



**UNCUYO**  
UNIVERSIDAD  
NACIONAL DE CUYO



**FACULTAD DE  
INGENIERÍA**

# **ROBOTICA I**



**UNIDAD VI:**



**Simulación**

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**JTP: Eric Sanchez**

# Contenido UNIDAD 6

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- Modelado y Simulación.
- Métodos de Programación.
- Lenguajes de Programación

# Modelado y Simulación: Solidwork

The image displays the SolidWorks software interface for motion analysis. The main workspace is split into two views of a mechanical assembly, showing a blue cylindrical component and a grey base. The bottom section features a motion analysis timeline with a scale from 0 to 22 seconds. The timeline includes a legend with the following items:

- Ensamblaje3 (Predeterminado <Estado
- Orientación y vistas de cámara
- Luces y cámaras
- RotaryMotor 1
- RotaryMotor 2
- RotaryMotor 3
- (f) base <1> (Predeterminado <<Pr
- (-) giro <1> (Predeterminado <<Pre
- (-) medio <1> (Predeterminado <<P
- (-) rotor <1> (Predeterminado <<Pr
- Relaciones de posición (6 redundan

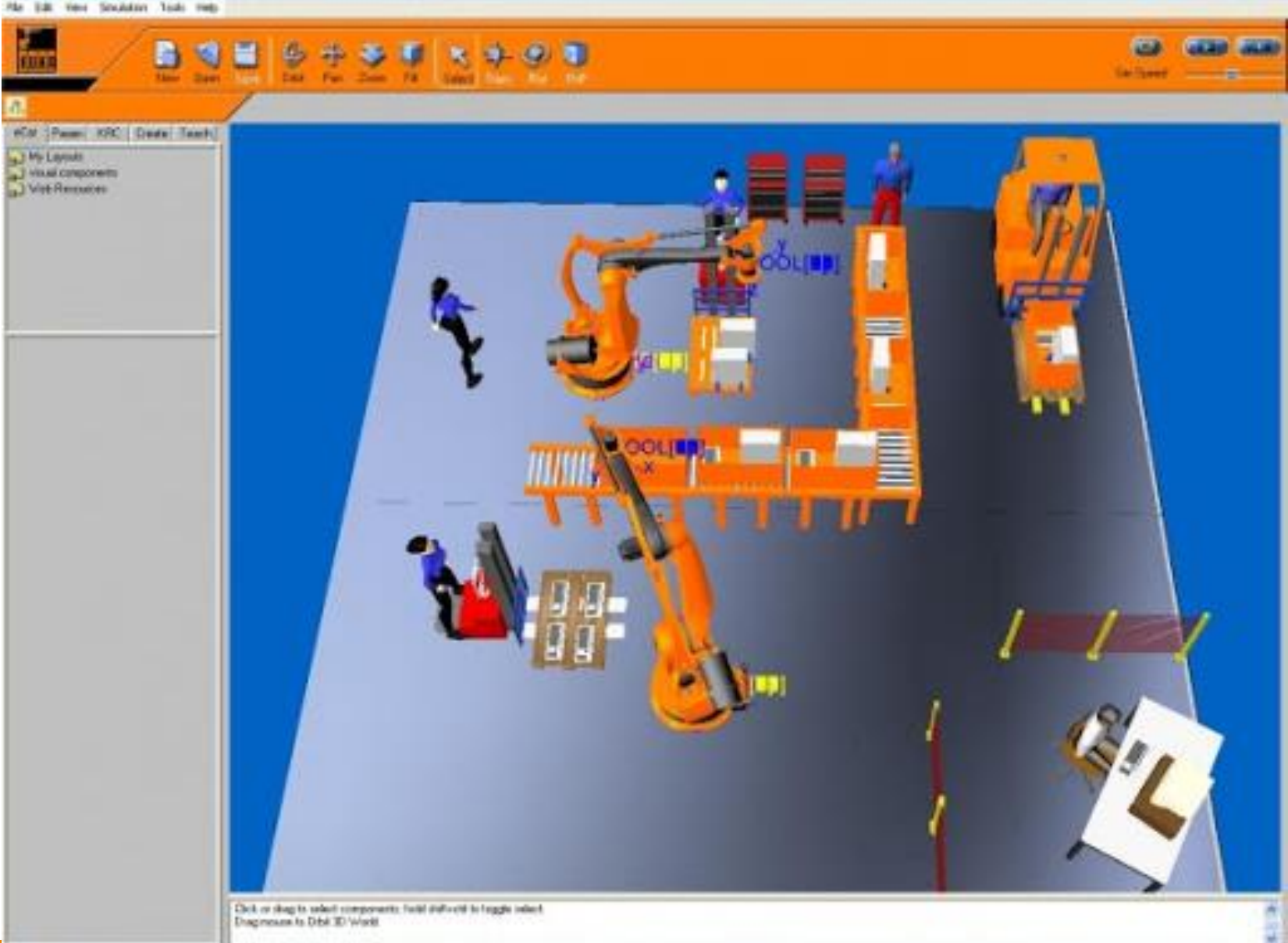
The right-hand panel, titled "Apariencias, escenas y calcomanías", contains a tree view with the following items:

