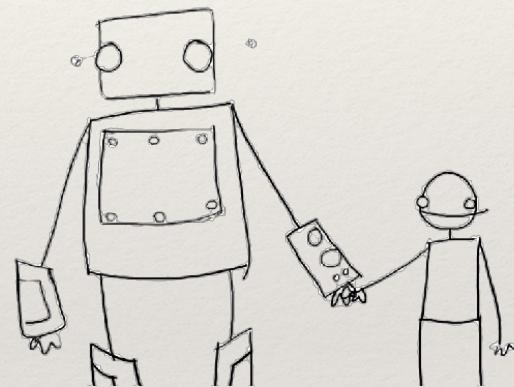


ROBOT VISION



ROBOT VISION

Make computers / robots understand images and video

- ❖ Specific Recognition Tasks
 - ❖ Outdoor, indoor.
 - ❖ City, forest, factory.
- ❖ Image Annotation
 - ❖ street
 - ❖ people
 - ❖ building
 - ❖ mountain
 - ❖ tourism
 - ❖ cloudy
 - ❖ brick



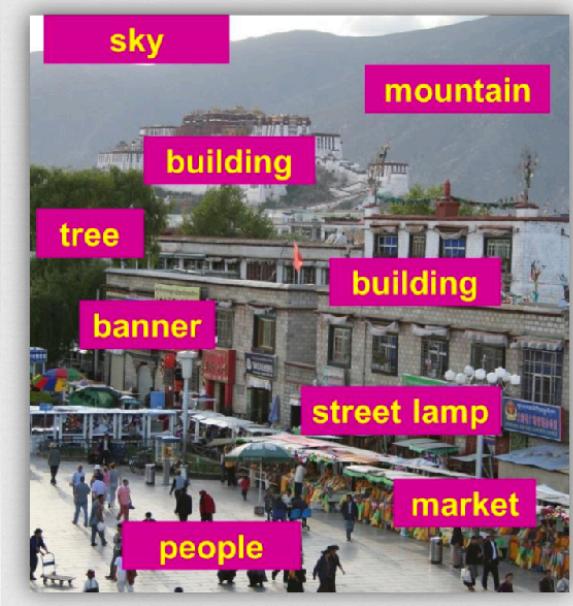
ROBOT VISION

Make computers / robots understand images and video

- ❖ Object Detection
 - ❖ Find Pedestrian

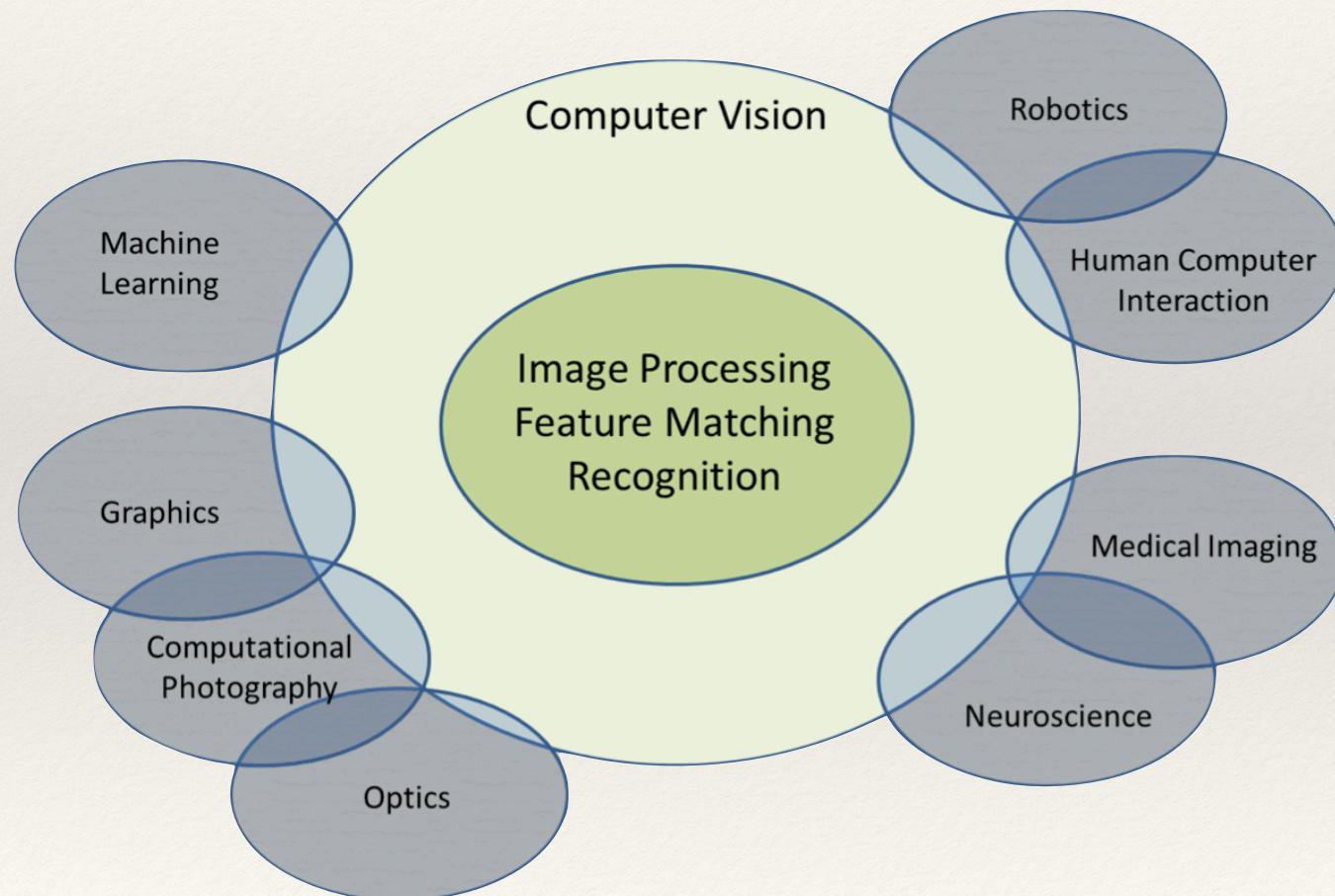


- ❖ Image Segmentation



ROBOT VISION

Computer Vision Scope



ROBOT VISION

Computer Vision is Challenging...

ROBOT VISION

Computer Vision is Challenging...very



ROBOT VISION

Computer Vision is Challenging...



- ❖ Where was this picture taken ?
- ❖ How many people are there ?
- ❖ What are they doing ?
- ❖ What is the object the person on the left is standing on?
- ❖ Why is this a funny picture ?

ROBOT VISION

Computer Vision is Challenging...



- ❖ Where was this picture taken ?
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- ❖ What is the object the person on the left is standing on?
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ROBOT VISION

Computer Vision is Challenging...



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ROBOT VISION

Computer Vision is Challenging...



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- ❖ Why is this a funny picture ?

