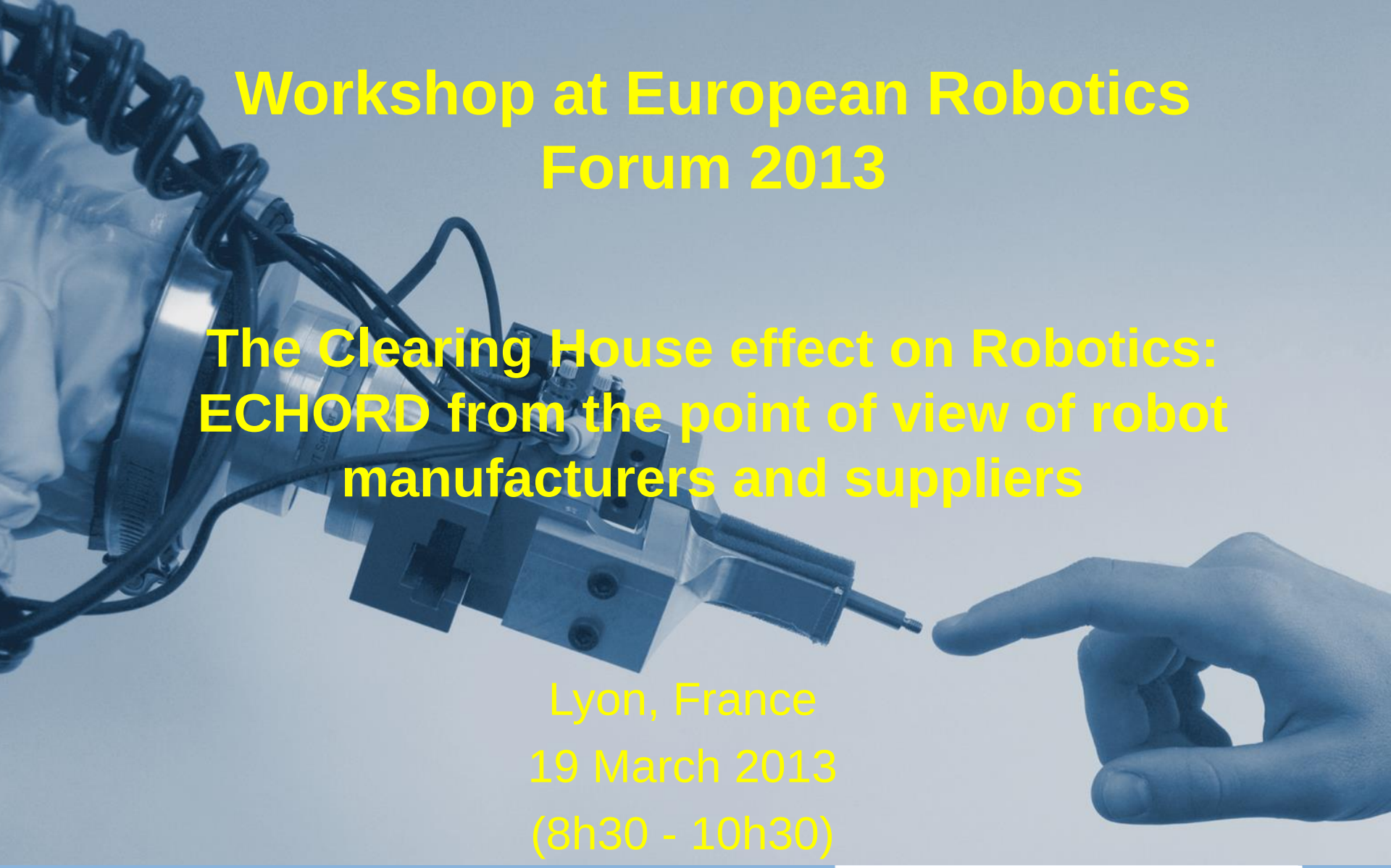

Workshop at European Robotics Forum 2013

The Clearing House effect on Robotics: ECHORD from the point of view of robot manufacturers and suppliers

