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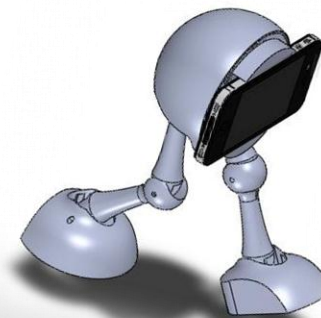
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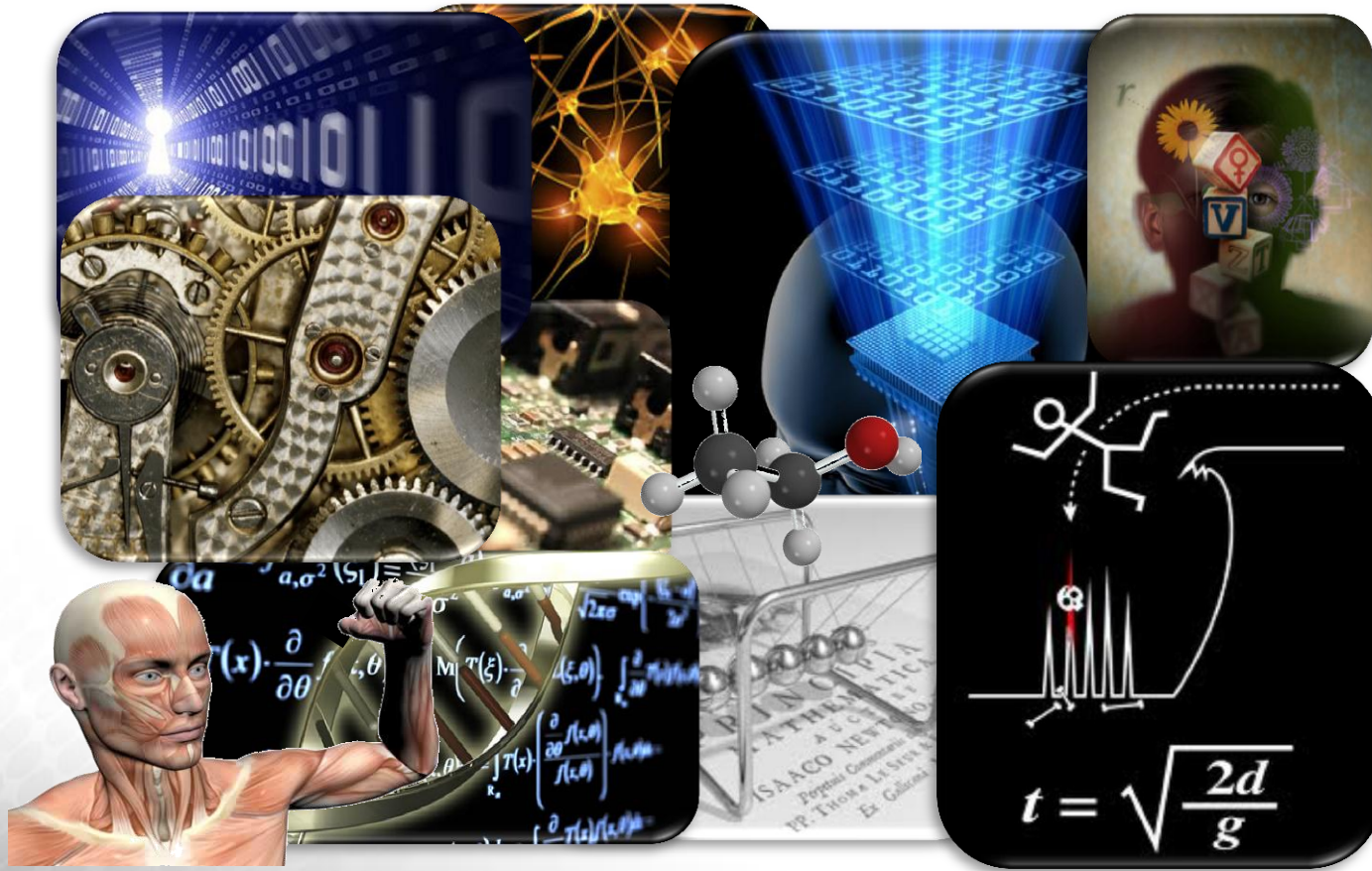


Humans, Robots, & Intelligent Objects

– New communication approaches



Building Robot intelligence ... Interdisciplinarity





We are going to chat about...

