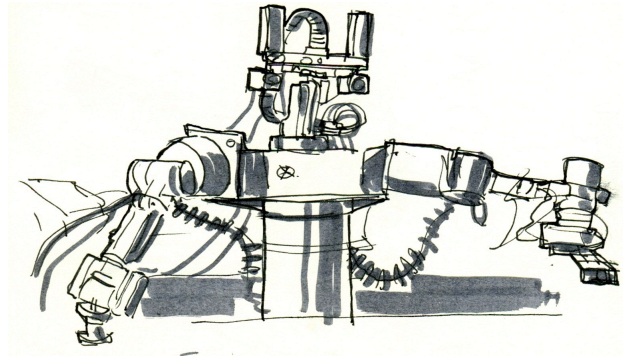# Degrees of freedom in Robotics

Angel P. del Pobil

Professor, Computer Science & Engineering Dept., Jaume-I University, Spain

Director, UJI Robotic Intelligence Laboratory, Spain

UNIVERSITAT JAUME·I

Robotic Intelligence Lab

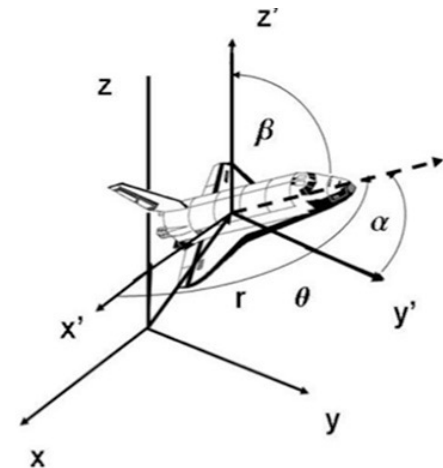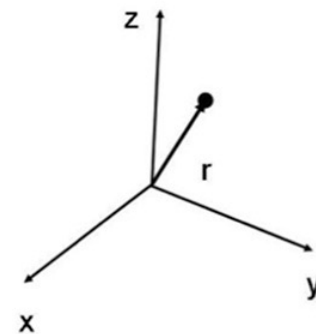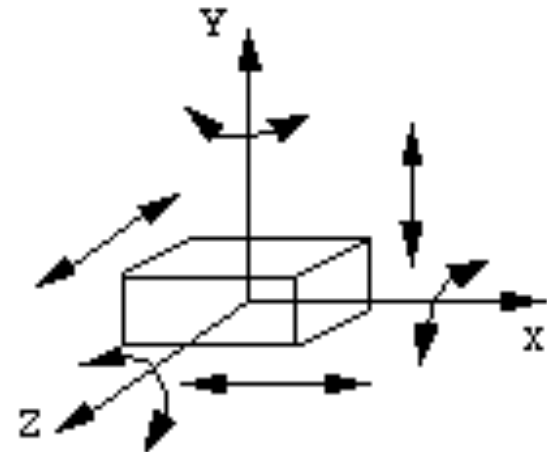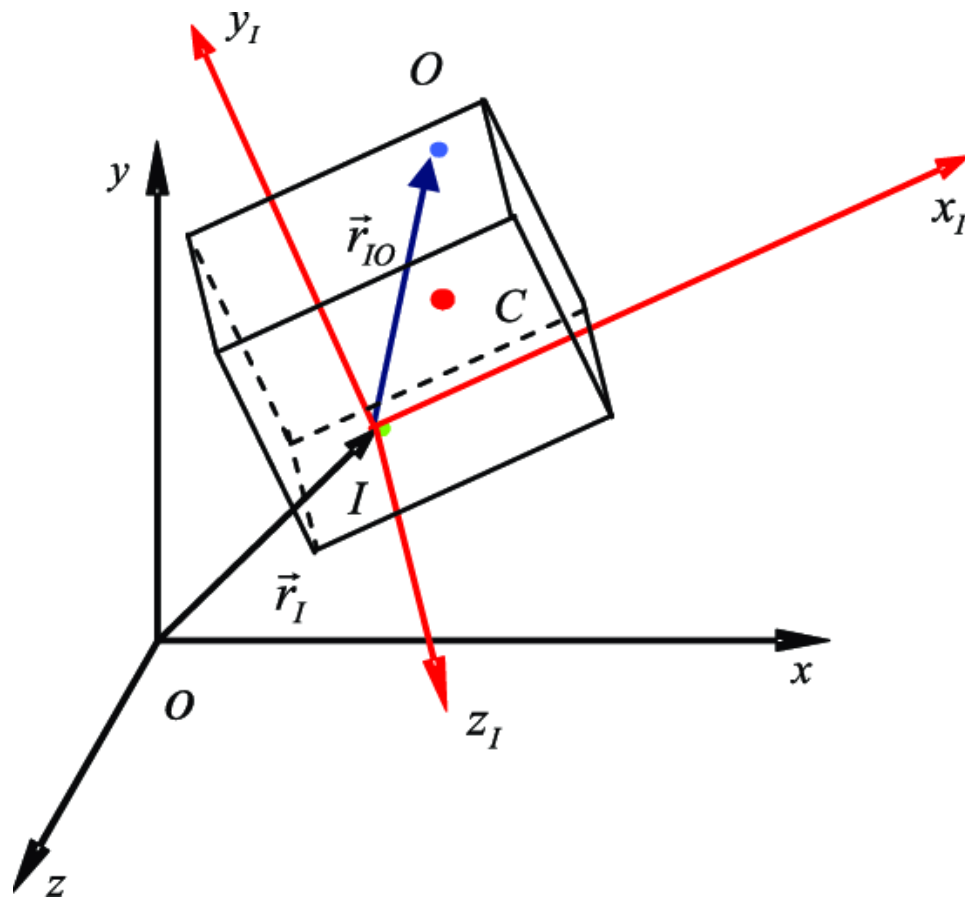# Main Research Platform: the UJI Humanoid Torso

