

# TECH TO SCHOOL



**FONDAZIONE EDOARDO  
GARRONE**



**istituto  
italiano di  
tecnologia**

**I.I.S. Italo Calvino – Classe 3BII**



# **F.E.G** **(Fondazione Edoardo Garrone)**



F.E.G is a cultural foundation operating with the aim of promoting the diffusion of culture and science in Genoa, financing educational projects dedicated to primary and secondary schools.





# CHEMISTRY MUSEUM



An experienced chemist explained us, in a short summary, the Chemistry's story and its instruments. The main instruments, that here take place in the first room, are :

➤ FUNNELS

➤ MORTARS

➤ RETORTS



# Water decomposition

In the following room, the chemist showed us the instruments used by Lavoisier to do his experiments on the water decomposition. The water placed into a retort was steamed. The steam reacted with an iron coil and it was decomposed: the oxygen oxidized the iron and the hydrogen was stored into a glass bell.





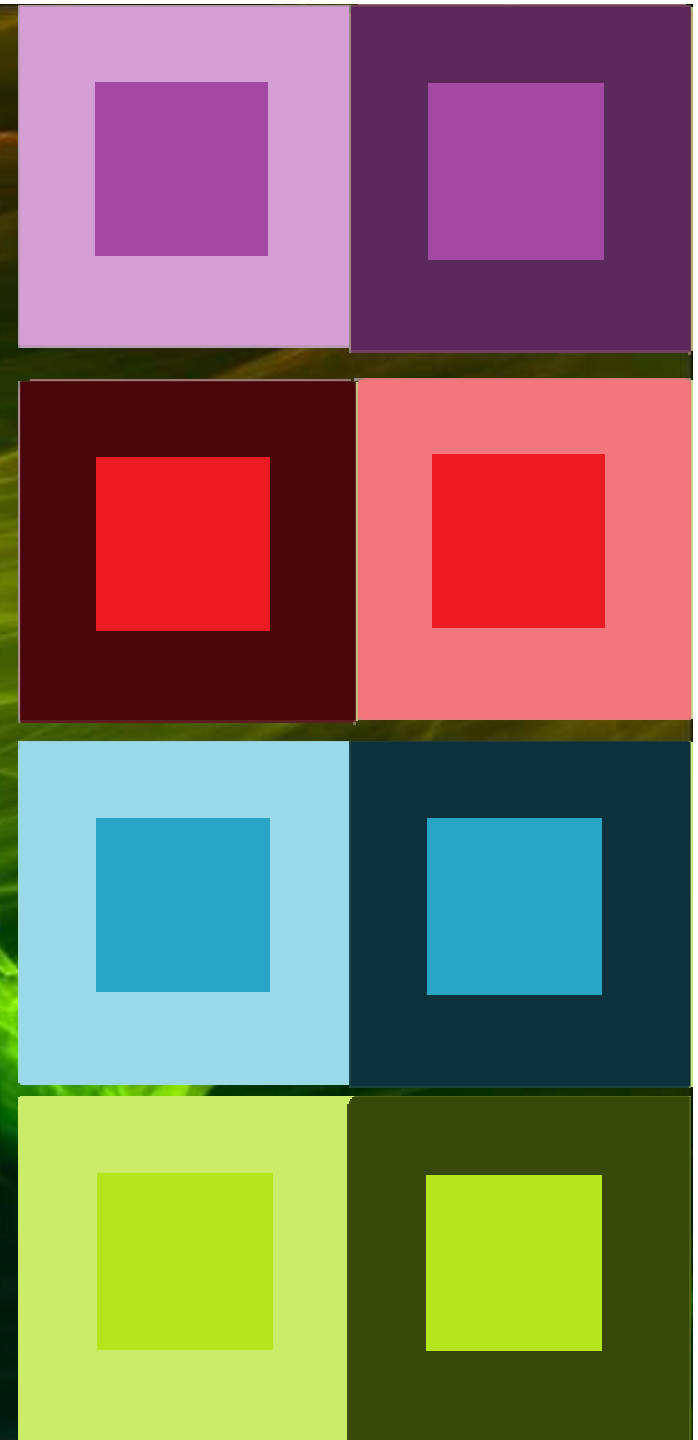
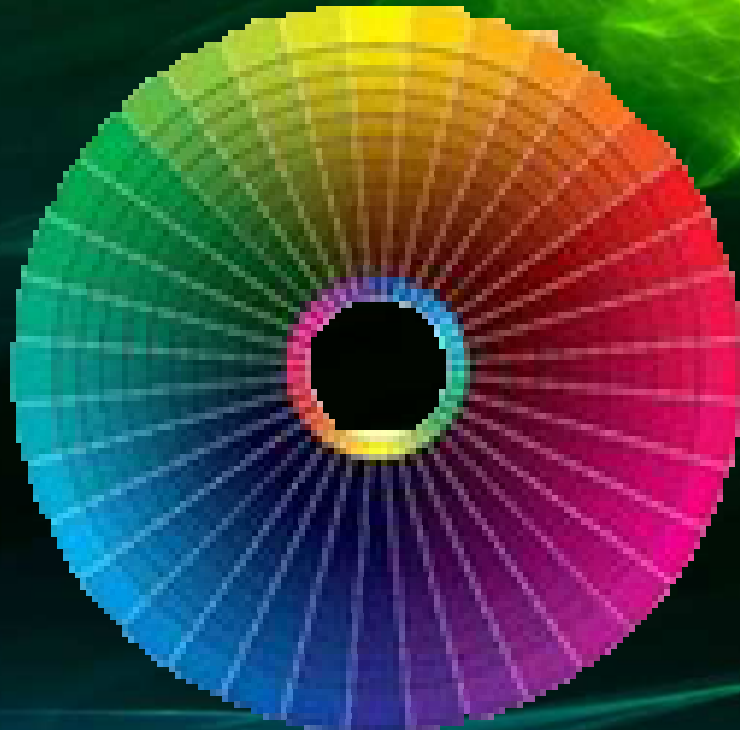
# COLOURS IN THE PAST