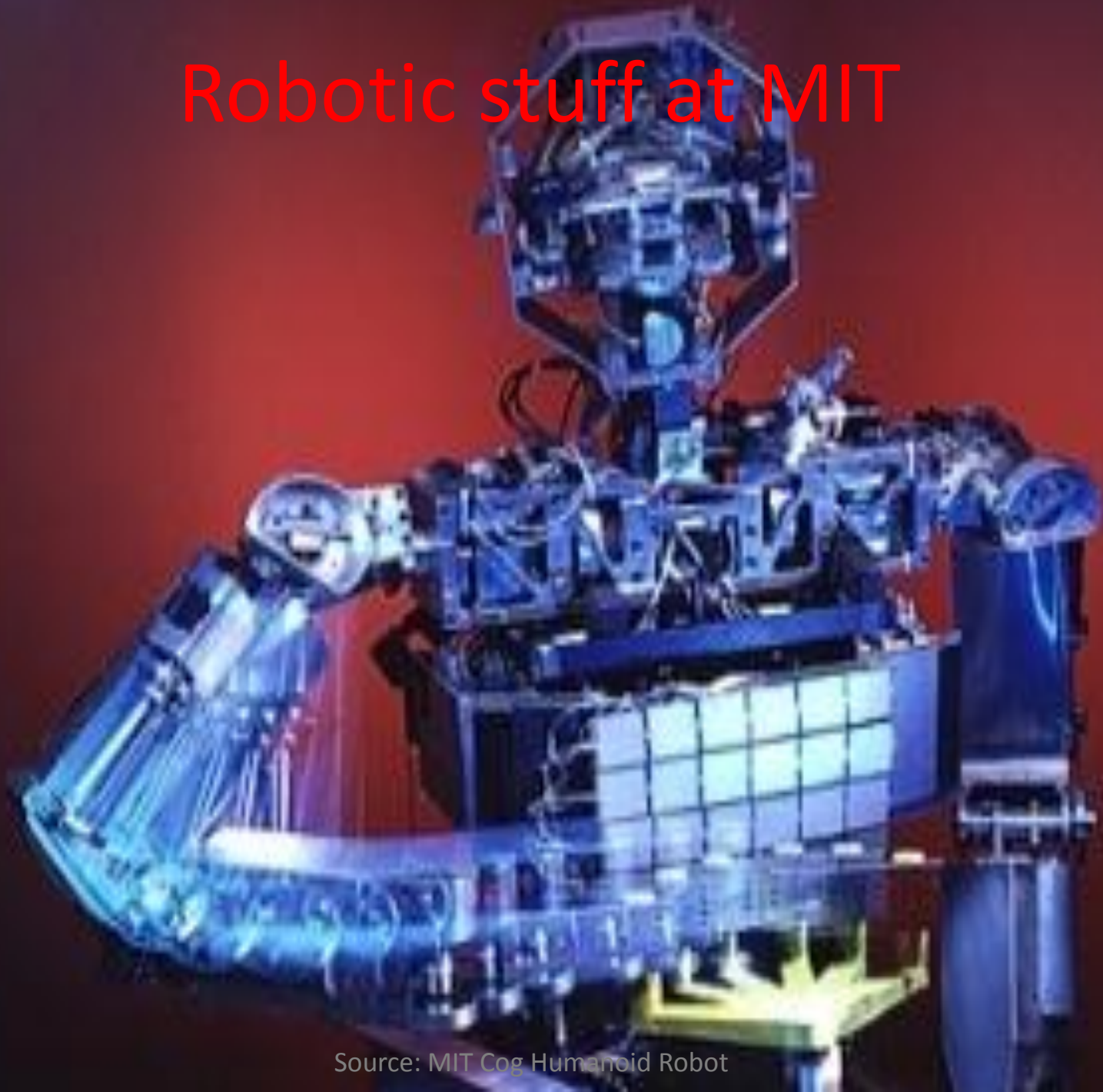
Robotic stuff at MIT

- Building Robot intelligence
 - and social interaction approaches for robot's learning based on a human teacher

Robotic stuff at YDreamsRobotics

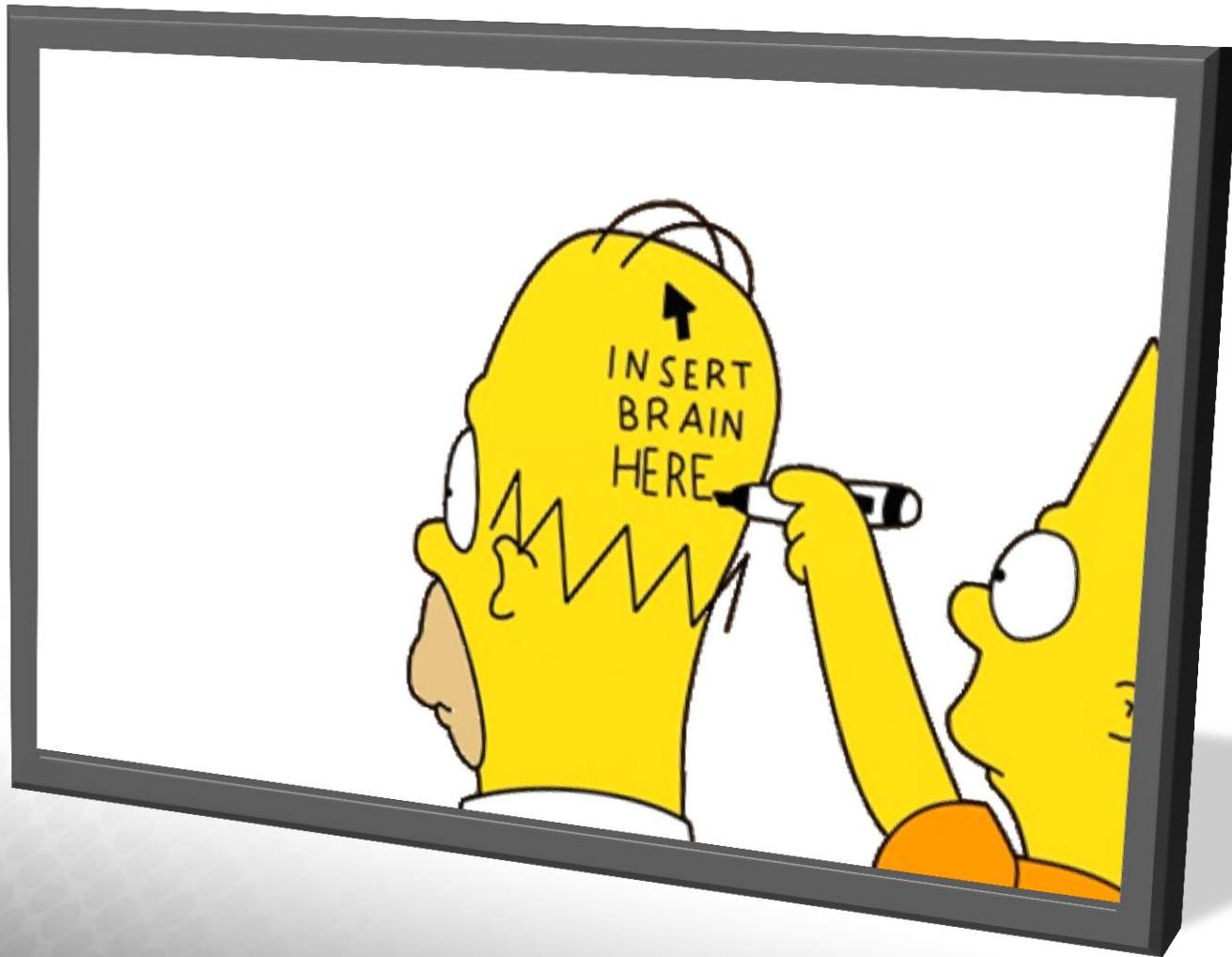
- Bringing pervasive robotics
 - bringing robots into people's life
 - Internet of Things and new paradigms for robots

Robotic stuff at MIT



Source: MIT Cog Humanoid Robot

Building Robot intelligence



Curiosity ...