- Two Mitsubishi PA-10 7-d.o.f arms

- Two 3-fingered hands (Barret, Schunk)

- Two wrist-mounted force-torque sensors

- Pan-tilt-vergence head with 4 d.o.f.

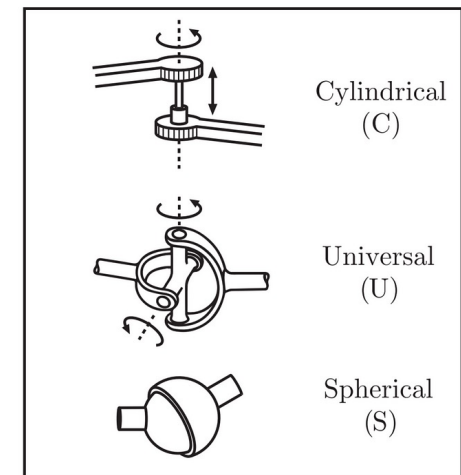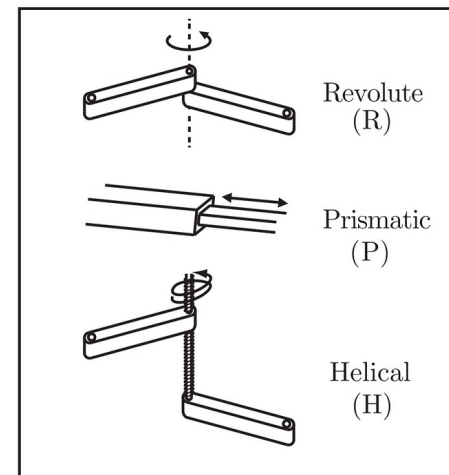- Integrated tactile sensors in the fingers

Integrating:
- Visuomotor Learning,
- Cognitive Grasping and
- Sensor-Based Physical Interaction