ROBOT VISION

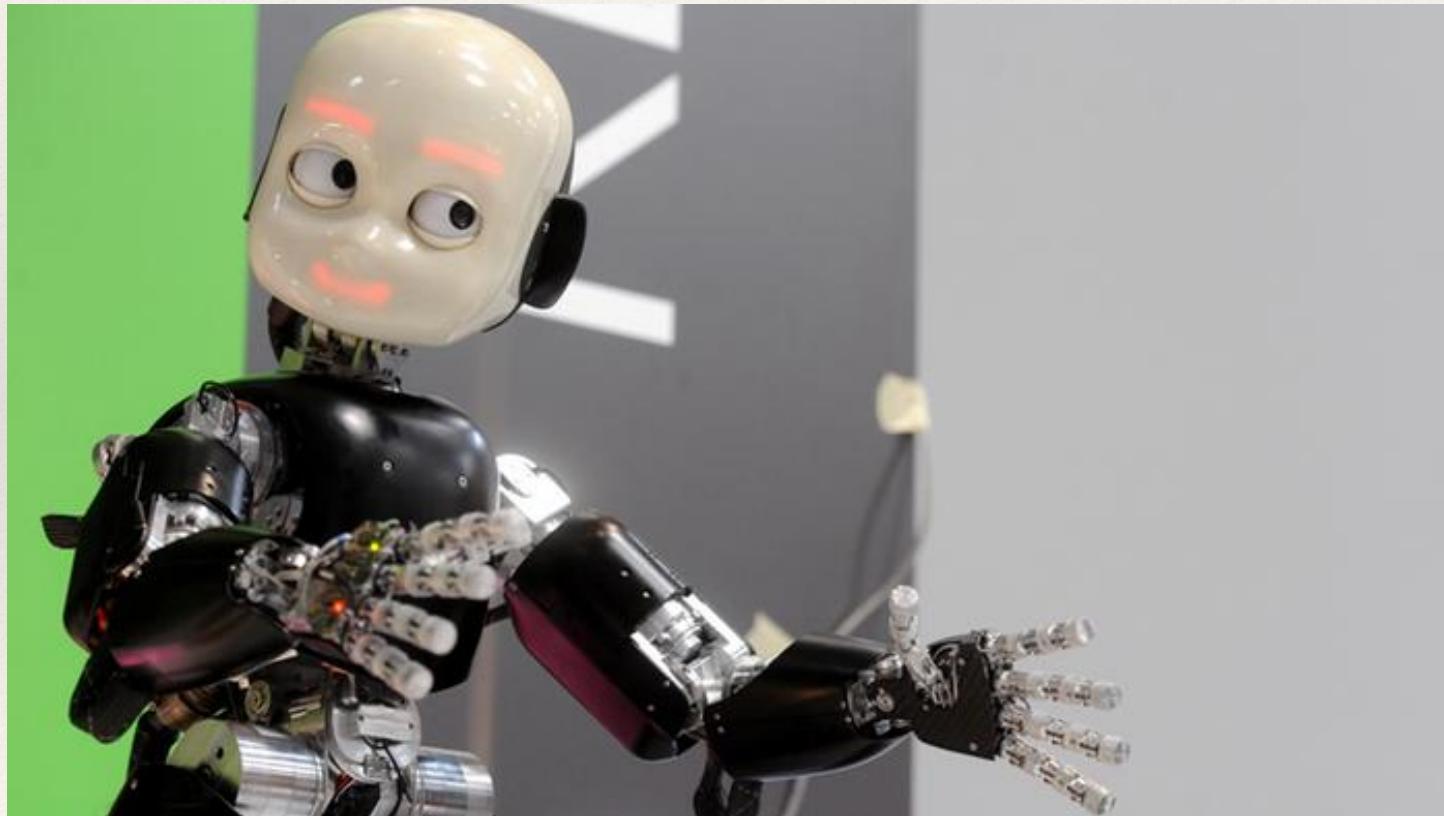
Computer Vision is Challenging...



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- ❖ Why is this a funny picture ?

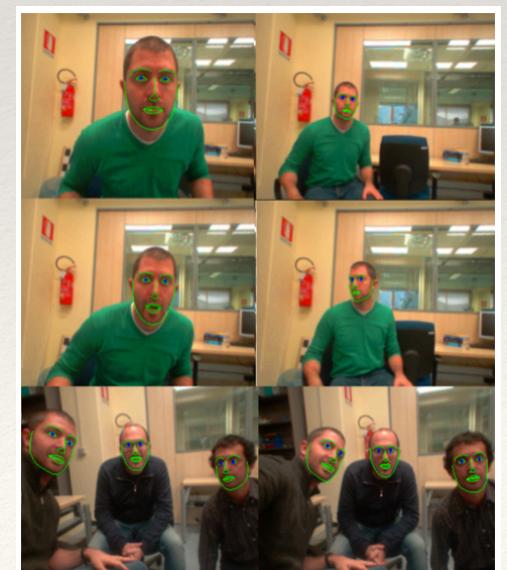
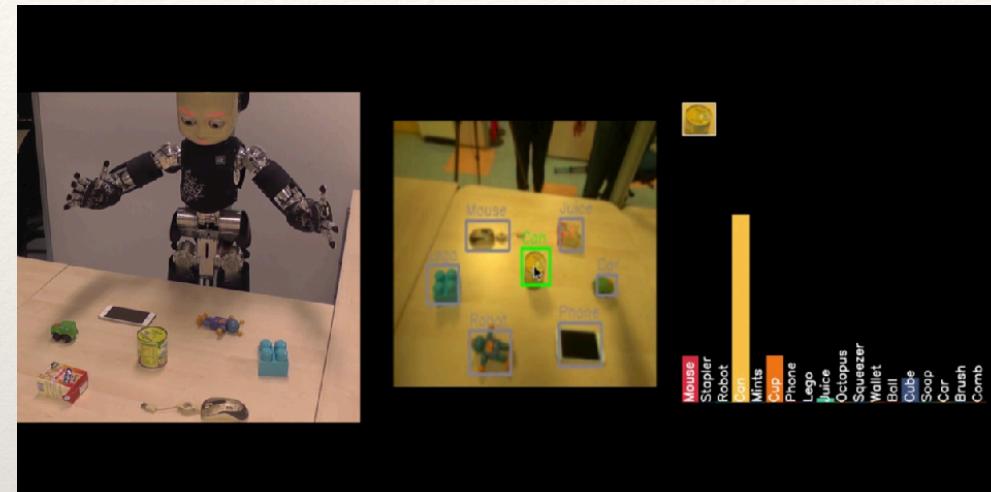
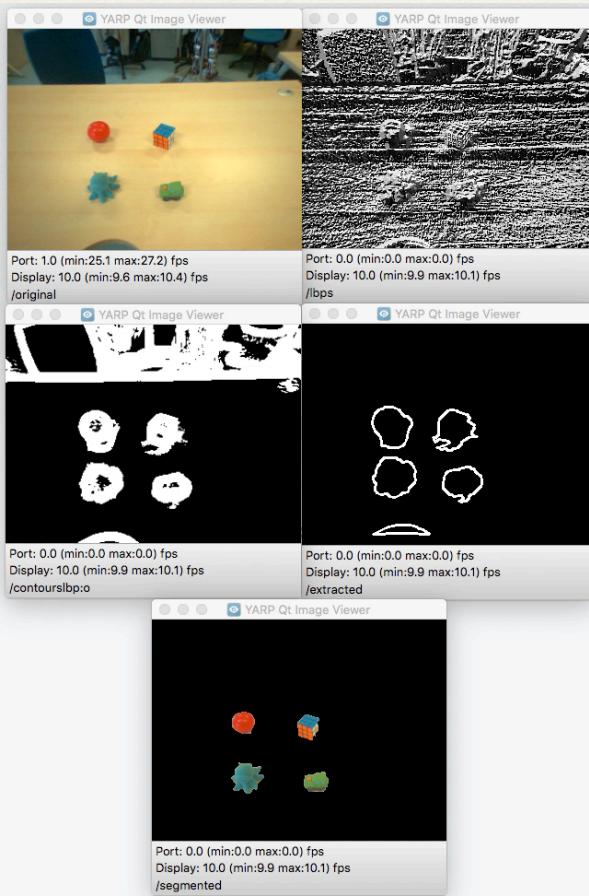
ROBOT VISION