Lyon, France

19 March 2013

(8h30 - 10h30)

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for Open Robotics Development
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ECHORD

KOMPEYE - Enhancing the visual perception capabilities of Kompaï robot using parallel processing

Andoni Beristain – Vicomtech-IK4

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INTRODUCTION

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Partners and Roles

- ROBOSOFT (Coordinator)
  - Role:
    - Kompaï robot, including services (e.g. navigation, emergency call).
    - Robot adaptation for computer vision system (camera and PC).
    - Experiment validation, including appropriate environment setup.
  - Person in charge: Arnaud Lago
- Vicomtech-IK4
  - Role:
    - Develop computer vision modules
    - Integration into Kompaï platform
  - Person in charge: Luis Unzueta

Adapted Kompaï robot

Kompaï platform tablet-PC

Panic button

Sensing

Microsoft Kinect®

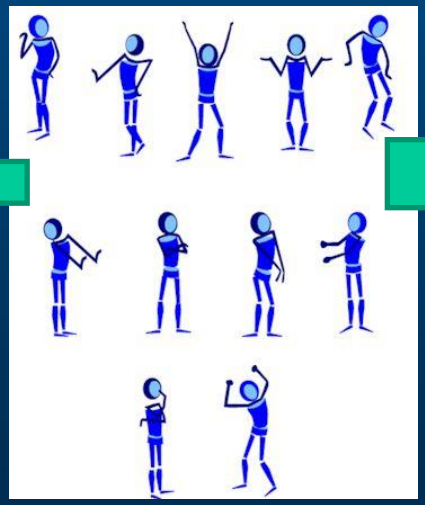
Computer Vision Module PC

Kompaï robot platform

Computer Vision Modules

Facial and Body language Analysis

Identify if the person is in trouble and notify his carer



COMPUTER VISION MODULES

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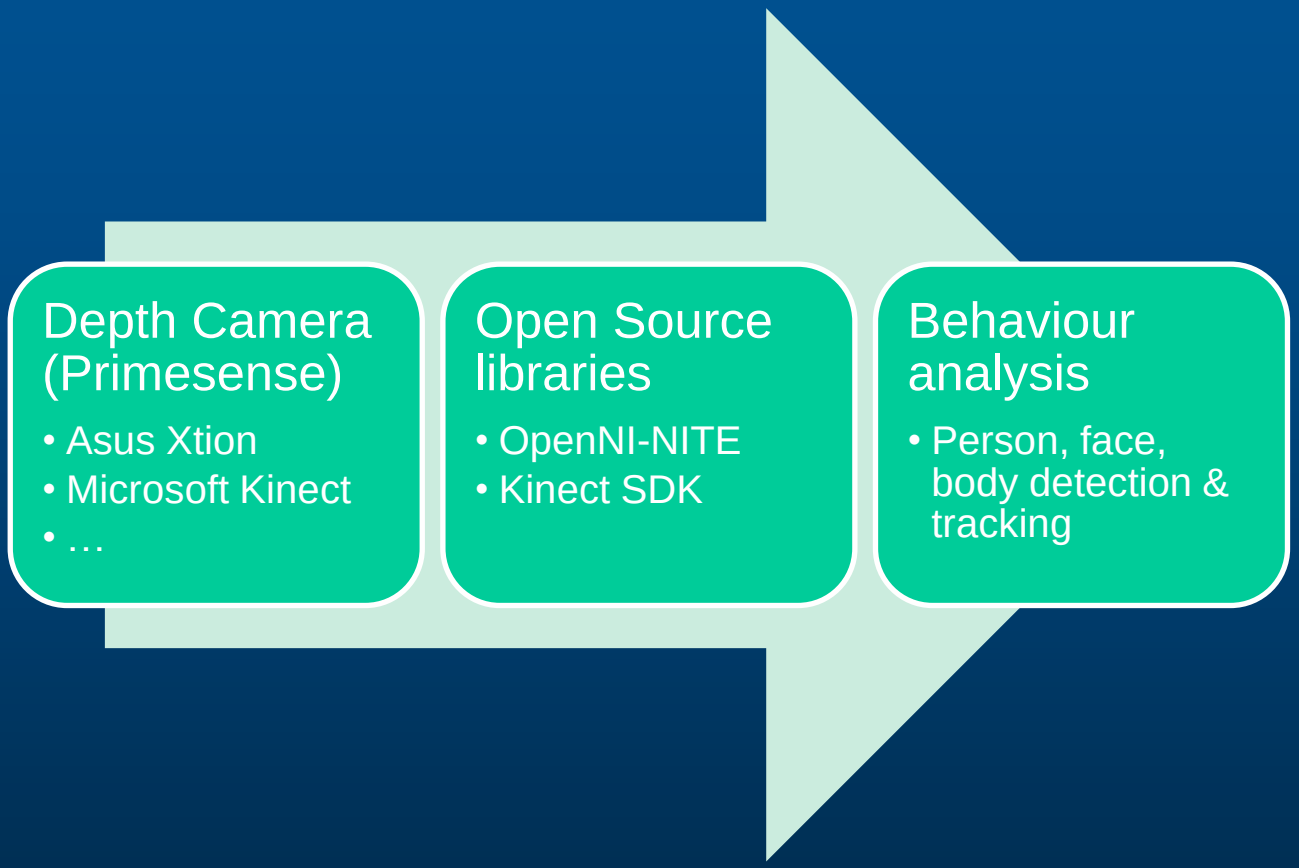
Depth Camera (Primesense)
• Asus Xtion
• Microsoft Kinect
• …
Open Source libraries
• OpenNI-NITE
• Kinect SDK
Behaviour analysis
• Person, face, body detection & tracking