Concept of Degrees of freedom of a rigid body

Concept of Degrees of freedom in Robotics

Main Research Platform: the UJI Humanoid Torso

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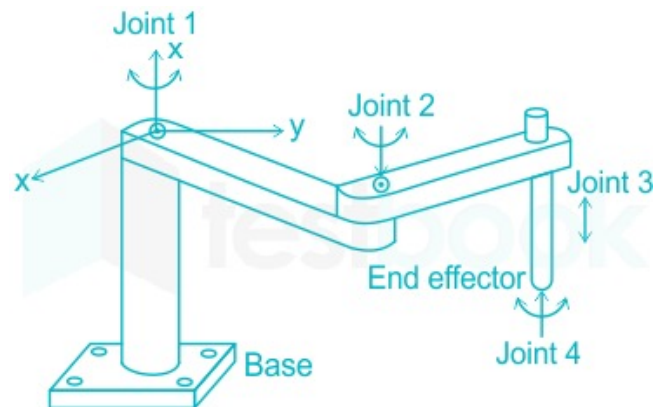
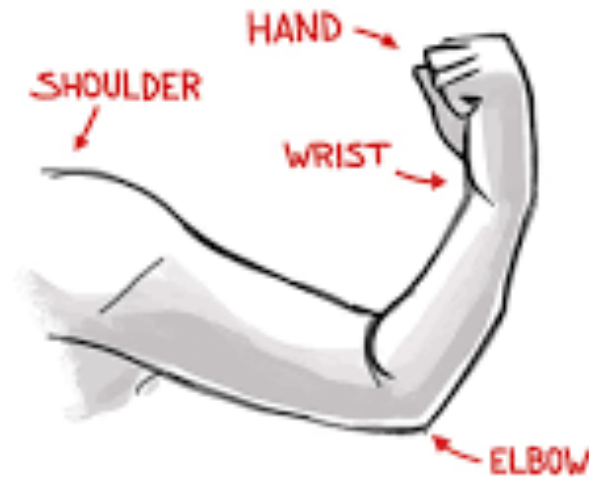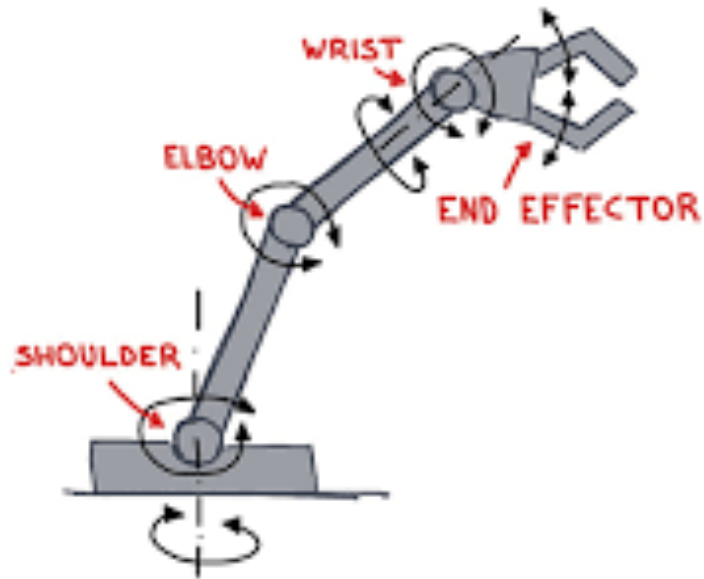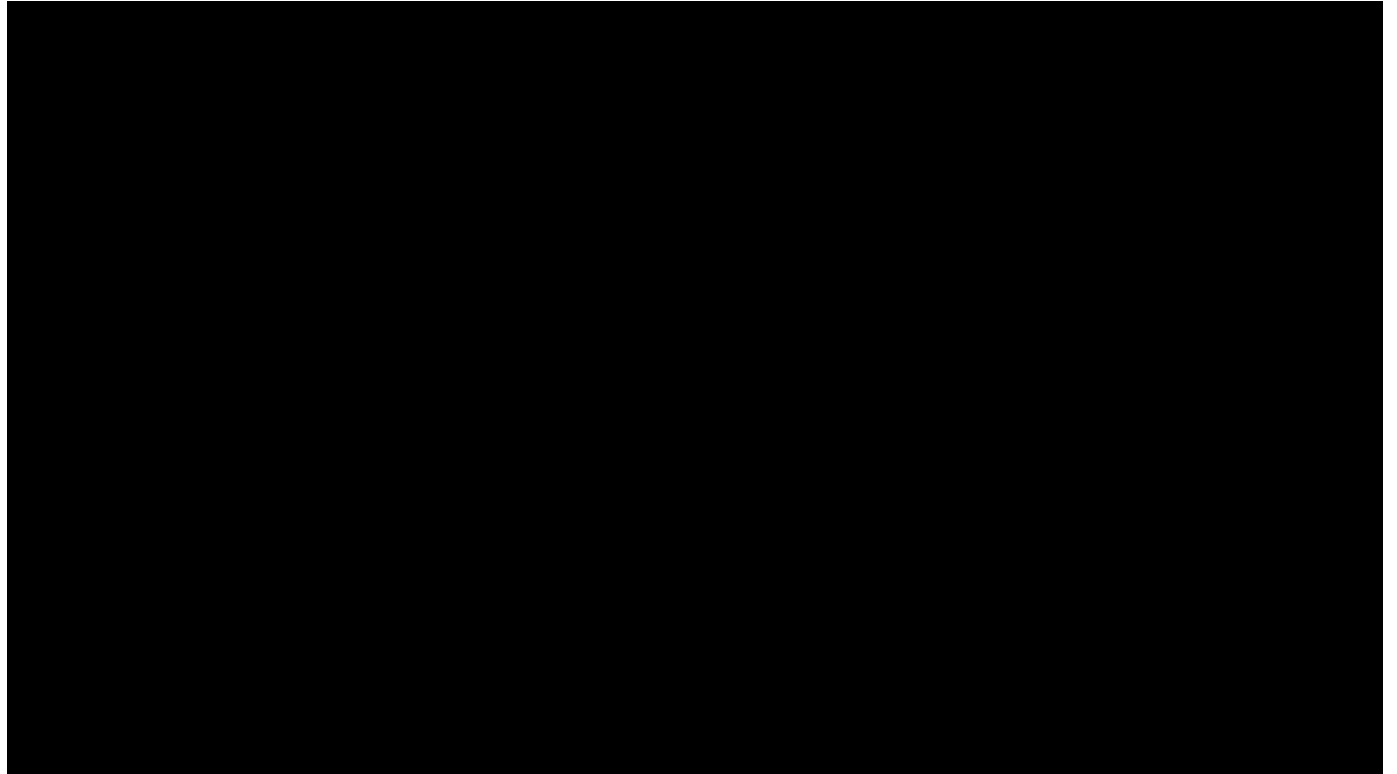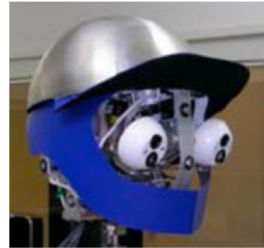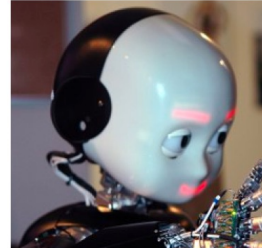 - Integrated tactile sensors in the fingers
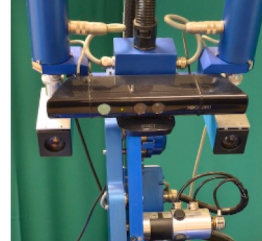
Robots heads