Fundamentals and Applications - 2D Vision



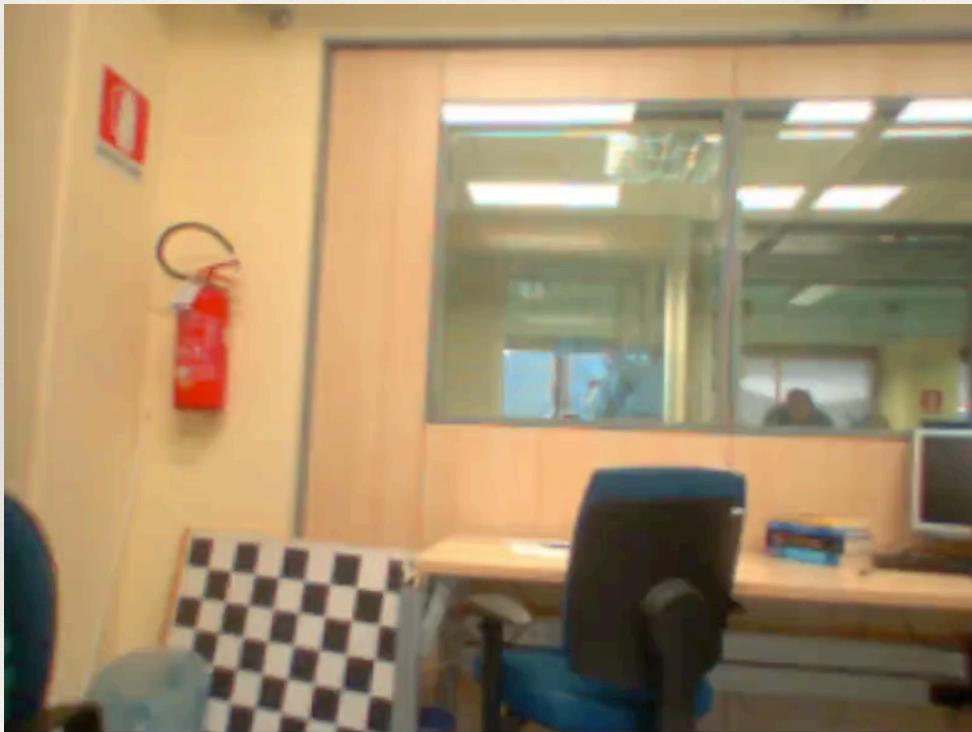
ROBOT VISION

Fundamentals and Applications - 2D Vision



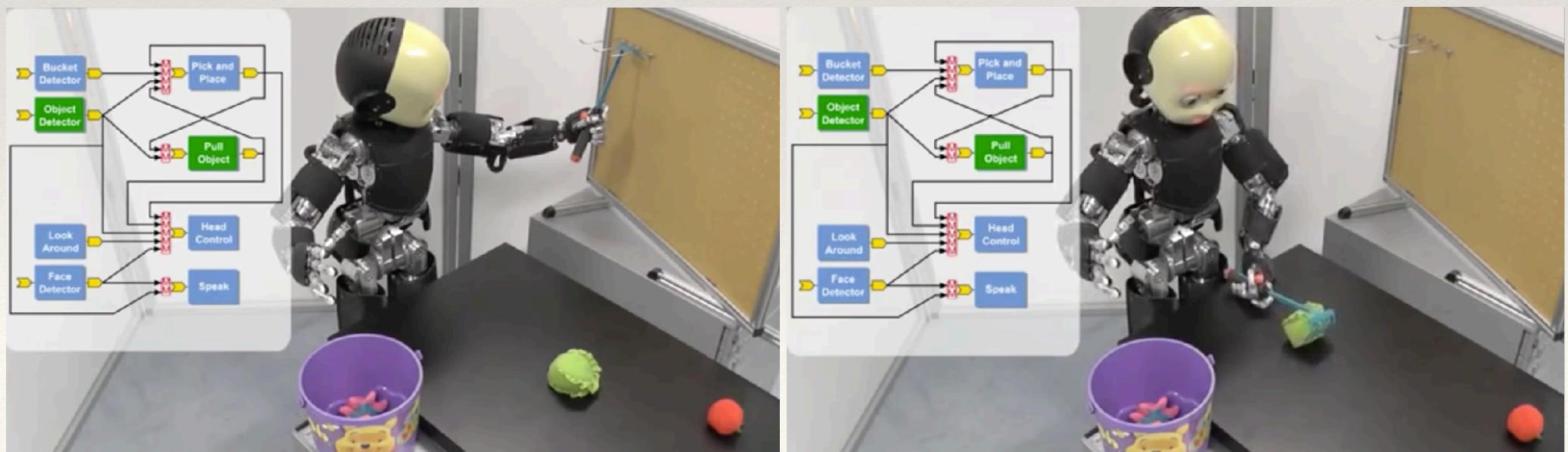
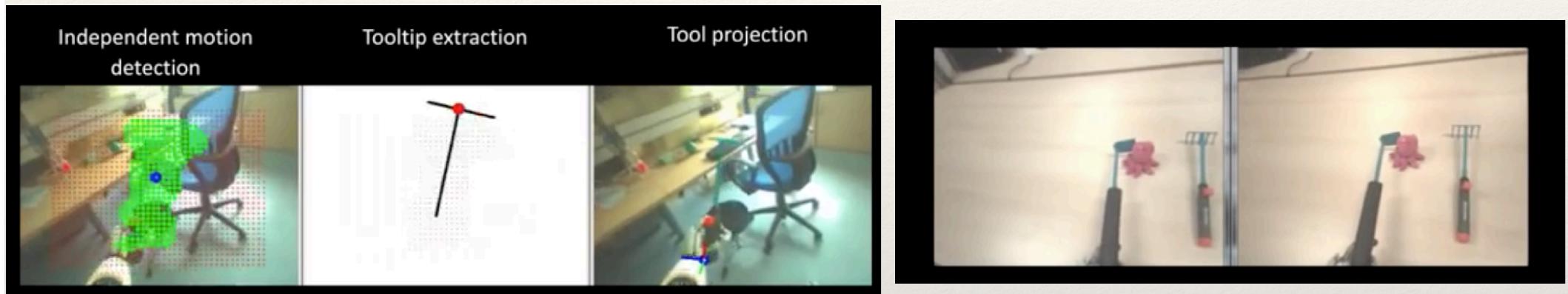
ROBOT VISION

Fundamentals and Applications - 2D Vision



ROBOT VISION

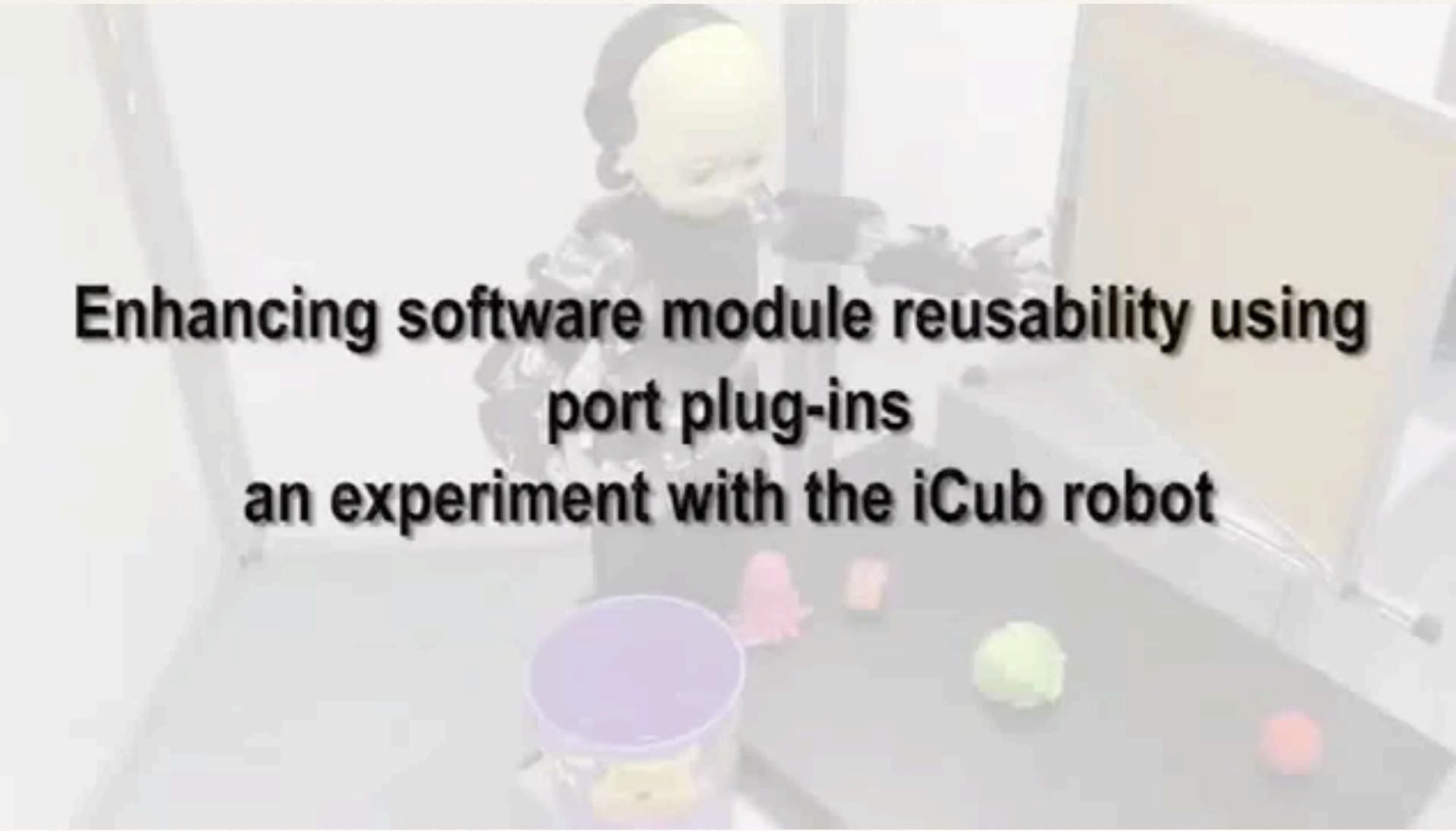
Fundamentals and Applications - 2D Vision