Rachel: *We have got to find out if [ugly naked guy]'s alive.*

Monica: *How are we going to do that? There's no way.*

Joey: *Well there is one way. His window's open – I say, we poke him. (brandishes the Giant Poking Device)*

Curiosity ... and Explorations...



But How to Acquire new Knowledge?



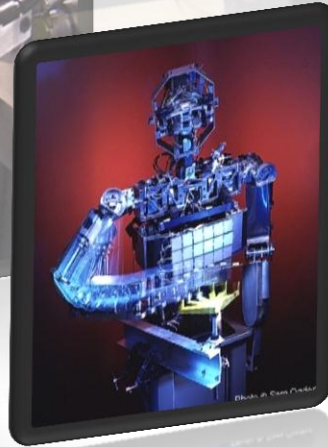
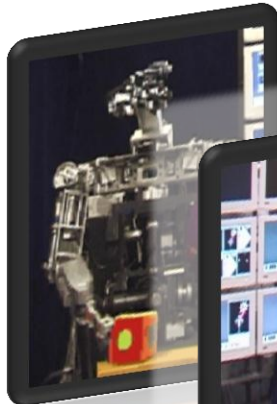
Imitate Children... using their toys



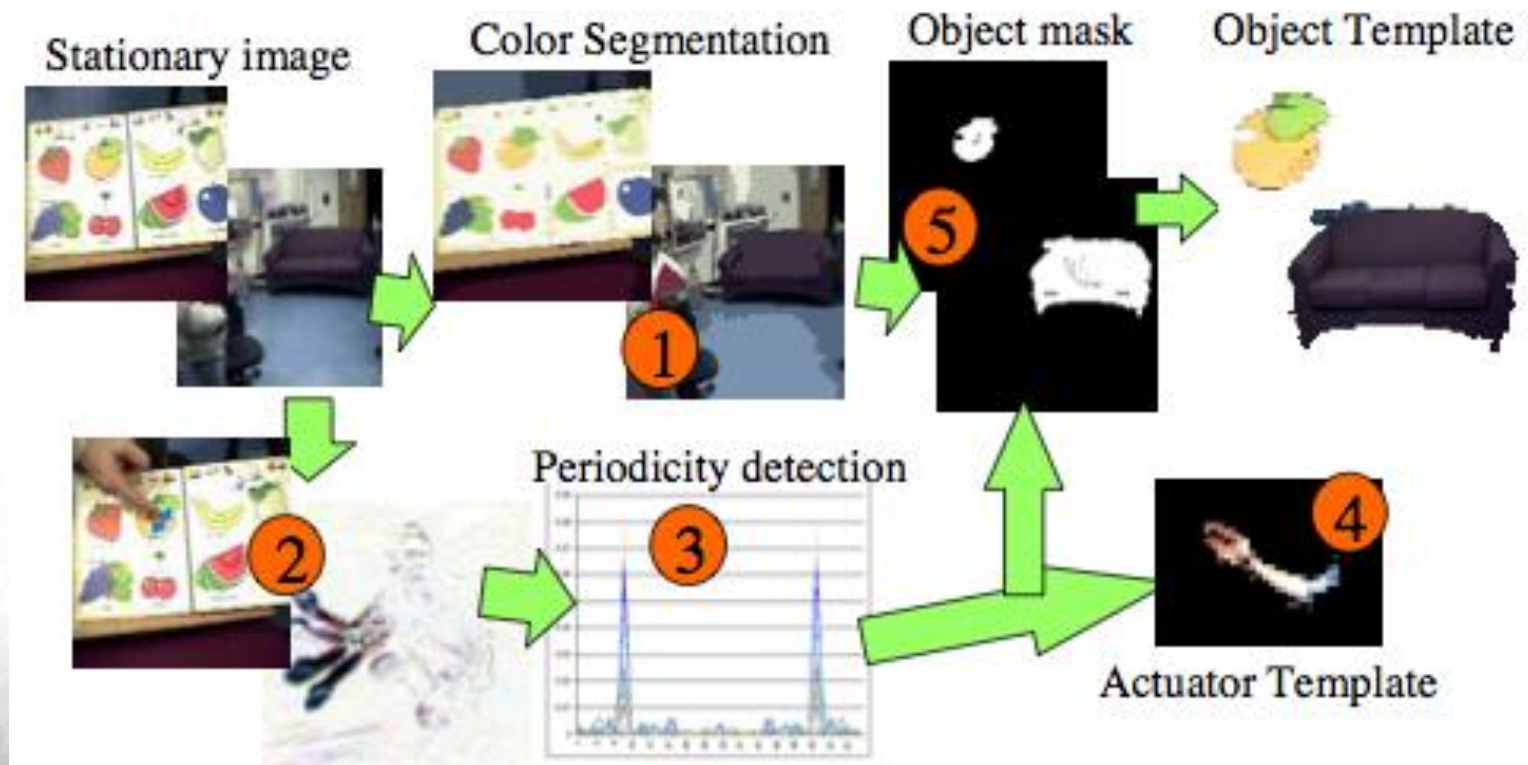


Human Caregiver - The Helping Hand