Asimo
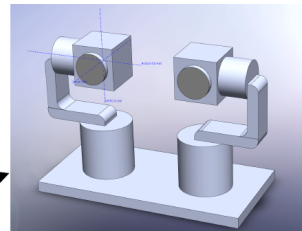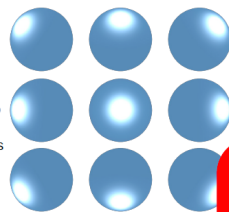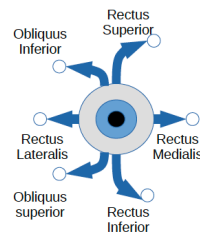
Armar III

ICub

HRP-4C

Justin

Nao

Tombatossals

Some examples robotic visuo-oculomotor systems

Eye movements

Rectus Superior

Obliquus Inferior

Rectus Lateralis

Rectus Medialis

Obliquus superior

Rectus Inferior

Fick config.

Helmholtz config.

A.P. del Pobil – Degrees of freedom
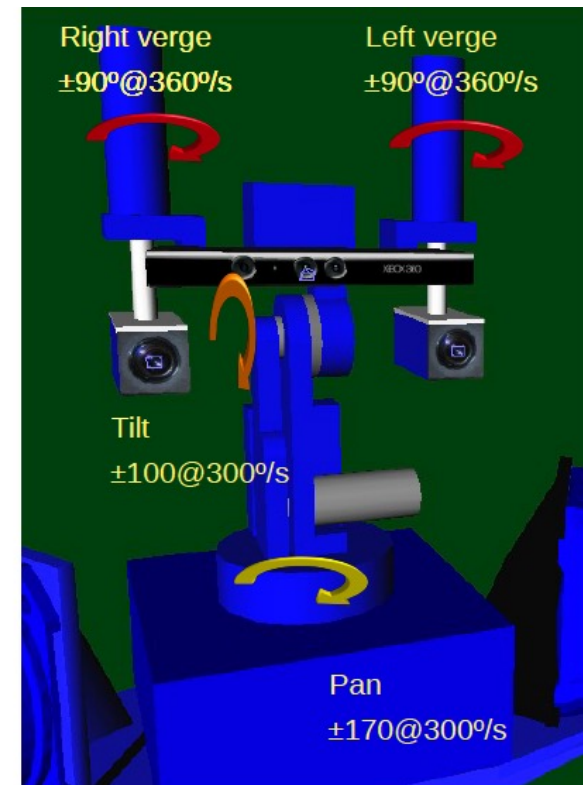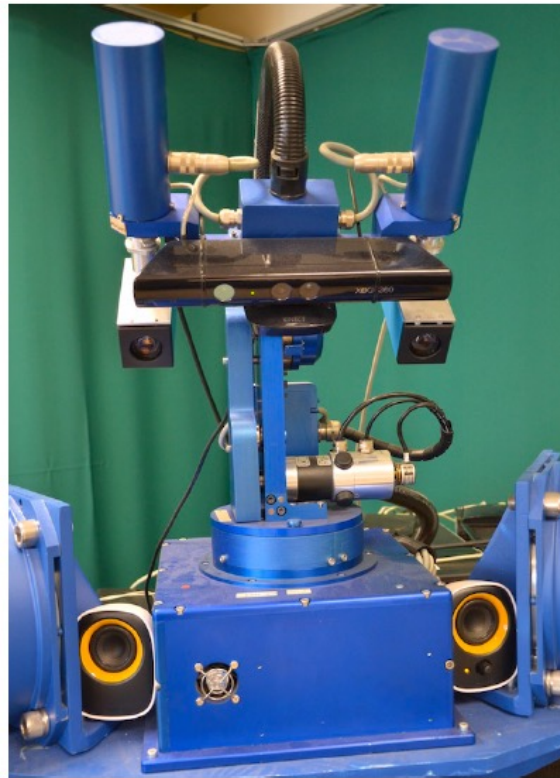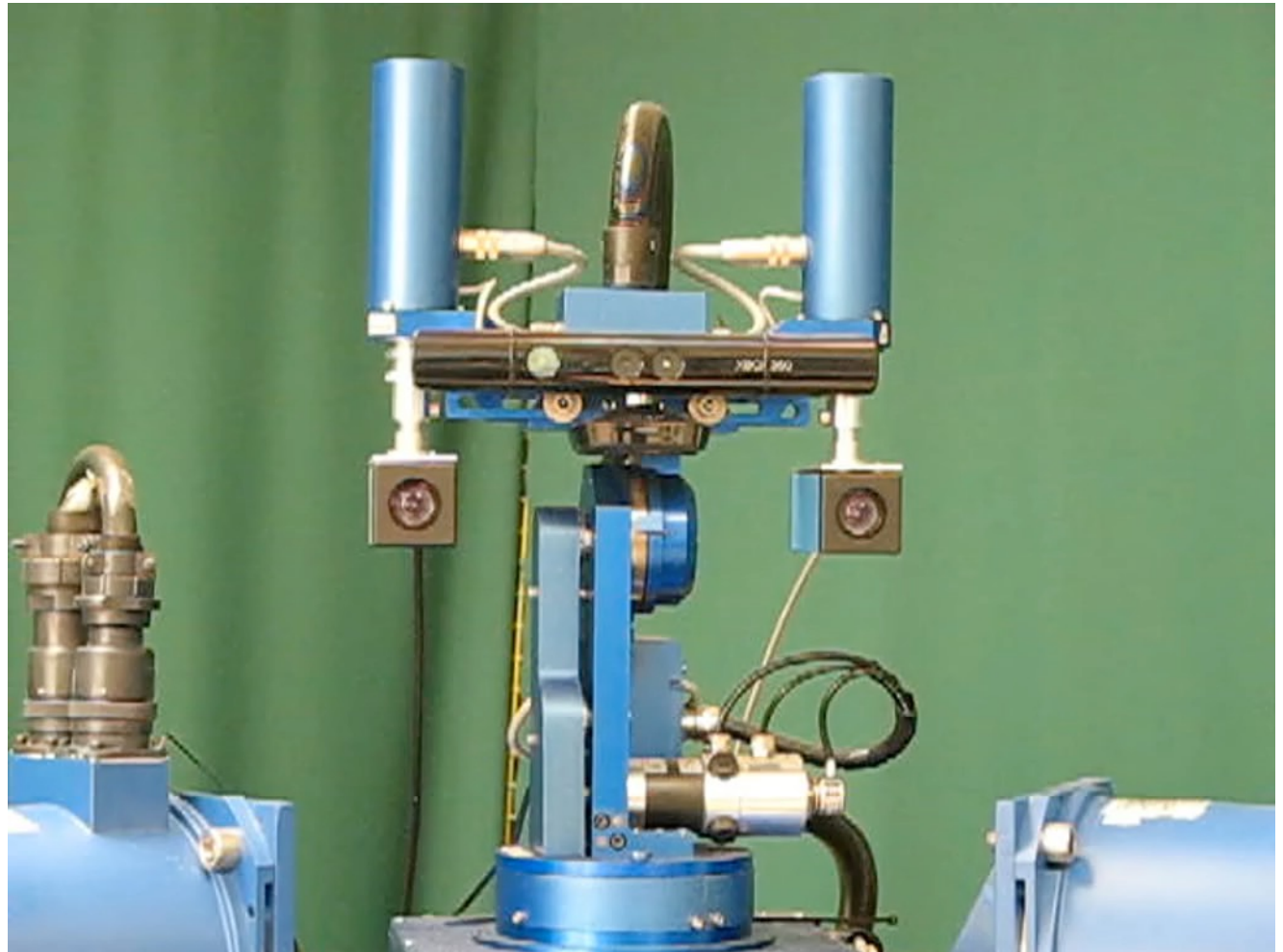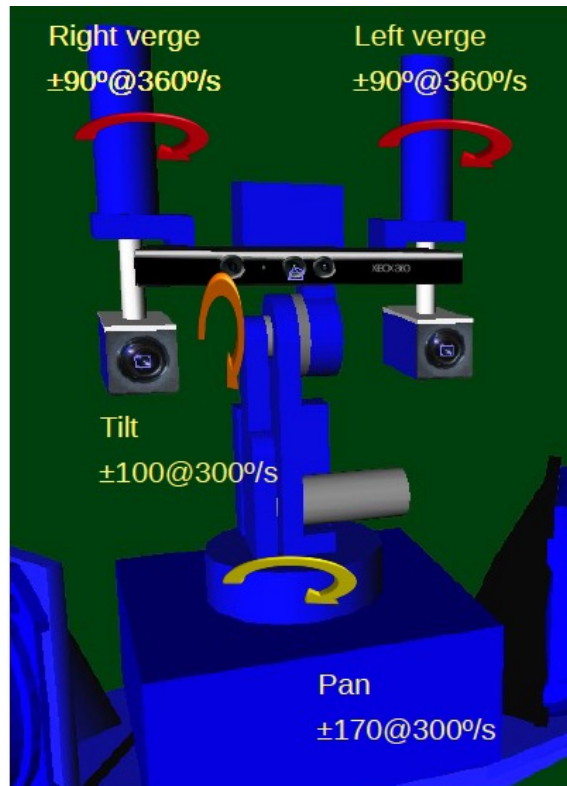
Tombato's head