In the past there were only a dozen of organic colors, and the same numbers made by inorganic pigments.

	ZAFFERANO	
	ARZICA	
	CURCUMA	
	COCCINIGLIA	
	ROBBIA	
	CARTAMO	
	ALIZARINA	
	MELOGRANO	
	LEGNO BRASILE	
	INDACO	
	GINESTRA	

Our lesson continued. The chemist told us about the theory of **optical illusions** and introduced also the principle of the **simultaneous contrast** by Chevreul







# What is the plastic?

Plastics are typically organic polymers of high molecular mass. Used a lot because it's versatile, but it's also non-biodegradable, in fact it degrades after 1000 years.



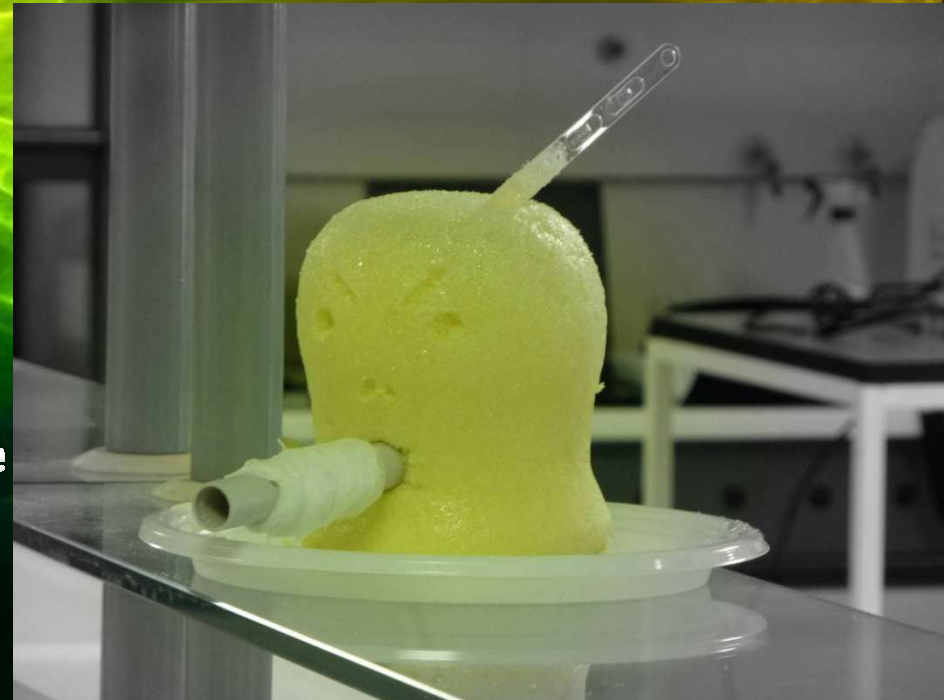
# FOAM POLYURETHANE'S SYNTHESIS

## ➤ Substances

- Diol
- Diisocyanate
- H<sub>2</sub>O

## ➤ Process

- Calibrate two glasses with the necessary quantity of the substances: 20 mL di diol and 25 mL di diisocyanate
- Put the substances into the glasses
- Put the diol into the glass of the diisocyanate
- Mix the solution
- Wait 4 minutes and the polyurethane will be hardened





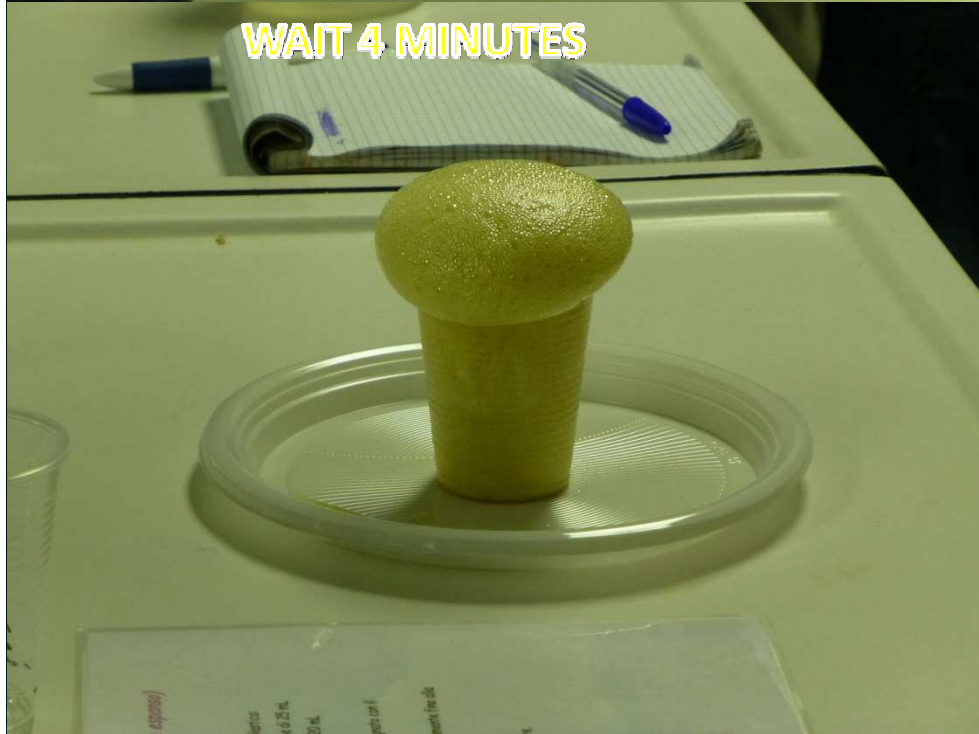
**20 ml DIOL + 25 ml DIISOCYANATE**



**MIX THE SOLUTION**



**WAIT 4 MINUTES**



**HARDENED, COMPLETED**



# SYNTHESIS OF THE NYLON 6,6

## ➤ Substances

- NaOH 1M
- EMDA
- H<sub>2</sub>O
- Cyclohexane
- Adipoyl chloride

## ➤ Process

- Prepare the aqueous phase: 25 mL of distilled water, 3,1 mL of NaOH and 0,9 mL of EMDA. Put all in the beaker .
- Prepare the organic phase: 25 mL of cyclohexane and 0,5 mL of adipoyl chloride. Put all in the conical flask.
- Pour very slowly the organic phase in the beaker containing the aqueous one
- Collect the nylon with a spool
- Wash the spool, beaker and conical flask





# PVA'S CROSSLINKING AND SKIFIDOL'S PRODUCTION



## ➤ Substances

- Solution of PVA
- Borax solution at 5%
- Red and green dye

## ➤ Process

- Take the solution of PVA (which had been prepared in advance by the PhD who made the lesson)
- Put 20 mL of this solution in a beaker
- Add, if you want, the dye
- The PhD pours the borax solution for all of us (it's too toxic)
- Transfer the skifidol produced in a plastic container and close it with the cap