Depth Camera
(Primesense)
• Asus Xtion
• Microsoft Kinect
• …
Behaviour
analysis
• Person, face,
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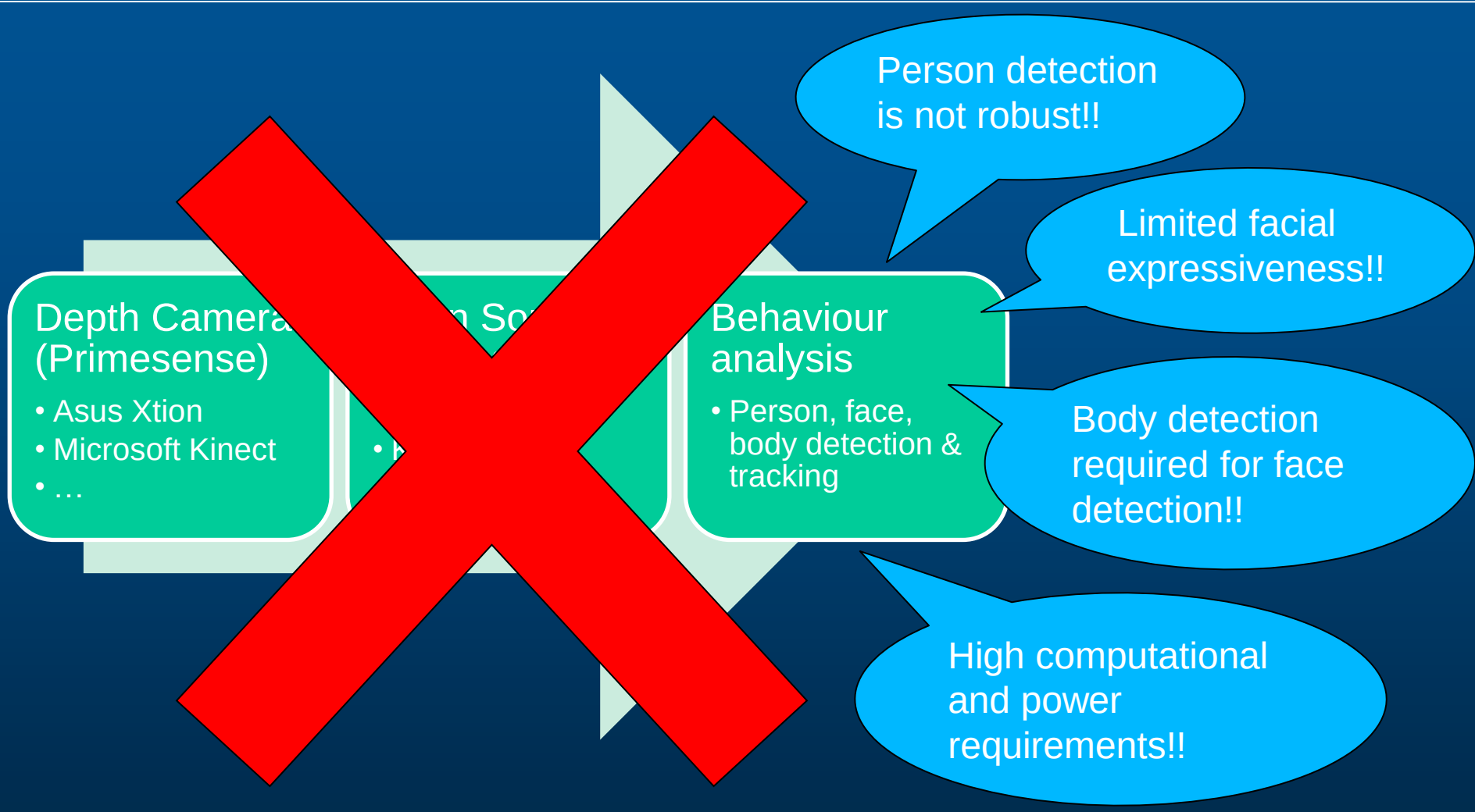
Person detection is not robust!!
Limited facial expressiveness!!
Depth Camera (Primesense)
• Asus Xtion
• Microsoft Kinect
• …
Behaviour analysis
• Person, face, body detection & tracking
Body detection required for face detection!!
High computational and power requirements!!

Computer Vision Modules

- **Person detection**
  - Cascade classifier based detection
  - Rao-Blackwellized Data Association Particle Filter (RBDAPF) based tracking
- **Body detection, tracking and expression analysis**
  - OpenNI-NITE
- **Face detection, tracking and facial expression analysis**
  - Cascade classifier based detection
  - Online Appearance Models (OAM) based tracking

Demonstration of Vision Techniques video

Deliverable D2.1

Video: **KOMPEYE Experiment: Demonstration of Vision Techniques**

BODY EXPRESSION ANALYSIS

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Body Expression Analysis

- Using a new full body expression coding system (including face and body)
- Two coding approaches, inspired by:
  - Body Action and Posture coding system (BAP)
  - Synergology
- None of them provide quantitative measure, therefore adaptation has been required
- BAP is not general enough, but technically feasible
- Synergology is too complex, but it can be partially implemented.

IDENTIFY IF THE PERSON IS IN TROUBLE

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Identify if the Person in Trouble

- Two complementary approaches to identify if the person is in trouble:
  - **Active**: The user performs a gesture to ask the robot for help
    - Wave hand over shoulder (universal gesture to ask for attention
  - **Passive**: The robot analyzes the person's facial expressions and/or body posture and gestures to automatically identify whether the person is in trouble or not
    - Based on BAP and Synergology

Behaviour recognition techniques video

Deliverable D2.2

Video: **KOMPEYE Experiment: Demonstration of behaviour recognition techniques**

Thank you for your attention

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