ROBOT VISION

Fundamentals and Applications - 2D Vision

**Enhancing software module reusability using
port plug-ins
an experiment with the iCub robot**



ROBOT VISION

Fundamentals and Applications - 3D Vision

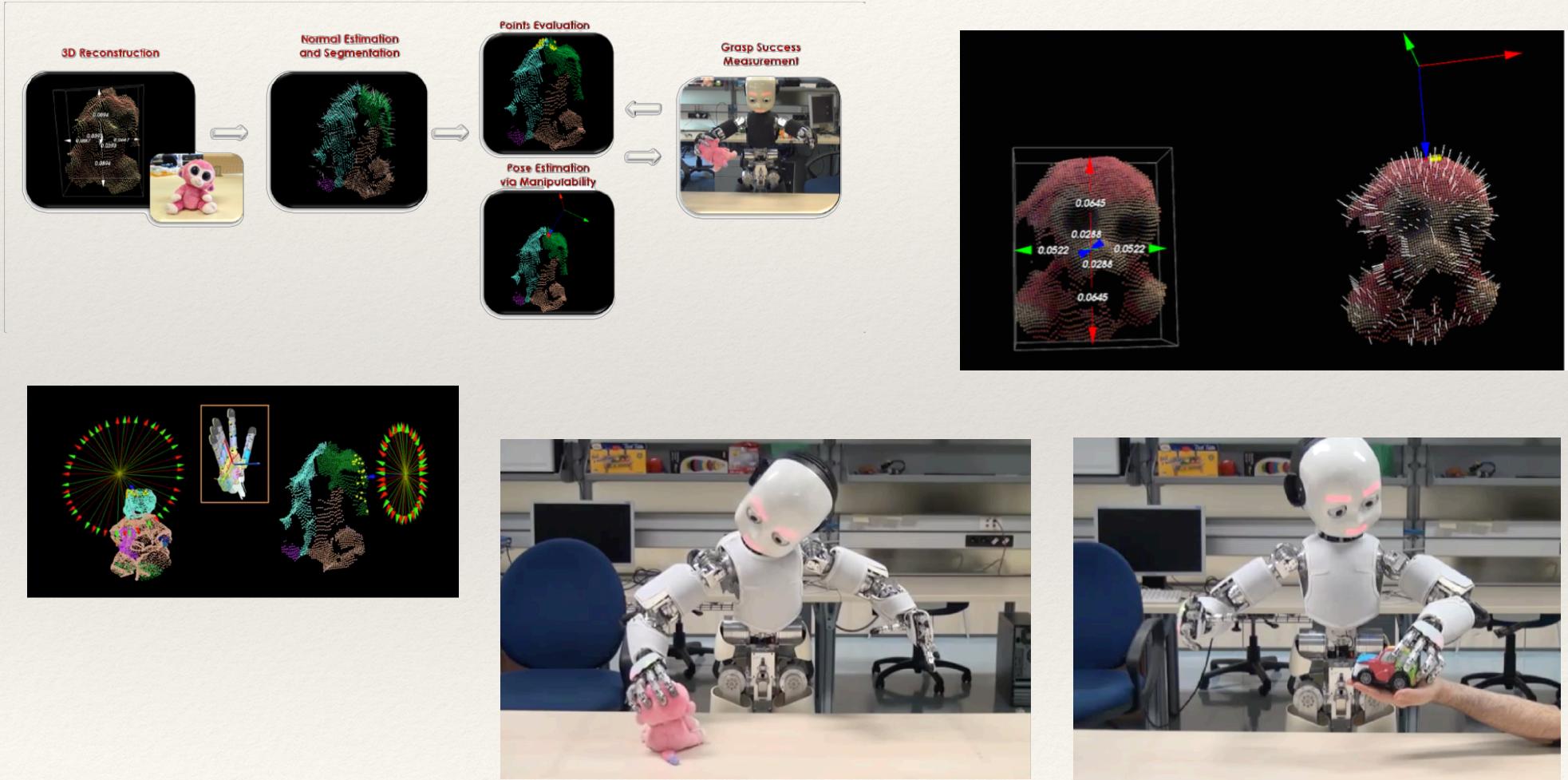
ROBOT VISION

Fundamentals and Applications - 3D Vision



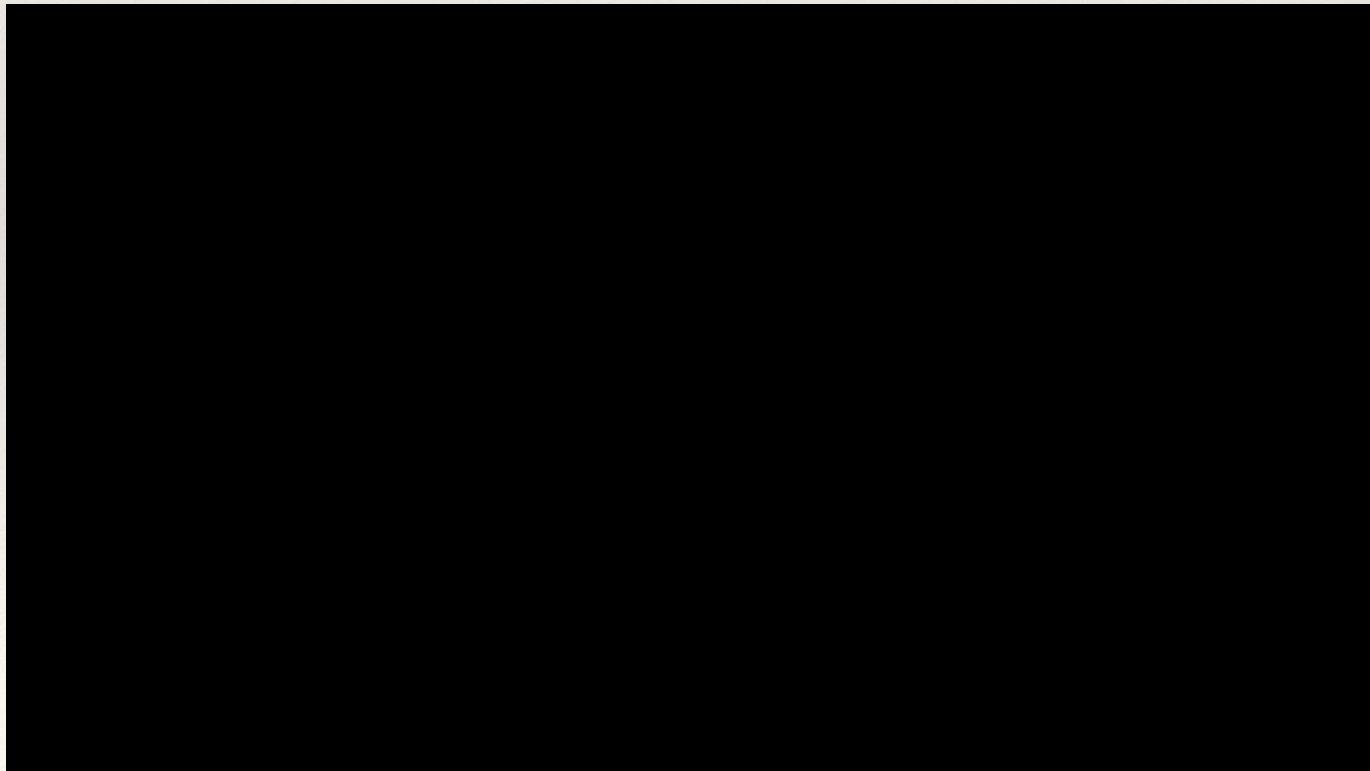
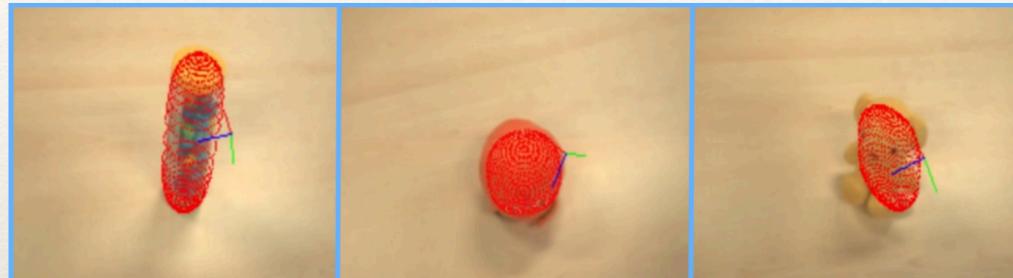