Example: Segmentation from Human-Robot Interactions

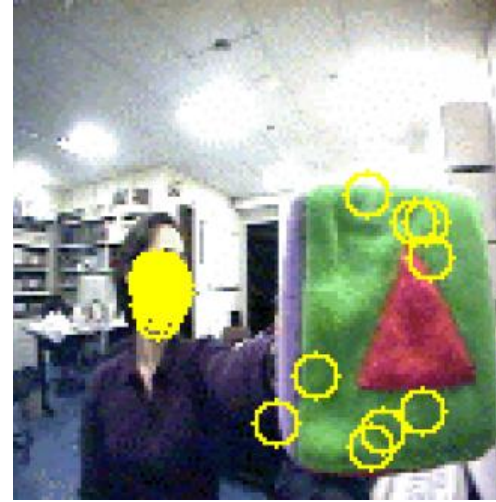


Robot Motivation



“Seek toy” – search for toy

observation: 28% faces, 72% toy

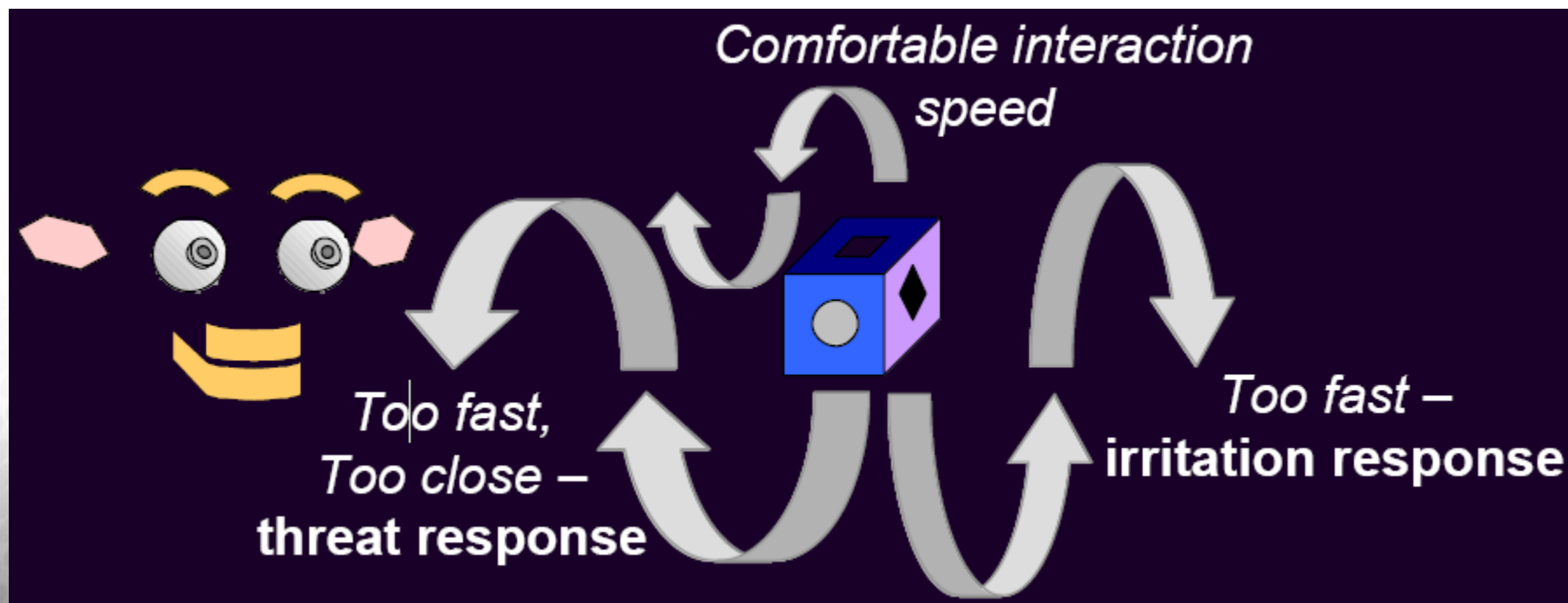


“Seek face” – search for faces

observation: 80% face, 20% toy

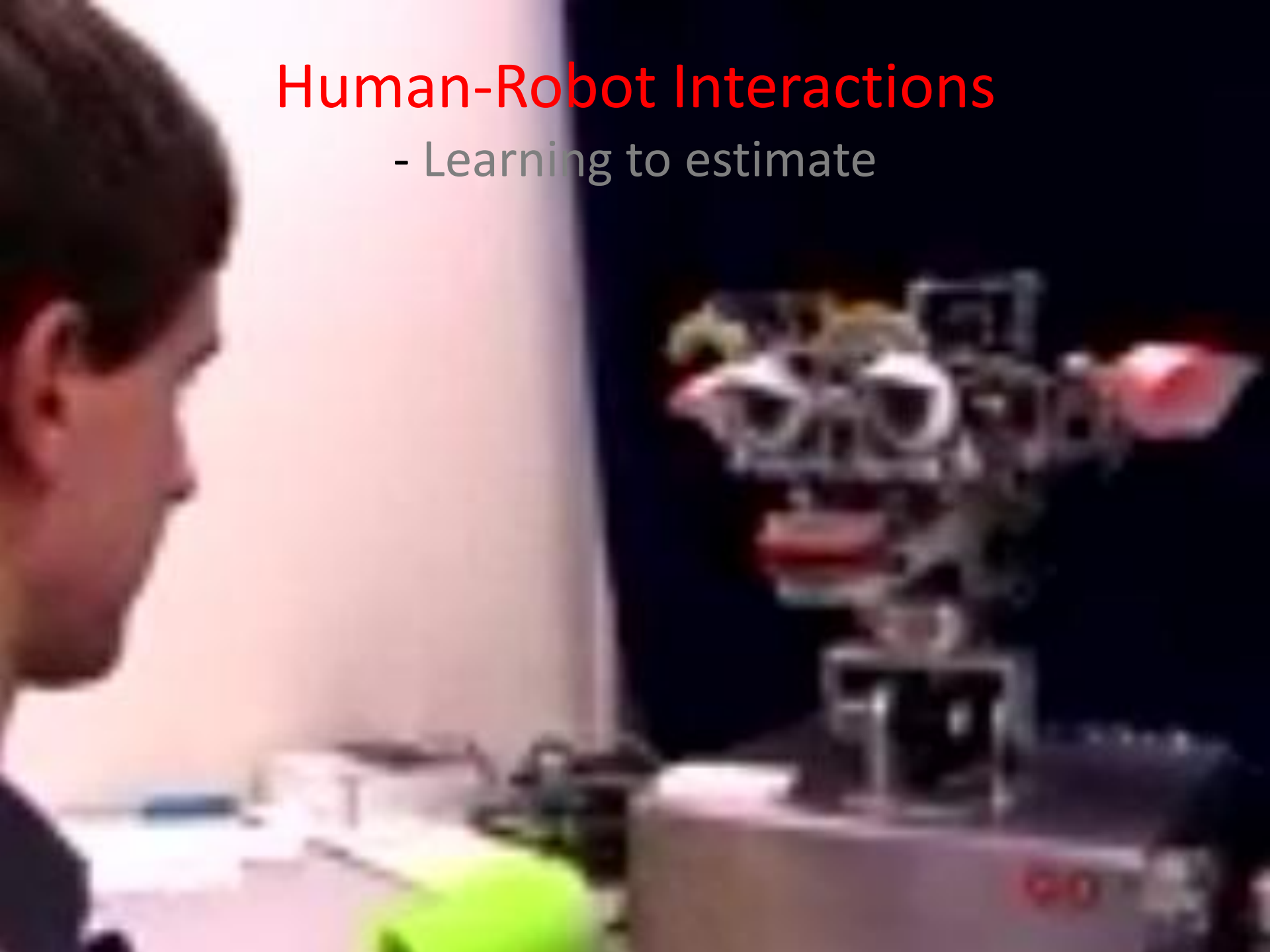
- Internal status affect the measure of the salient stimulus
- Robot is not a slave of its environment
- Robot prefers stimulus which are relevant to its behaviours