Back

# IIT's organizing & scientific activity





# Italian Institute of Technology

- Experience done on March, 26 2013
- Promoted and financed by FED

## Topics treated:

- IIT's history and organizing
- Advanced Robotics Department (ADVR)
- PAVIS project

# What is the IIT?

- Scientific organization financed by State
- Scientific office in Morego, Genova Bolzaneto
- There are Center IIT all over Italy
- Interdisciplinary center: humanoid robots, high-tech software, nanotechnologies, new drugs, energy, neurosciences, military technologies etc..
- At the end of 2012, there are over 1100 workers
- The half are PhDs (post-docs) from the University.
- There are lot of Italian doctors, but there are also foreigner ones, which come from 50 different countries.
- Heterogeneous formation scientists

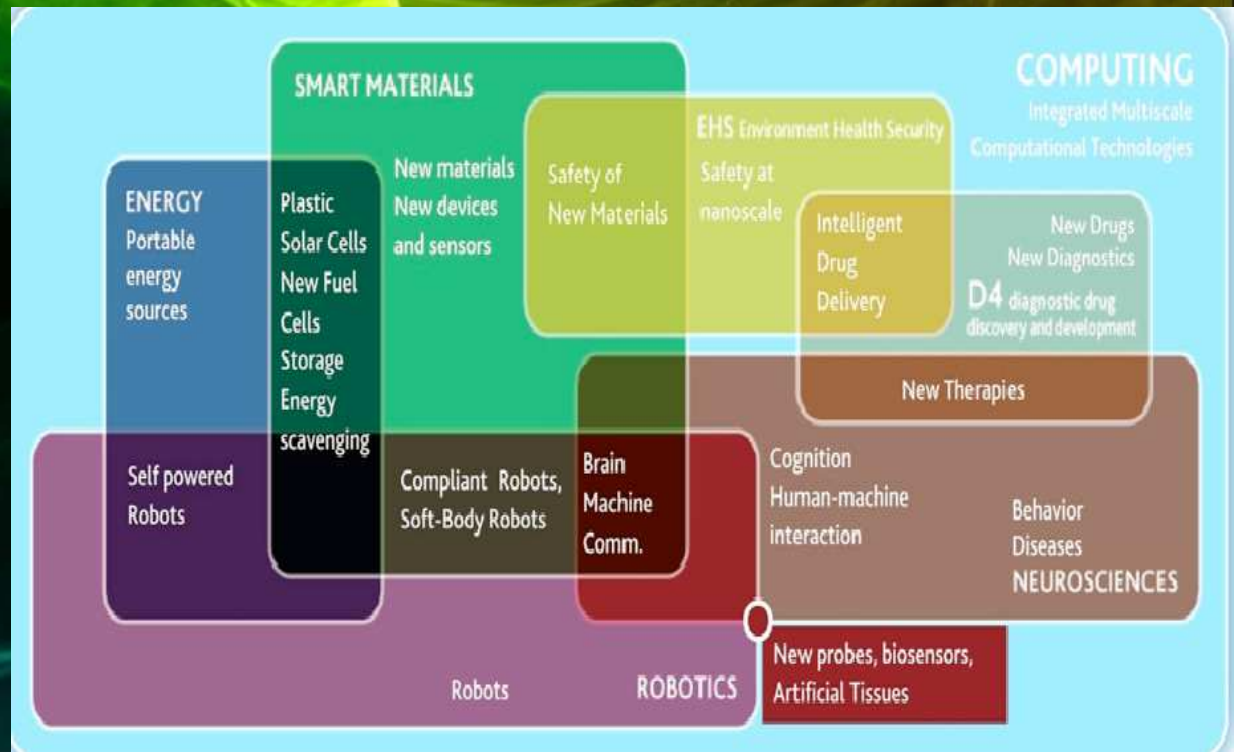


# History and productivity

- Conference by Valeria Delle Cave
- Born in 2003, according to the law number 326 of November, 11<sup>th</sup> of the same year

Productivity regards:

- Publications on scientific reviews
- Conferences all over the world
- Patents' selling