ROBOT VISION

Fundamentals and Applications - 3D Vision



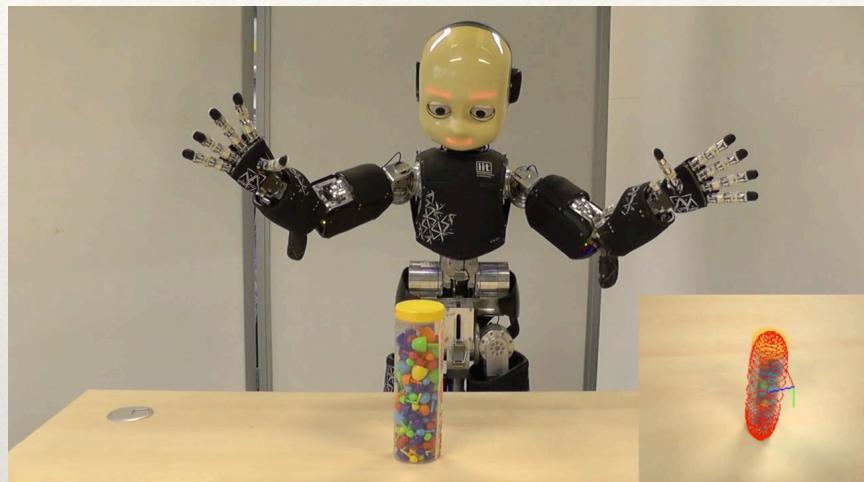
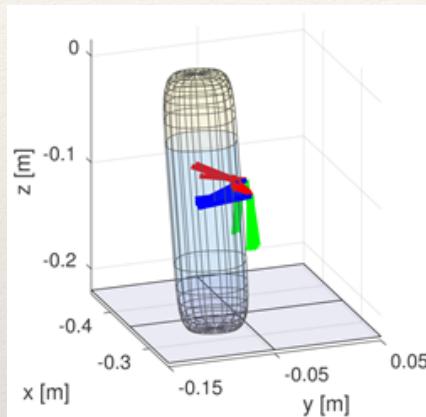
ROBOT VISION

Fundamentals and Applications - 3D Vision



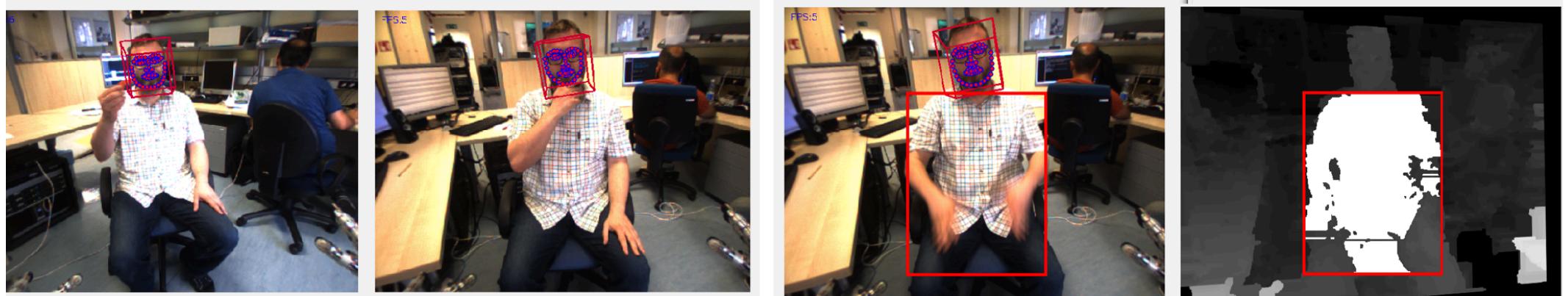
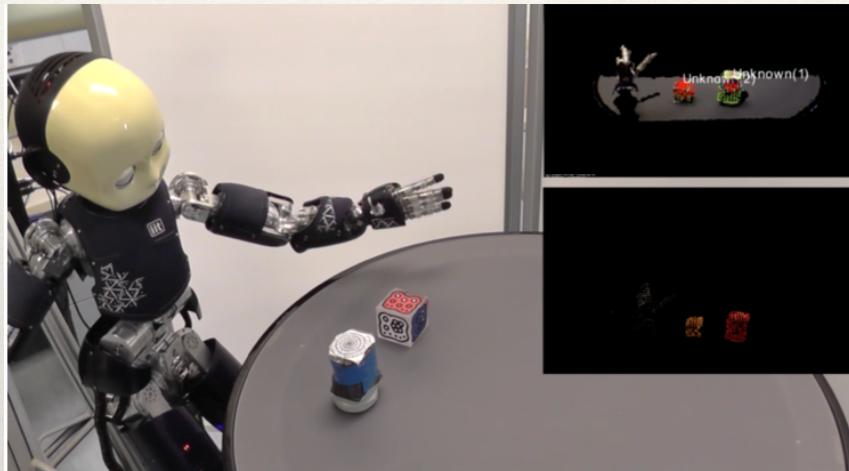
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Fundamentals and Applications - 3D Vision