Negotiating Social Contact Distance



Human-Robot Interactions

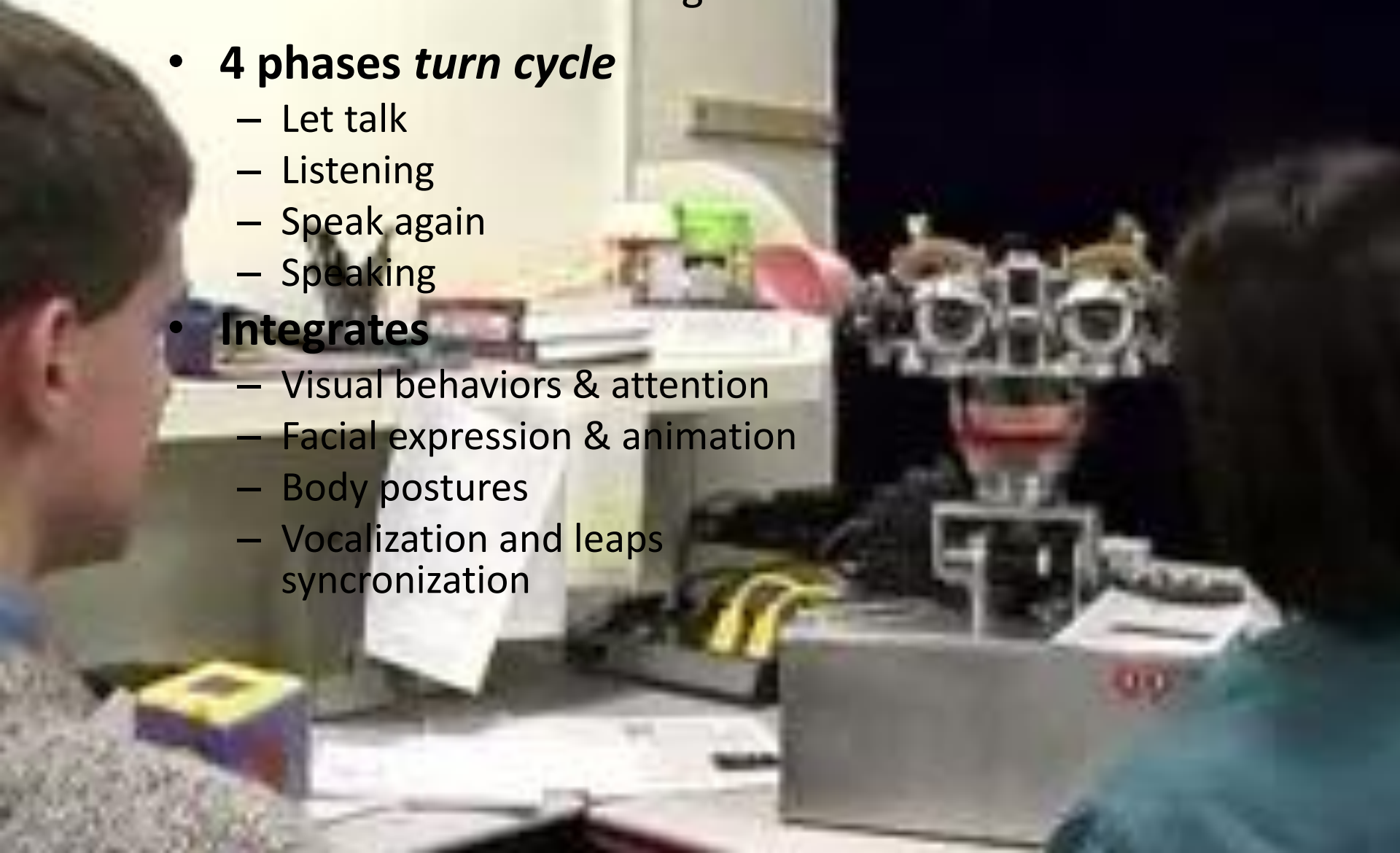
- Learning to estimate



Turn-Taking

Human communication and learning

- **4 phases *turn cycle***
 - Let talk
 - Listening
 - Speak again
 - Speaking
- **Integrates**
 - Visual behaviors & attention
 - Facial expression & animation
 - Body postures
 - Vocalization and leaps synchronization



Motor Area

- Control Processes
 - Sliding-Modes Controller
 - Learning of Locally Affine Dynamic Models
- Matsuoka Neural Oscillators for the execution of Rhythmic Movements

