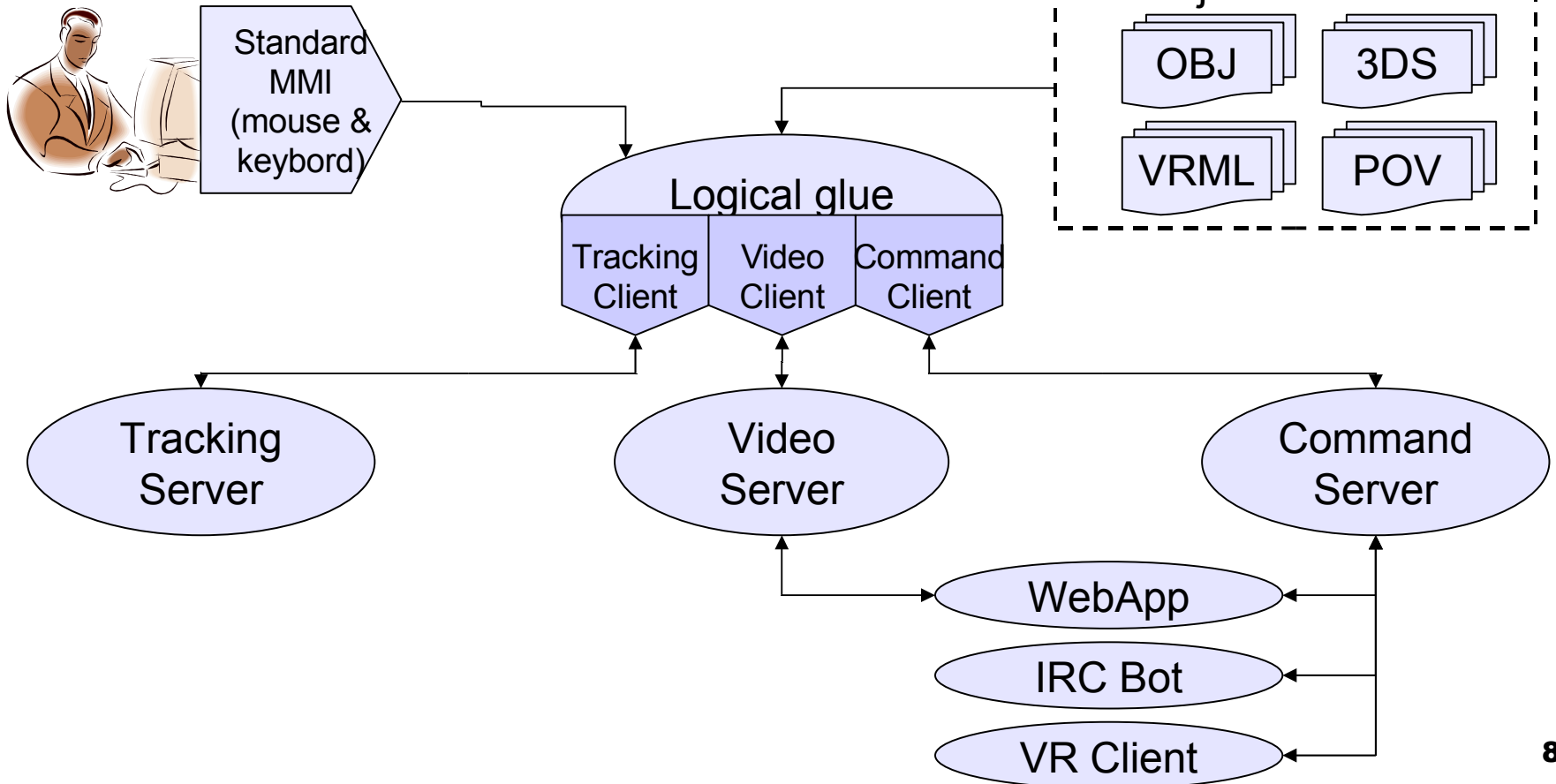
- Display system
  - Projector
    - DLP technology
    - Clear images in standard illumination
  - Screen
    - 320x240cm
    - retroilluminated

# The new platform : Evr@

- Frame grabbing
  - Compact Sony cameras
    - Light
    - Grayscale
    - Require a framegrabbercard
  - Logitech webcams
    - RGB
    - Universal USB connectors