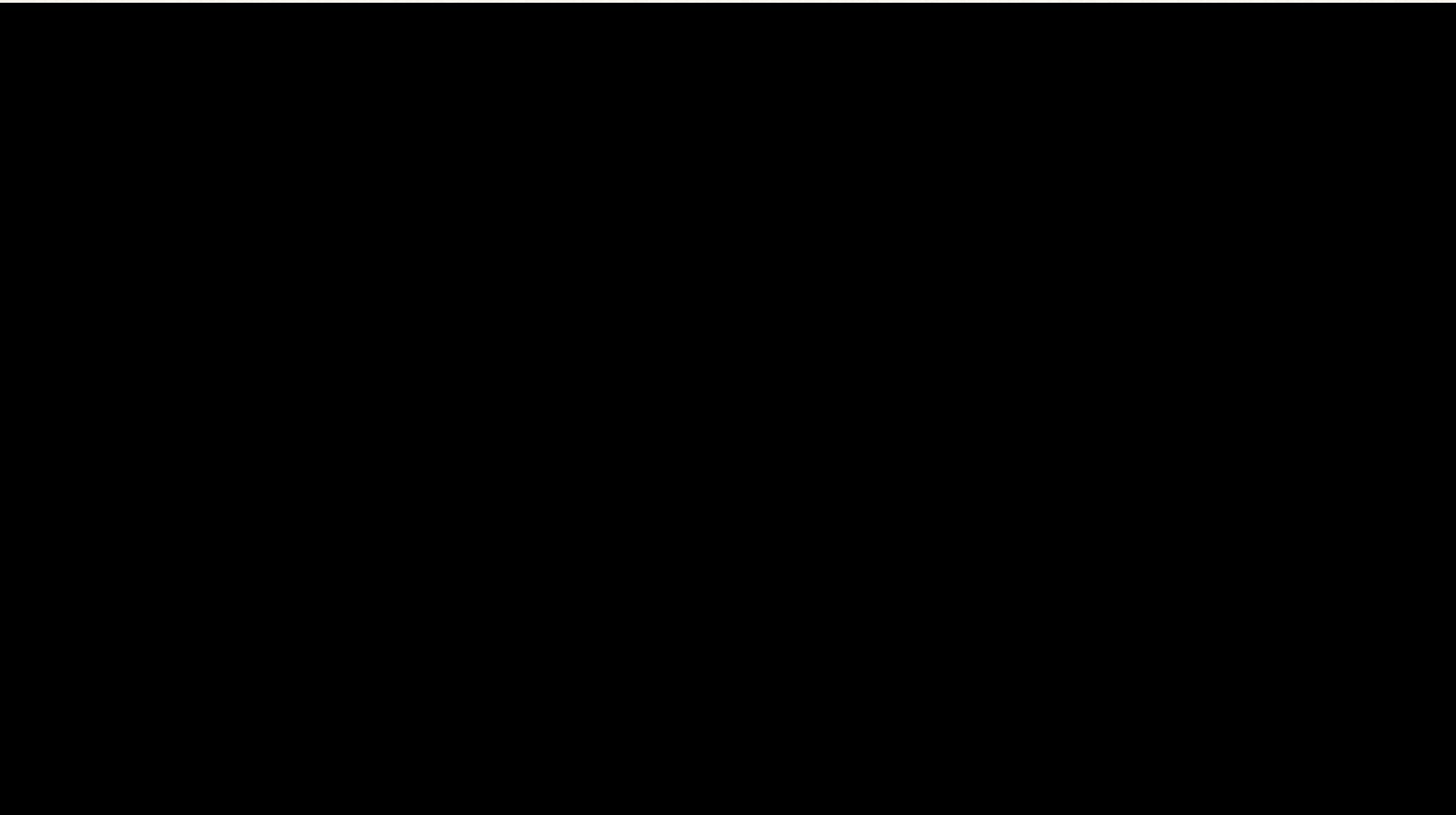


ROBOT VISION

Fundamentals and Applications - 3D Vision

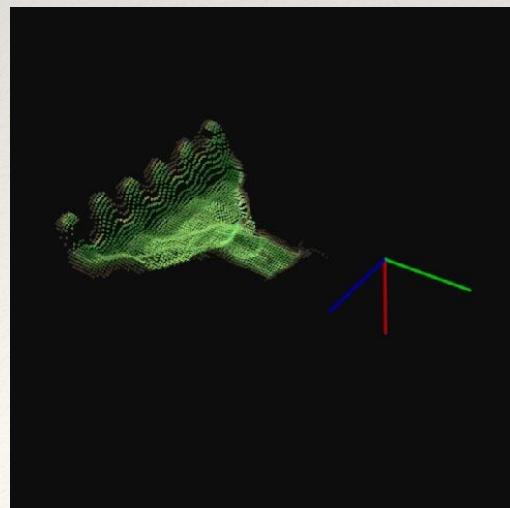
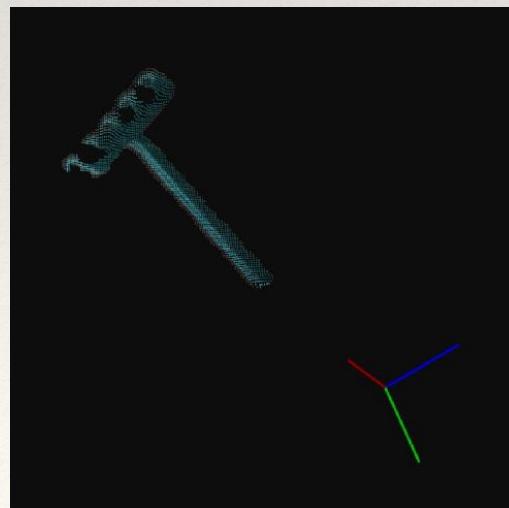
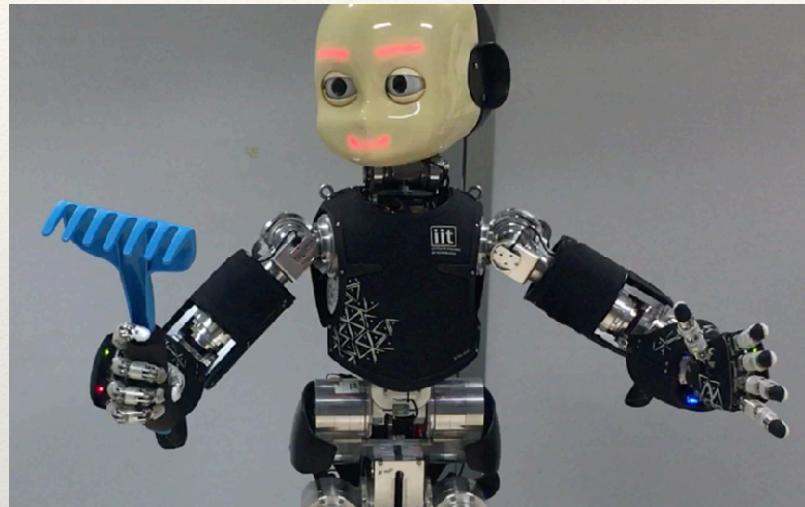