Primary Visual Association Area

- Space-variant Attentional System
- Face and Head pose Detection/Recognition
- Keeping Track of Multiple Objects
- Binding multiple features

Where pathway

- Scene recognition
- Spatial Organization of objects
 - Object-based – mixture of gaussians to learn spatial distributions of objects and people relative to the spatial layout of a scene
 - Holistic-based - mixture of gaussians to learn spatial distributions of objects from the spatial distribution of frequencies on an image

Emotional Processes

- Motivational Drives, Speech emotional content

Sensory-motor maps

- Locally weight regressions are used to map proprioceptive data from body joints to 3D cartesian space
- Perception of robot's own body

Acoustic Perception

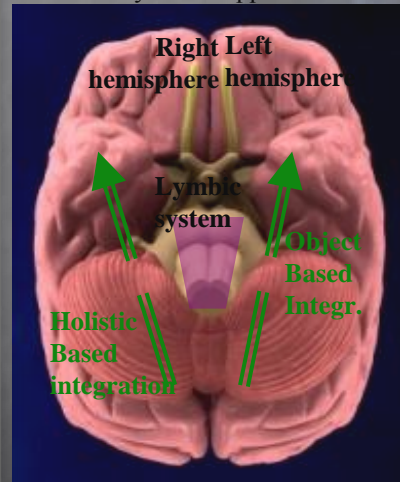
- Sound recognition (PCA - clusters input space into eigen sounds)
- Recognizing sounds of objects
- Word Recognition

Binding proprioceptive data from robotic body parts (head, torso, left or right arms and hand) to the sound they generate

Binding proprioceptive data from the robot's joints to the robot's body visual appearance

Cerebellum

- Vestibulo-ocular reflex
- Smooth pursuit
- Saccades
- Own body kinematics and Dynamics



Learning and Task Identification

- Identification of tasks using Markov Models e.g. Hammering, sawing, painting, drawing...
- Learning the kinematics and dynamics of mechanical mechanisms

Binding Sounds to Visual descriptions

- bang sound to Hammer visual segmentation
- acoustic representation of a geometric shape (such as a circle) to its visual description
- Mapping a No! sound to a head shaking movement

Frontal Lobe and Motor area

Parietal Lobe

Temporal Lobe

Occipital Lobe

Cerebellum

Body-retina spatial maps

What Pathway

- object recognition through:
 - integration of shape features
 - integration of Chrominance features
 - integration of luminance features
 - integration of texture descriptors

Low-level visual processing - Wavelets computation, Short-time Fourier Transforms, Edge detection (Canny algorithm), Edge orientation (Sobel Masks), Line estimation (Hough transform), Topological color areas (8-connectivity labelling)
 Skin detection, Optical flow estimation (Horn & Schunk), Point tracking (Lukas and Kanade Pyramidal Alg.)

Bringing People into Robot's Life



“Turning Things... ... into Robots!”

YD Robotics’ is guided by the vision of assuming a leading role in the rapidly emerging consumer robotic market, especially in the home robotic segment, with the aim of bringing robots into people’s lives.

We believe intelligence can be added to everyday objects and appliances allowing for the introduction of new revolutionary products for the end-consumer.

Cooperative Robot Swarms



Friendly bank bots

Spanish bank Santander has some new tour guides – robots that relax in their spare time:

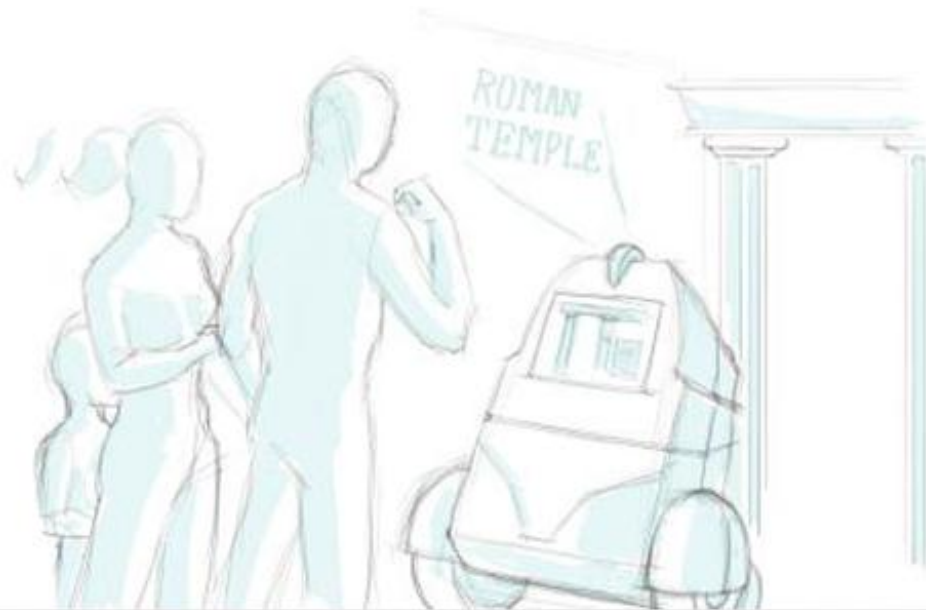
These intelligent robots are here to help. Called Sigas (Santander Interactive Guest Assistants), the five 61cm-tall

robots guide guests around the visitors' centre of Santander bank's Group City HQ, near Madrid. Using 16 sonar sensors for object detection and RF to take bearings from the centre's 12 RF tags, each robot is autonomous, sharing information with the others to assign tasks efficiently. In their down time, the Sigas play music, interact with people or chat among themselves. The project, by Portuguese firm YDreams, includes interactive walls and LED displays. "Santander came to us with a clear brief," says Carolina Luz, account manager for YDreams. "They needed something that reflected the modernity of the bank, but also gave the space some 'soul'." JM.ydreams.com