- Apariencias(color)
- Escenas
- Calcomanías

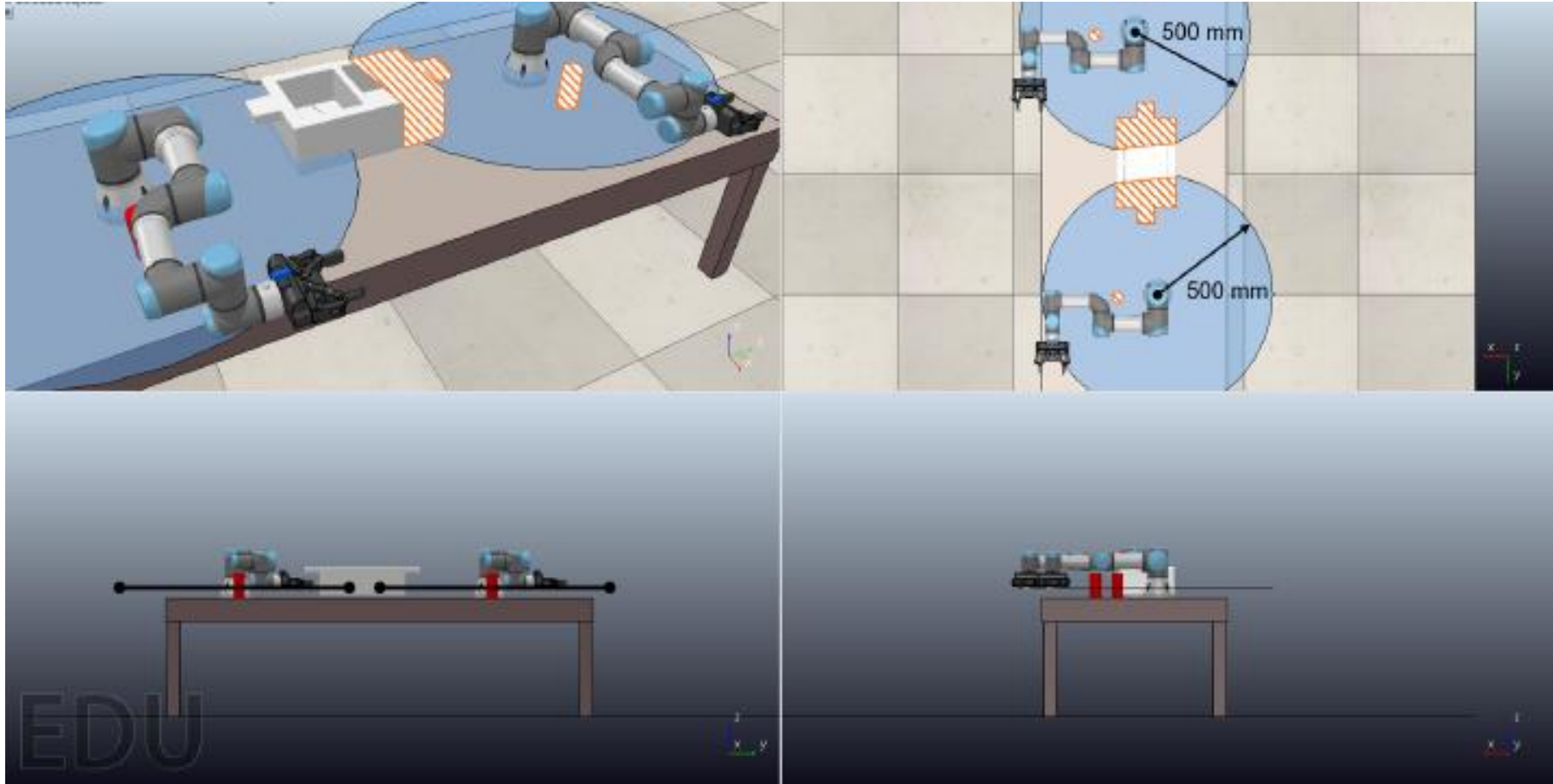
A yellow box in this panel contains the text: "Seleccione elementos para arrastrar y colocar."