ROBOT VISION



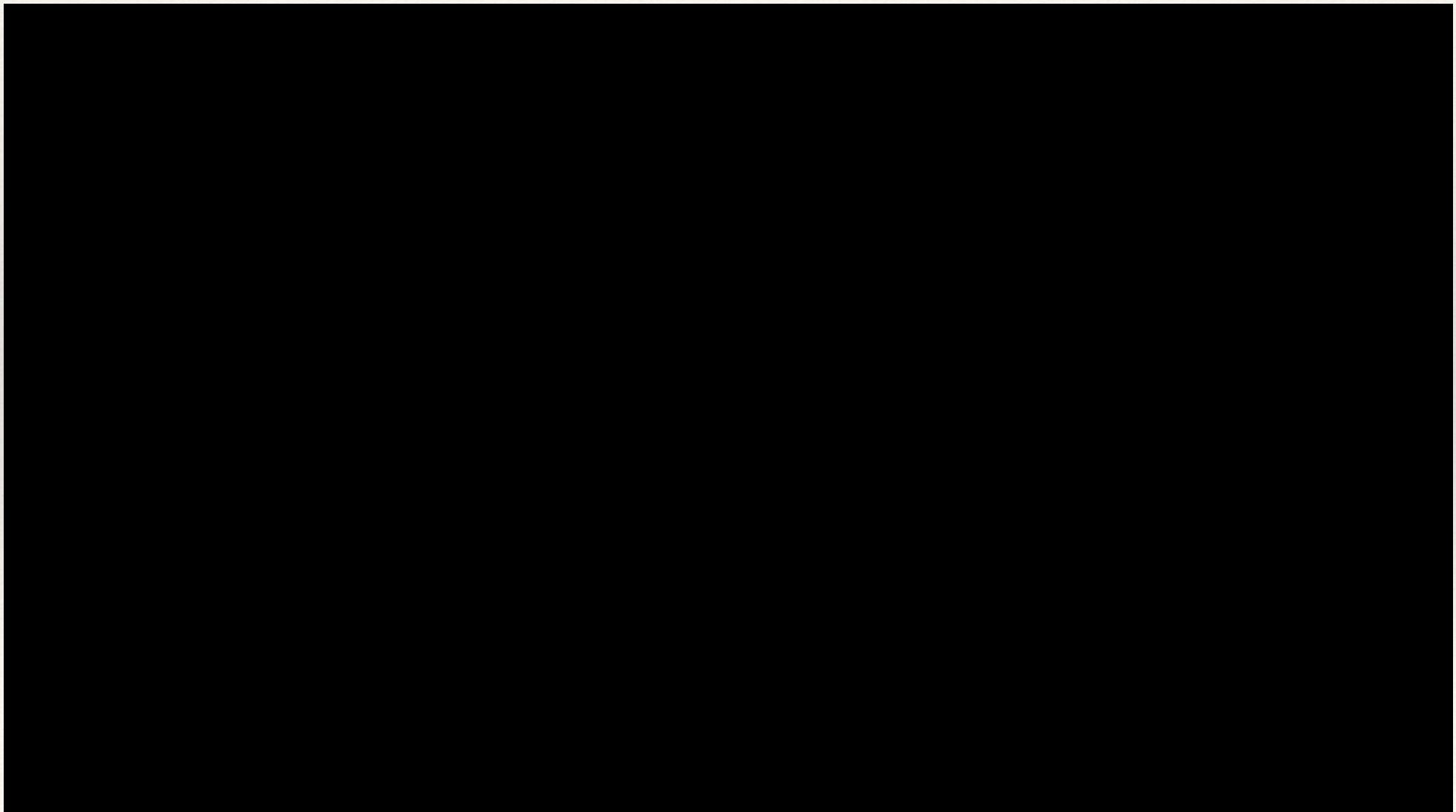
ROBOT VISION

Fundamentals and Applications - 3D Vision

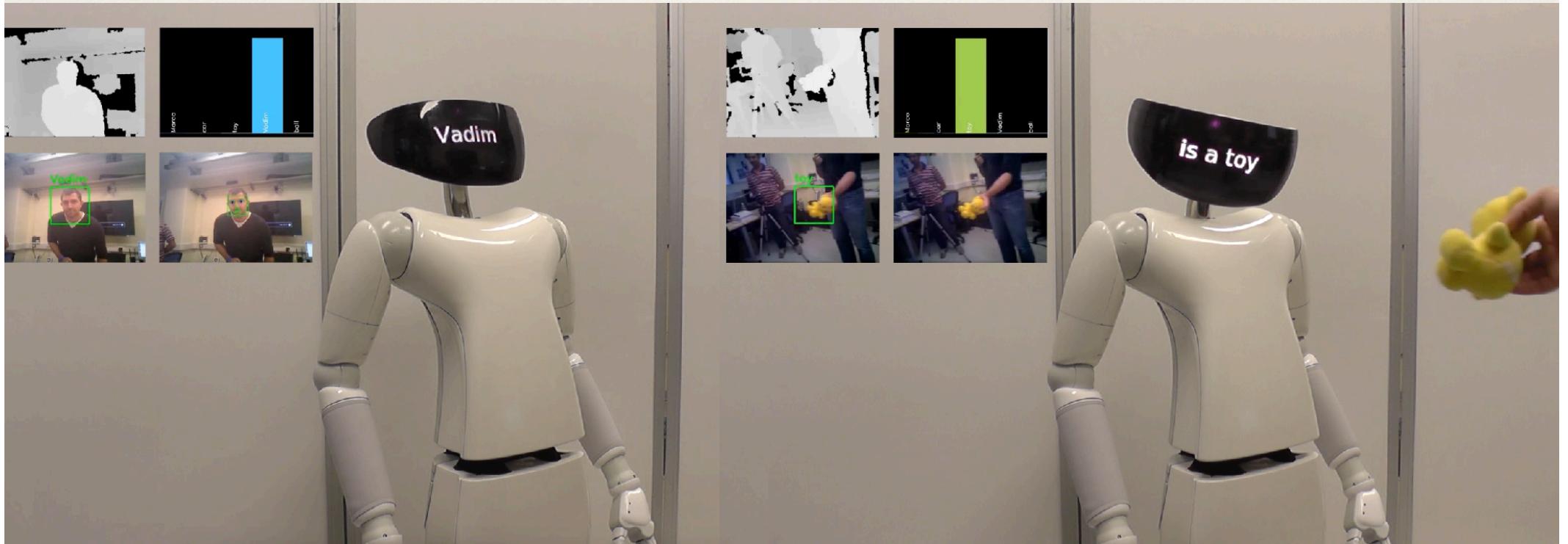


ROBOT VISION

Fundamentals and Applications - 3D Vision



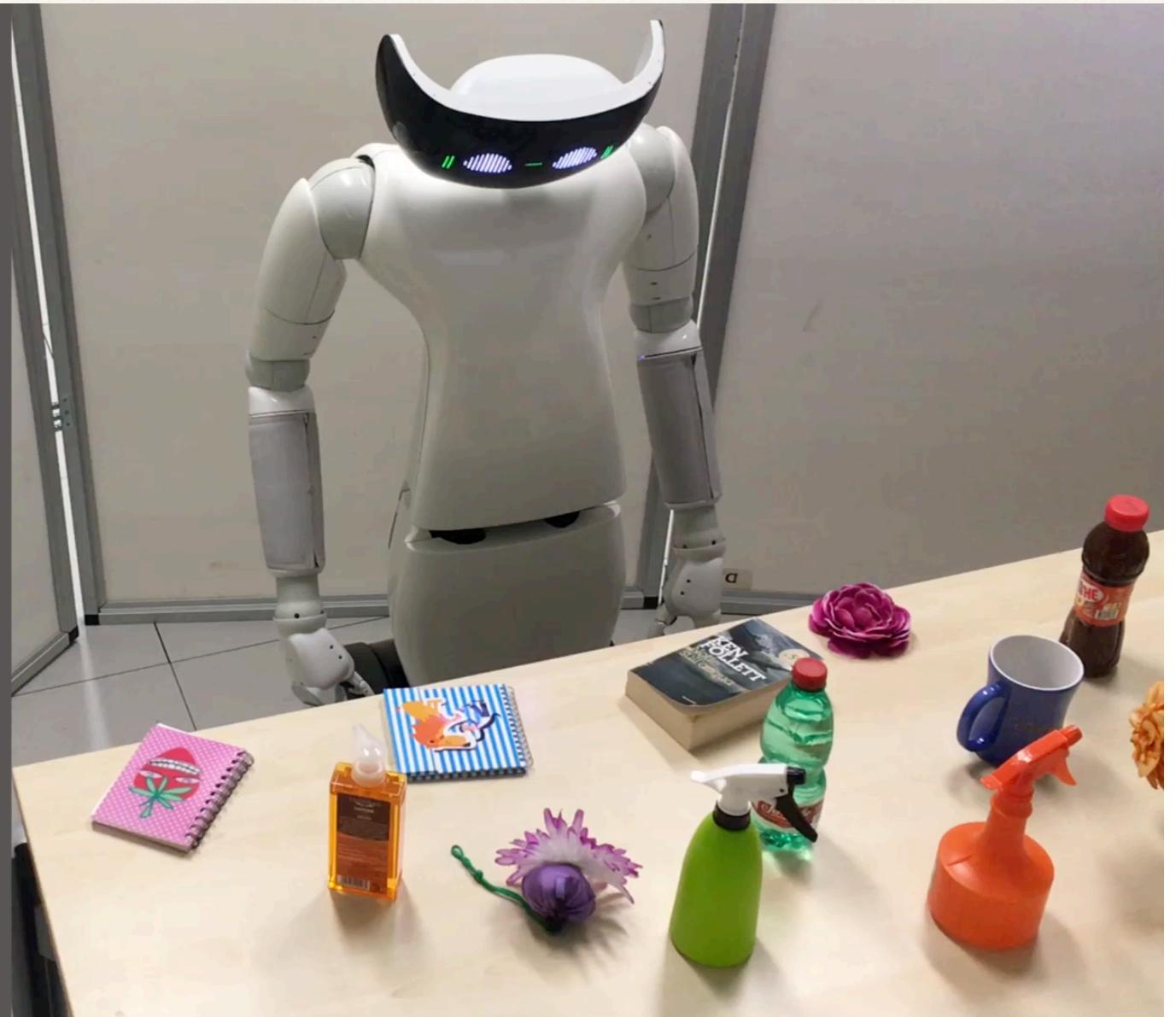
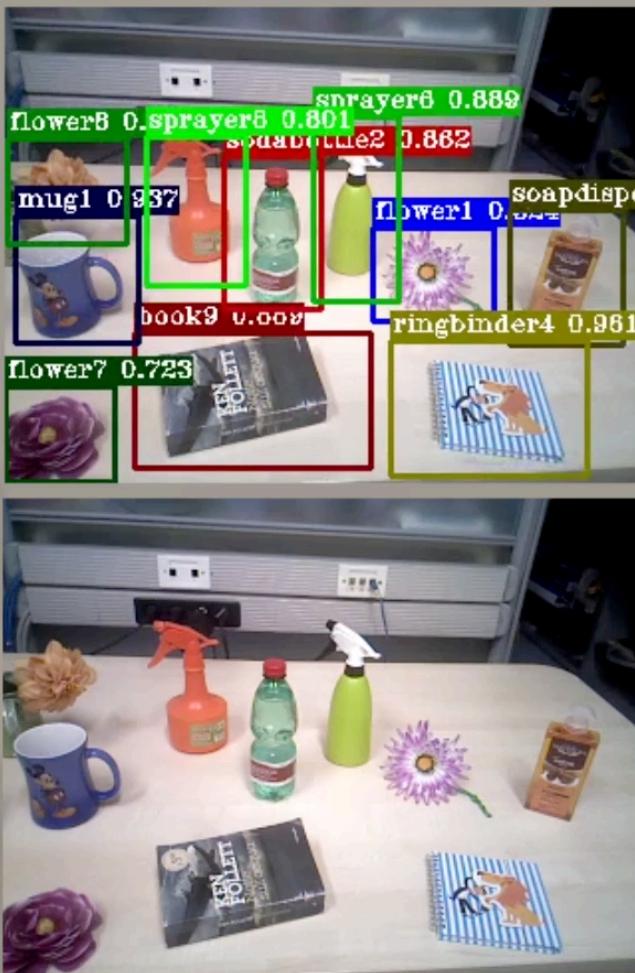
ROBOT VISION



ROBOT VISION

Task 1: Object Identification
learning

ROBOT VISION



ROBOT VISION



ISTITUTO ITALIANO
DI TECNOLOGIA
iCub FACILITY

Laboratory for Computational
and Statistical Learning



Online Learning Object Detection Pipeline for Humanoid Robots

Elisa Maiettini, Vadim Tikhanoff, Giulia Pasquale
Lorenzo Natale, Lorenzo Rosasco

ROBOT VISION

Session Outline

- ❖ Assignment #1
 - ❖ Port callbacks
 - ❖ Integration of OpenCV
 - ❖ Find Closest Blob
 - ❖ Images processing