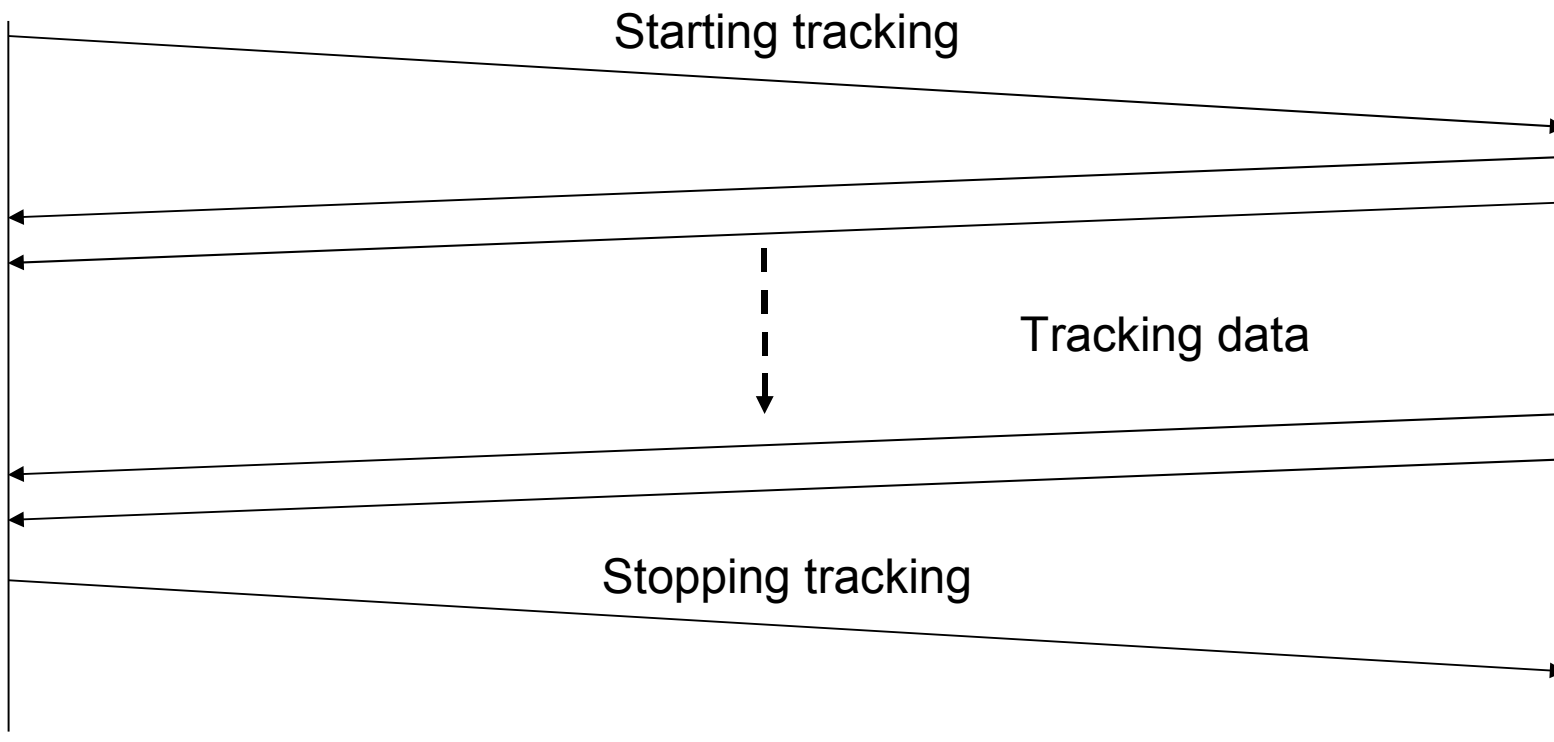
# Mixing perception and interaction

## ■ The software architecture



# Mixing perception and interaction

## ■ Tracking client/server



# Mixing perception and interaction

## ■ Image client/server

- Client requests image compression type and level (JPEG, ZIP, RAW, etc)
- Client Requests type of image (grayscale, RGB, stereo, etc.)
- Server provides the chosen image

# Mixing perception and interaction

- Command client/server
  - Sending orders (reset, positions)
  - Receiving robot status and positions

# Mixing perception and interaction

- Man Machine Interface (MMI)
  - Different methods of Perception (virtual, real, mixing)
  - Different methods of Interaction (absolute, relative control)

# Experiments and results

- Tasks are done faster
  - Better control
  - Free hand teleoperation
- Tasks are done safer
  - Virtual fixtures
  - Stereoscopic environment perception