The status bar at the bottom indicates "Insuficientemente definida" and "Editando Ensamblaje". The version number "SolidWorks Premium 2014" is visible in the bottom left corner.

# Modelado y Simulación: KukaSim

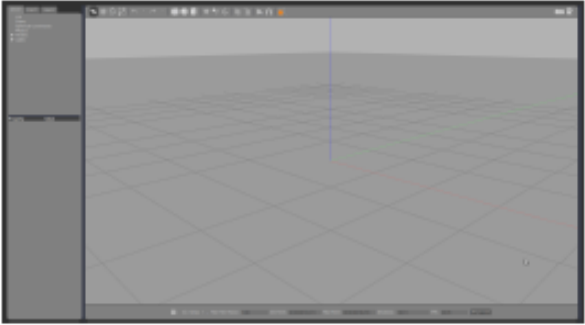
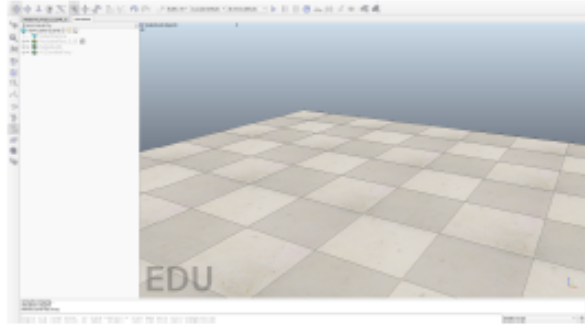