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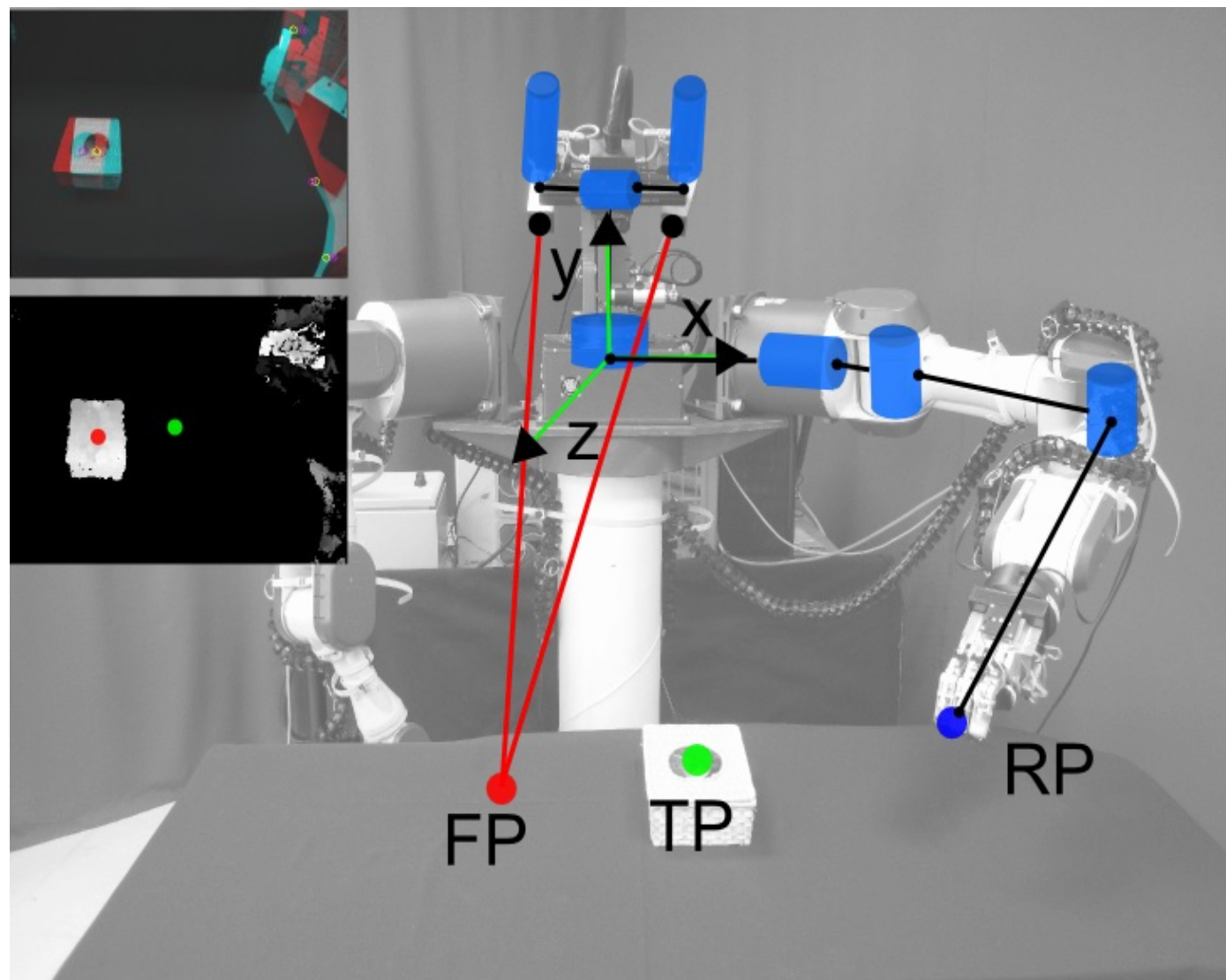
- Integrated tactile sensors in the fingers