# Divided into seven platforms:

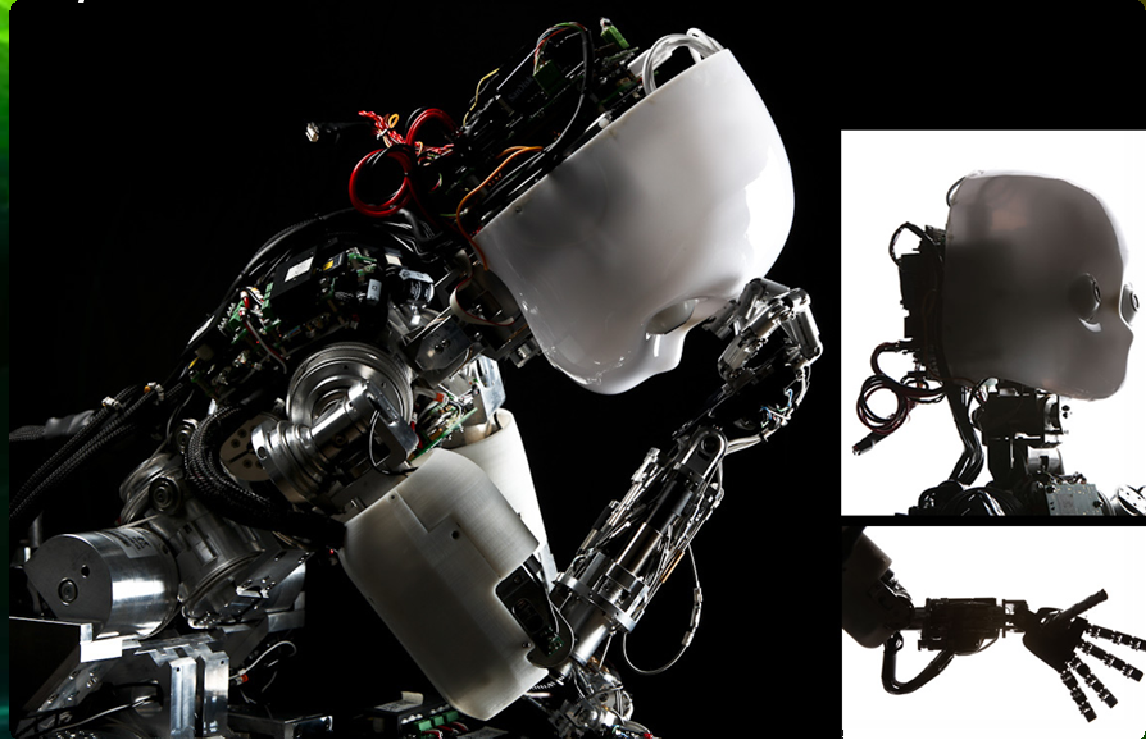
- Robotics Brain and Cognitive Sciences - RBCS
- Advanced Robotics - ADVR
- Neuroscience and Brain Technologies - NBT
- Drug Discovery and Development - D3
- Nanochemistry - NACH
- Nanophysics - NAPH
- Nanostructures – NAST
- Pattern Analysis & Computer Vision - PAVIS



# ADVR, Advanced Robotics

We have listen to two conferences, by Andrea Brogni, about two project of the ADVR Platform:

- Virtual Realities (VR)
- Robots

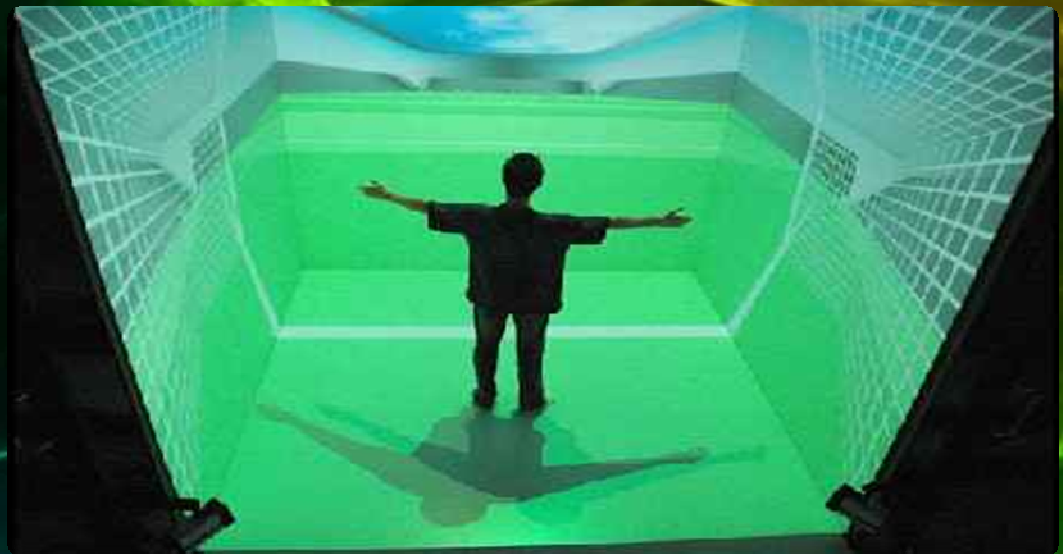


# Virtual Realities

- Situated on the third floor of the IIT building
- It's a program of research and development of a technology that can create a environment simulated by a computer which is indistinguishable by a real one

Used in:

- Music
- Cinematography
- Videogames

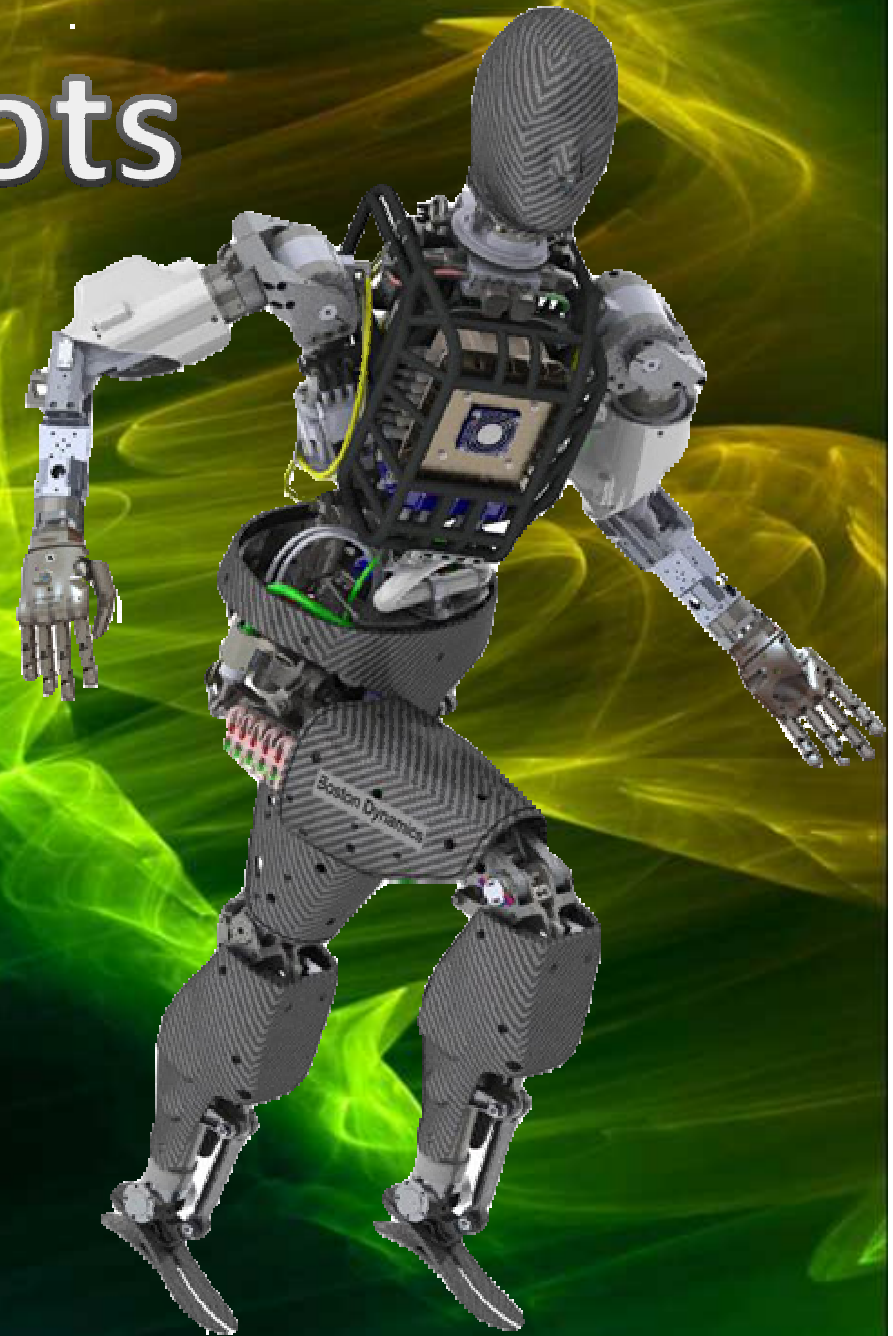




# Robots

Various implementations:

- Robotic systems for limbs rehabilitation
- Humanoid robots which can walk
- Humanoid robots which can learn (iCub)
- Quadruped robots (HyQ)



# HyQ

- Quadruped robot which can walk thanks to hydraulic pistons and brushless motors
- It can walk on rough terrain
- It's not self-sufficient
- Implementation of on-board components





# iCub

- Humanoid robot
- Researches began in 2003, presented at Science's Festival in 2009