Link 237: Service Robot





Frog: The Fun Robotic Outdoor Guide

Multi-Robot Cognitive Systems Operating in Hospitals



HOMINIBUS ET ROBOTS SIMUL





Natural Human-Robot Interfaces



Making Robots Pervasive in our Lives

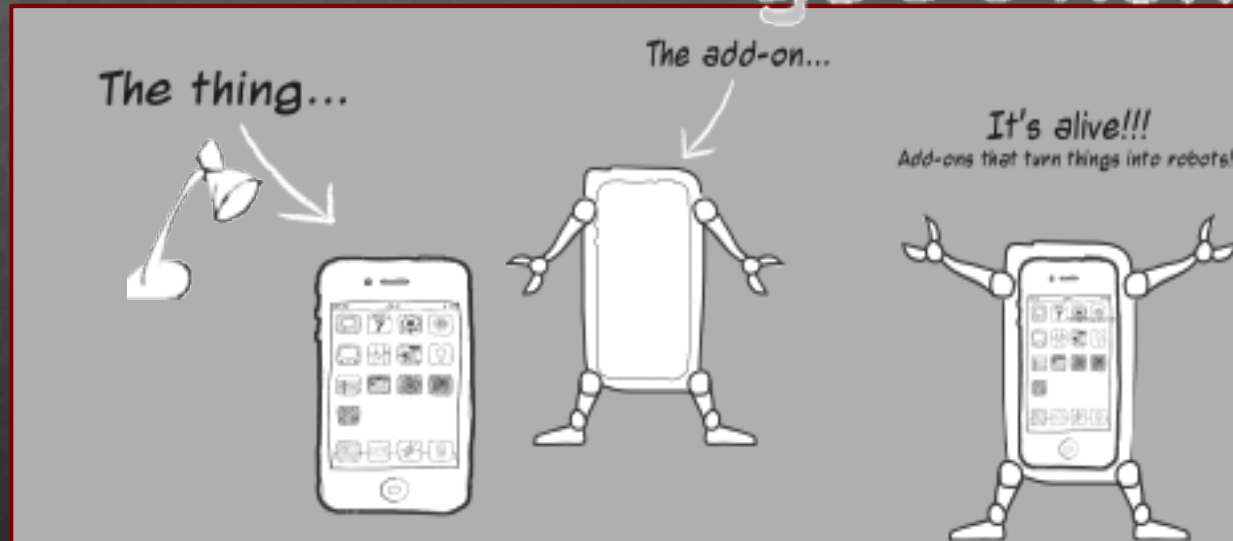


Mobile Devices as Edge Gateways



Transforming Things into Robots

yddons!!!



Actuators on Mobile Devices

ViviTouch > ViviTouch Users > What is ViviTouch?

What the heck is ViviTouch?

How in the heck does it work?

What people think of ViviTouch

Where to find ViviTouch

Bayer Links


- Bayer Global
- Investor Relations
- BayNews

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At Last: High Definition "Feel" Comes To Gaming



Bayer (Artificial Muscles)



VIVI touch™

Feel The Game.

Robotic Lamp by YdreamsRobotics



smart lamp™

Let your phone come alive.



What does it do?

In the bedroom:

A smart clock
Intelligent Lighting

In the living room:

Express emotions and personality on your calls
Your home robotic pet
Play games
Video surveillance with movement detection

- Download new features from www.YDRobots.com or program your own features
- Compatible with Android, Symbian and IOS Smartphone's
- Plug&Play
- Remote control trough your computer or from another Smartphone

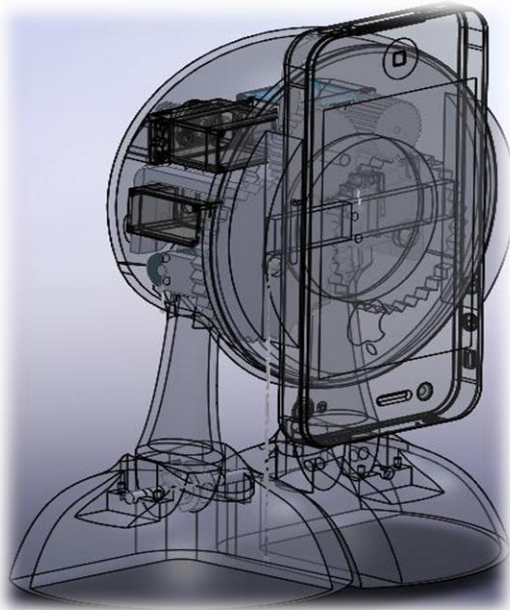
Order from:
www.YDRobots.com

Ages:
8 to 88

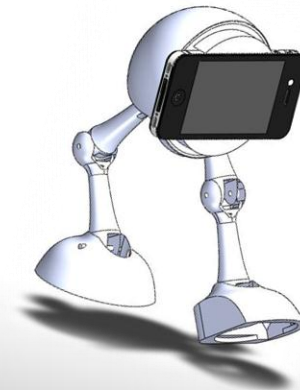
Price: **89.99[€]**

Things that Move

- Augmented functionalities



yoGO™



Robotic Shelves



Ziphius by Ydreams' Azorean



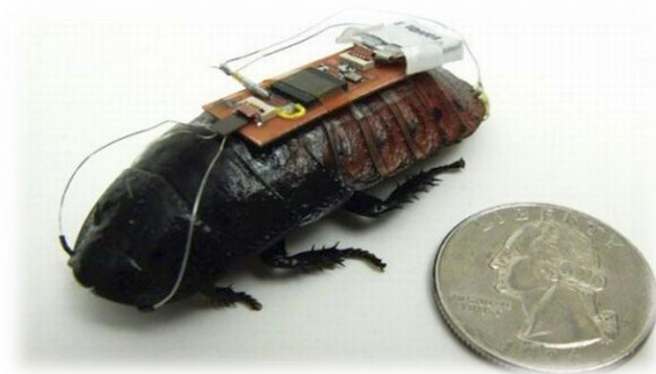
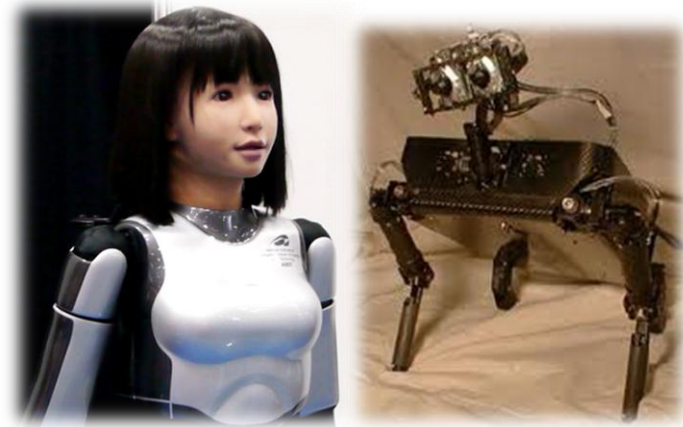
Invisible Networks