Right verge
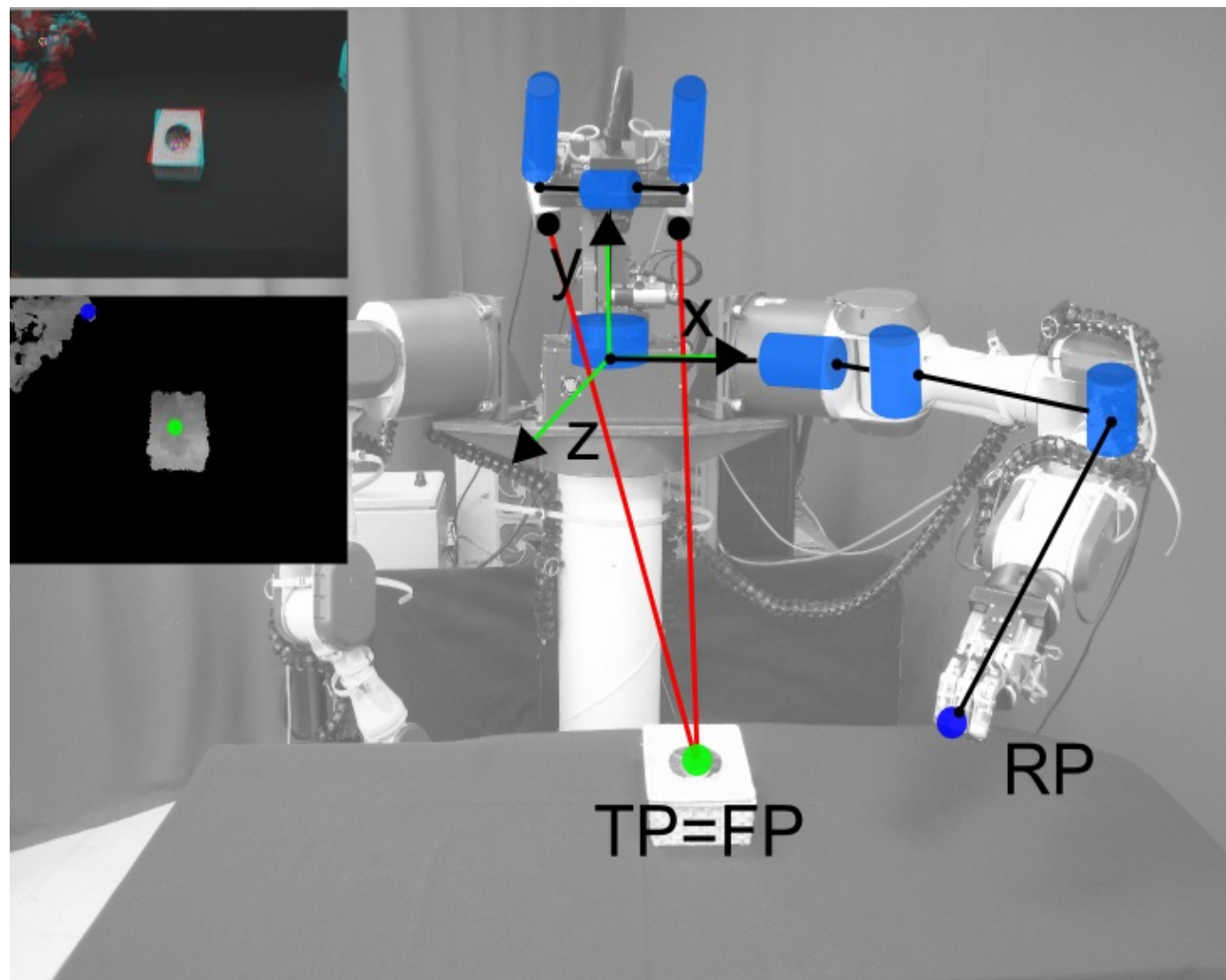±90º@360º/s

Left verge
±90º@360º/s

Tilt
±100@300º/s

Pan
±170@300º/s

Tombato's head

Right verge ±90°@360°/s Left verge ±90°@360°/s Tilt ±100@300°/s Pan ±170@300°/s

A.P. del Pobil – Degrees of freedom

Gazing 1

- 🔴 Fixation Point
- 🟢 Target Point
- 🔵 Reaching Point

A.P. del Pobil – Degrees of freedom

Gazing 2

A.P. del Pobil – Degrees of freedom

Reaching

A.P. del Pobil – Degrees of freedom