- Open-source project

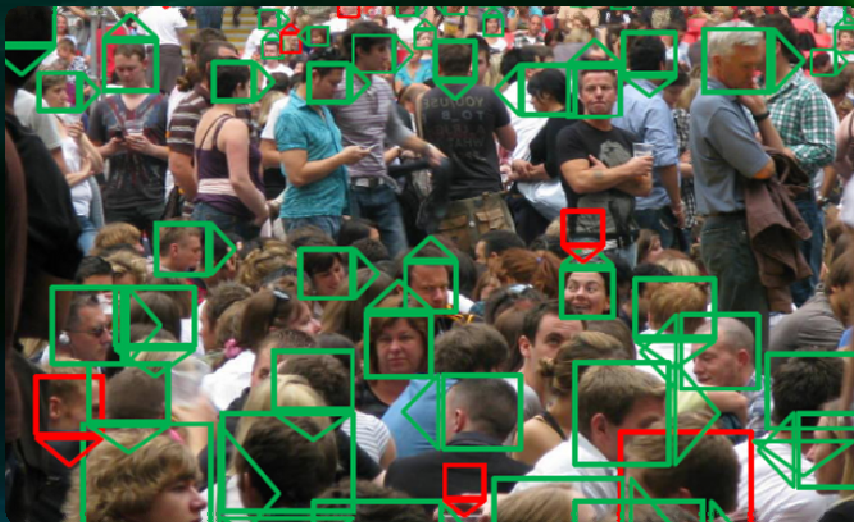
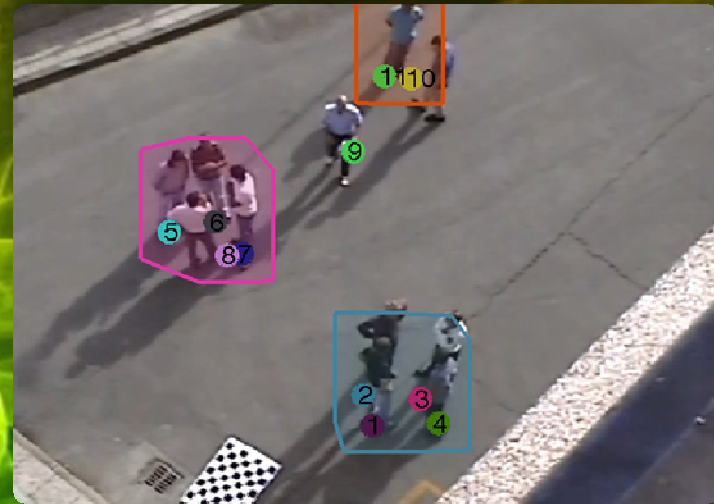
## Characteristics:

- It can crawl
- It has a HD microcamera
- Emotive interaction
- It can move arms and legs
- It can move objects
- proprioception sense
- ITALK program to learn language from scientists



# PAVIS

- Conference by Carlos Beltran – Gonzales
- Images analysis and understanding



- Intelligent systems building to actual applications
- Surveillance, biomedical scanner ...



# Classe 3bii – IIS Italo Calvino