## Modelado y Simulación: V-rep, copelia Sim

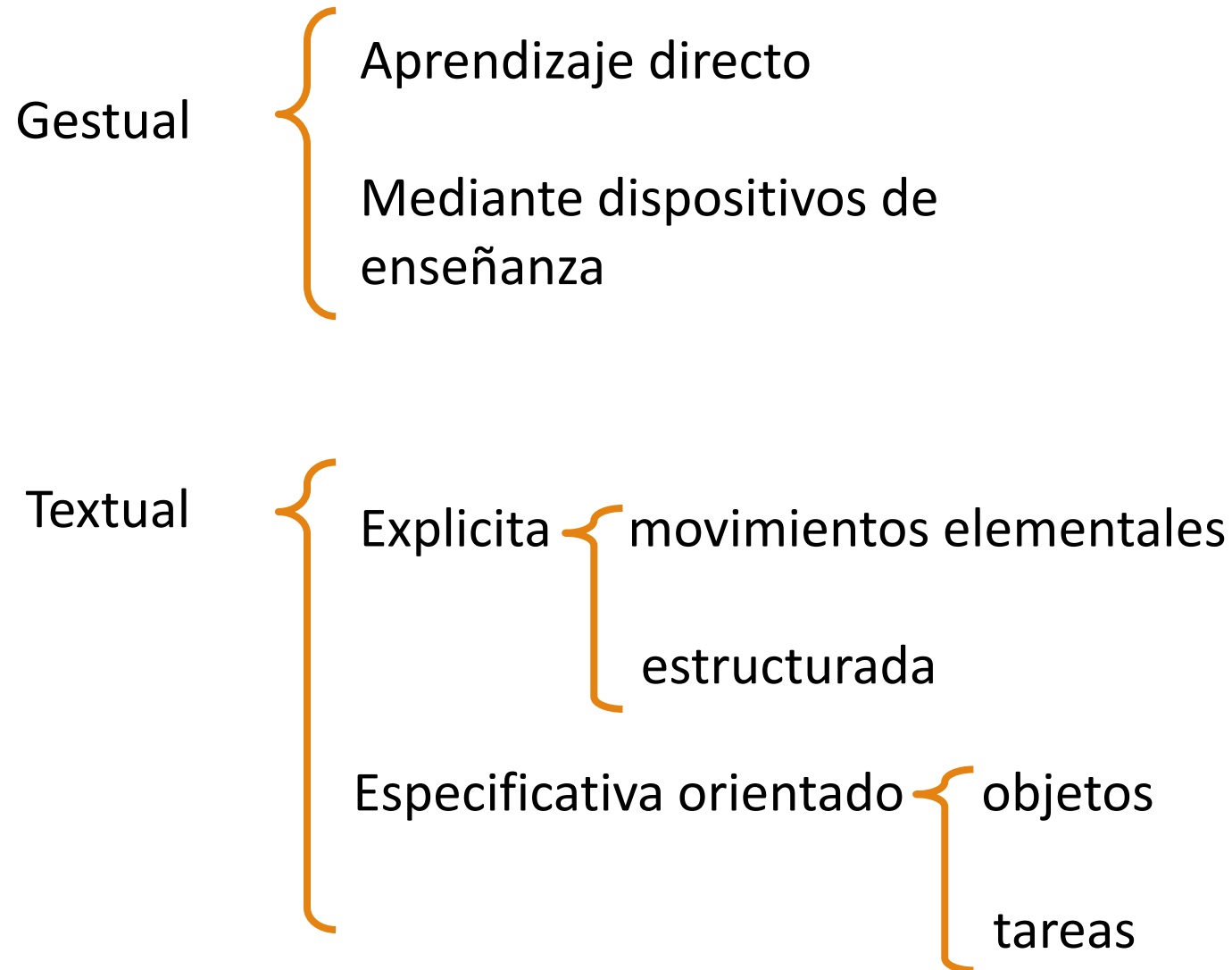


Autor Proyecto Intercambio Thibaud Hiltenbrand

## Cuadro comparativo Gazebo vs V-Rep

Simulador	Gazebo	V-REP
Interfaz		
Caract. principales	<ul style="list-style-type: none"> <li>▶ Desarrollado por Willow Garage (EE.UU)</li> <li>▶ Open-source</li> <li>▶ Soporte solamente Linux</li> </ul>	<ul style="list-style-type: none"> <li>▶ Desarrollado por Coppelia Robotics (Suiza)</li> <li>▶ Comercial (versión educativa gratuita)</li> <li>▶ Soporte Windows, Mac y Linux</li> <li>▶ Soporte 7 lenguajes de programación (Lua, Python, C++, ...)</li> </ul>
Ventajas	<ul style="list-style-type: none"> <li>▶ Motor físico ODE, otros disponibles (Bullet, Simbody y Dart)</li> <li>▶ Integración total con ROS</li> <li>▶ Comunidad muy activa</li> </ul>	<ul style="list-style-type: none"> <li>▶ Adecuado para modelos de alta precisión</li> <li>▶ Interacción con el entorno virtual durante la simulación</li> <li>▶ Múltiples motores físicos pre-instalados (ODE, Bullet y Vortex)</li> </ul>
Inconvenientes	<ul style="list-style-type: none"> <li>▶ Física aproximativa con manipulación</li> <li>▶ Edición de modelos compleja</li> <li>▶ Fallos frecuentes</li> </ul>	<ul style="list-style-type: none"> <li>▶ Sin soporte nativo de ROS</li> <li>▶ No es de código abierto</li> <li>▶ Disponibilidad de modelos limitada</li> </ul>