 - ❖ Play with streams of images
 - ❖ Extract closest blob

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YARP Port Callbacks

RFmodule

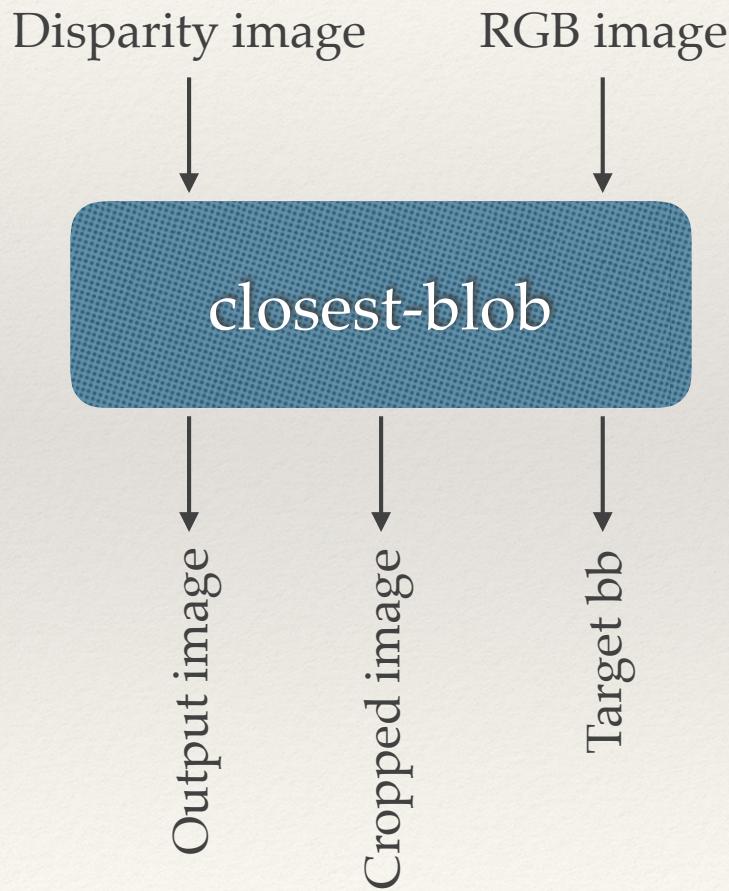
→ Update with fixed time

RFmodule
+
Callbacks

→ Callback depending of input

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Module Structure



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Image Processing

Blurring image



Transforming image

- Erode original image.
- Dilate eroded image.
- Smooths object boundaries, eliminates noise (isolated pixels) and maintains object size.

Original



Erode



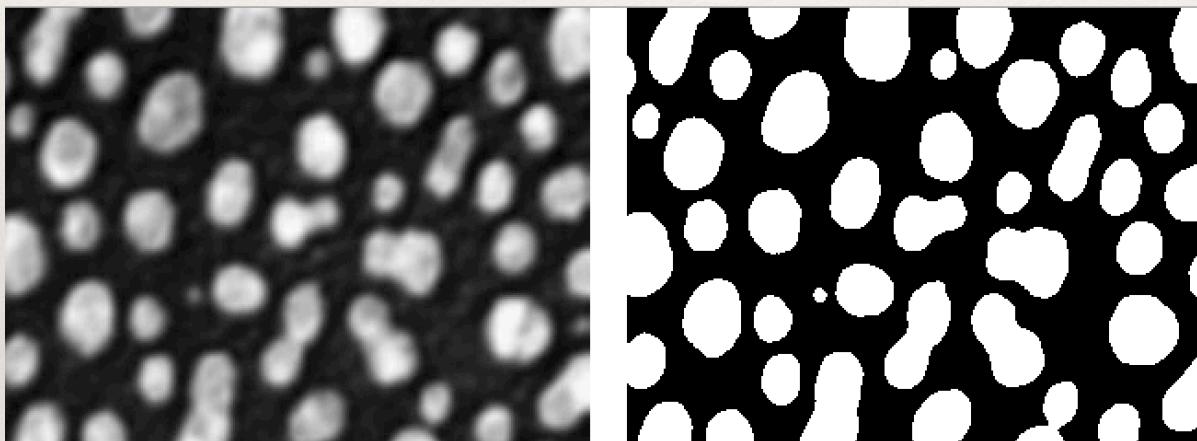
Dilate



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Image Processing

Thresholding image



Find contours in image