Actuation and communication embedded transparently into materials, objects and environments



Diverse Materials

- Metals
 - Aluminium
- Plastics
 - ABS, thermoplastics, fiber glass
- Silicone
- Gels
- Biological Material
- Living Beings
 - Ex. Remotely operated cockroach



Human muscle inspired Actuators

- Electroactive Polymers (EAPs)

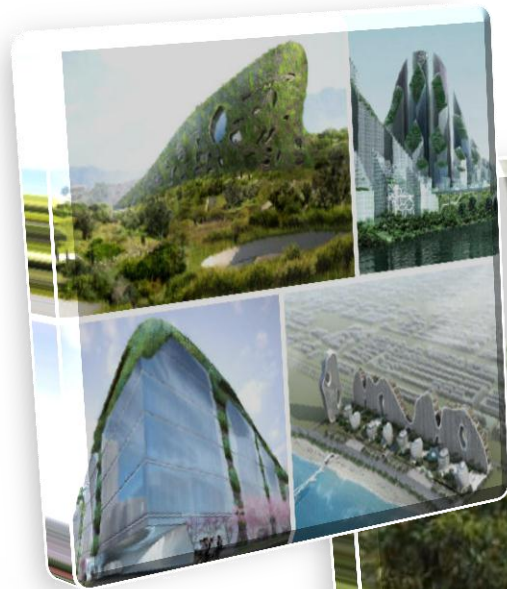


Smart Materials

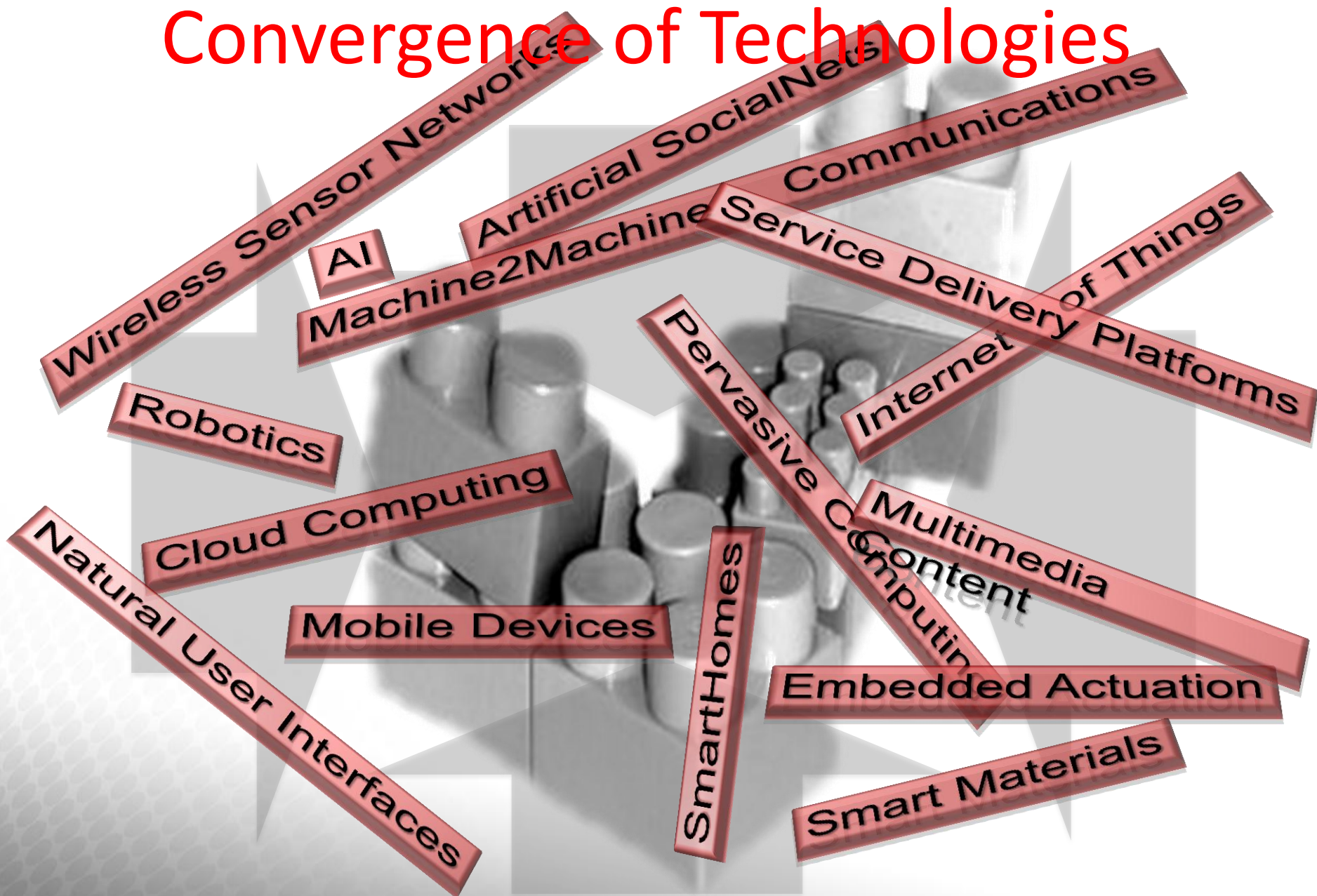
– Shape Memory Alloys



Grow your house vs Build it



Convergence of Technologies



Turning Things into Robots...

**Bringing
Robots into
People's Life**