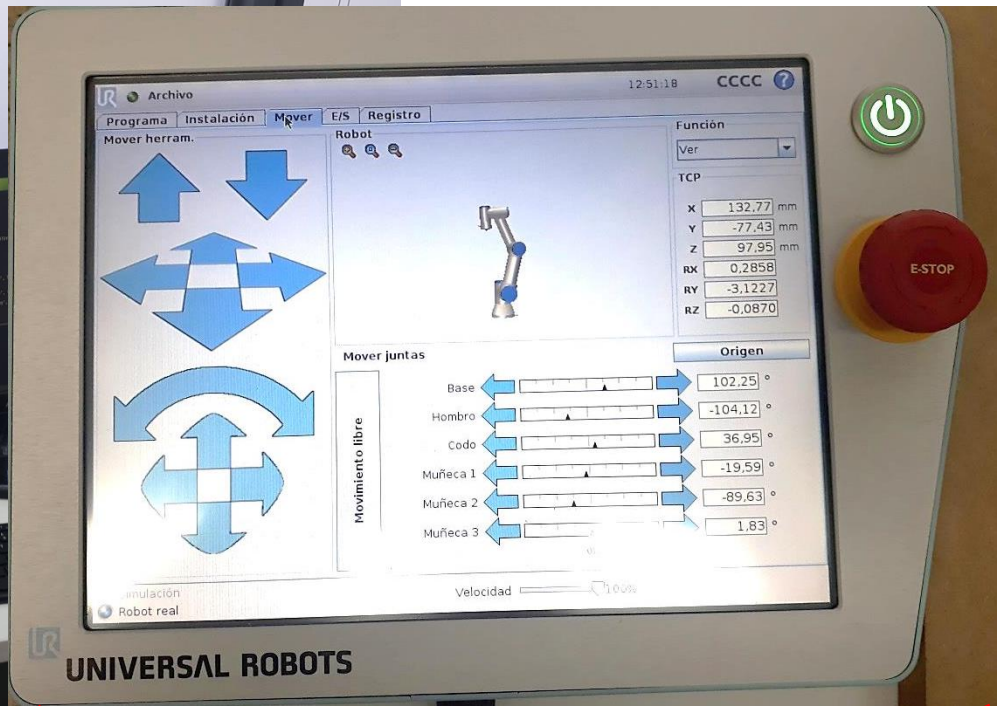
# Métodos de Programación











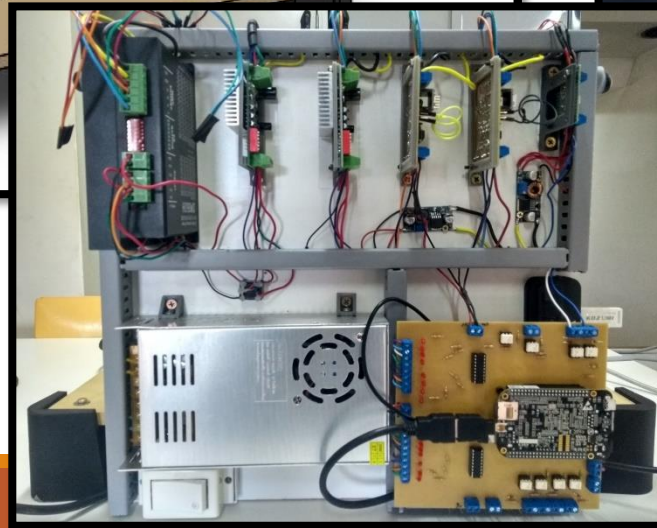
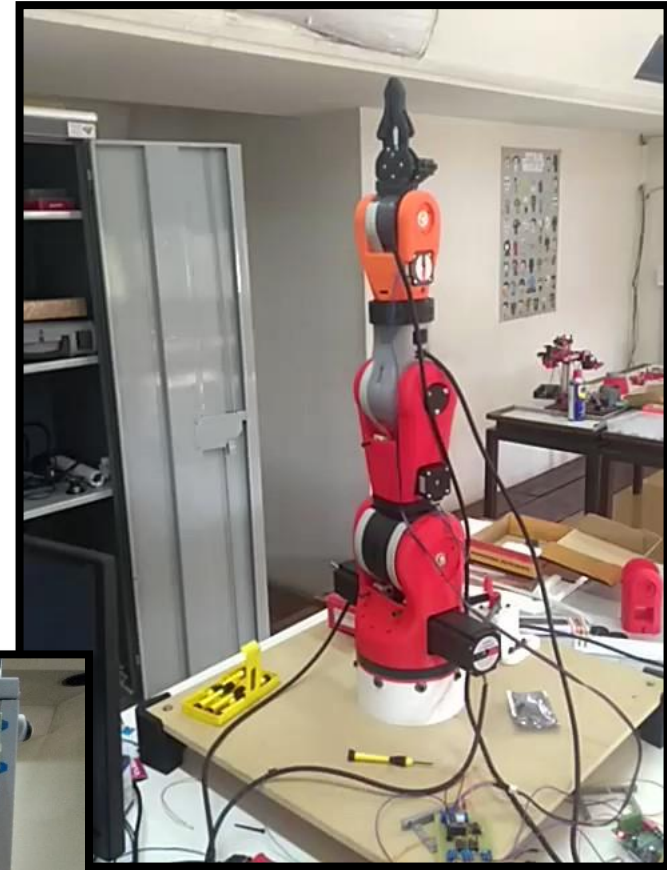
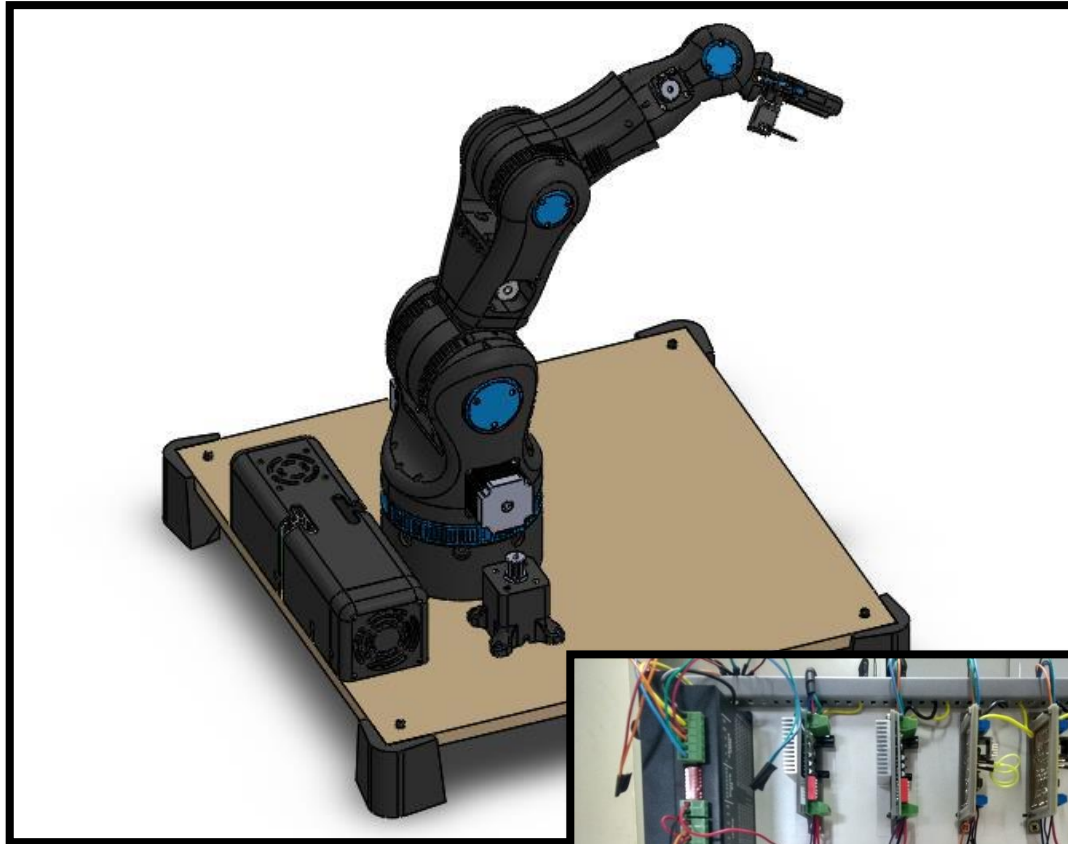
Principales Fabricantes de Robots Industriales			
Lenguaje de programación (nivel de usuario)	RAPID	KRL	TPE
Lenguaje de programación (nivel experto)	RAPID	KRL	KAREL
Programación Off-Line	RobotStudio	KUKA Sim	Roboguide
Controlador	SC4+	KRC 2	RJ3iC/R30iA
Sistema Operativo	Windows XP	Windows XP	propio (RISC)
Consola de programación	Teach pendant (Flexpendant)	Kuka Control Panel (KCP)	Teach pendant (ipendant)
Software edición en PC	ProgramMaker	Kuka office Lite	Wintpe

# Entornos de Programación y Simulación



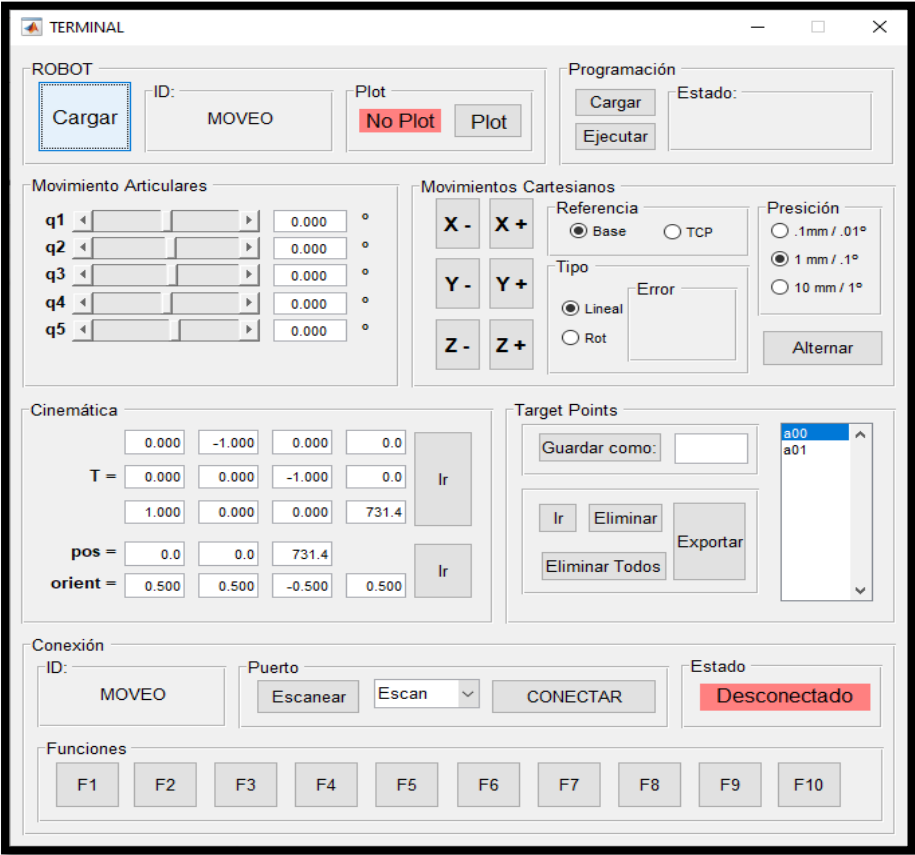
# PFE: DESARROLLO DE SISTEMA ROBÓTICO EDUCATIVO

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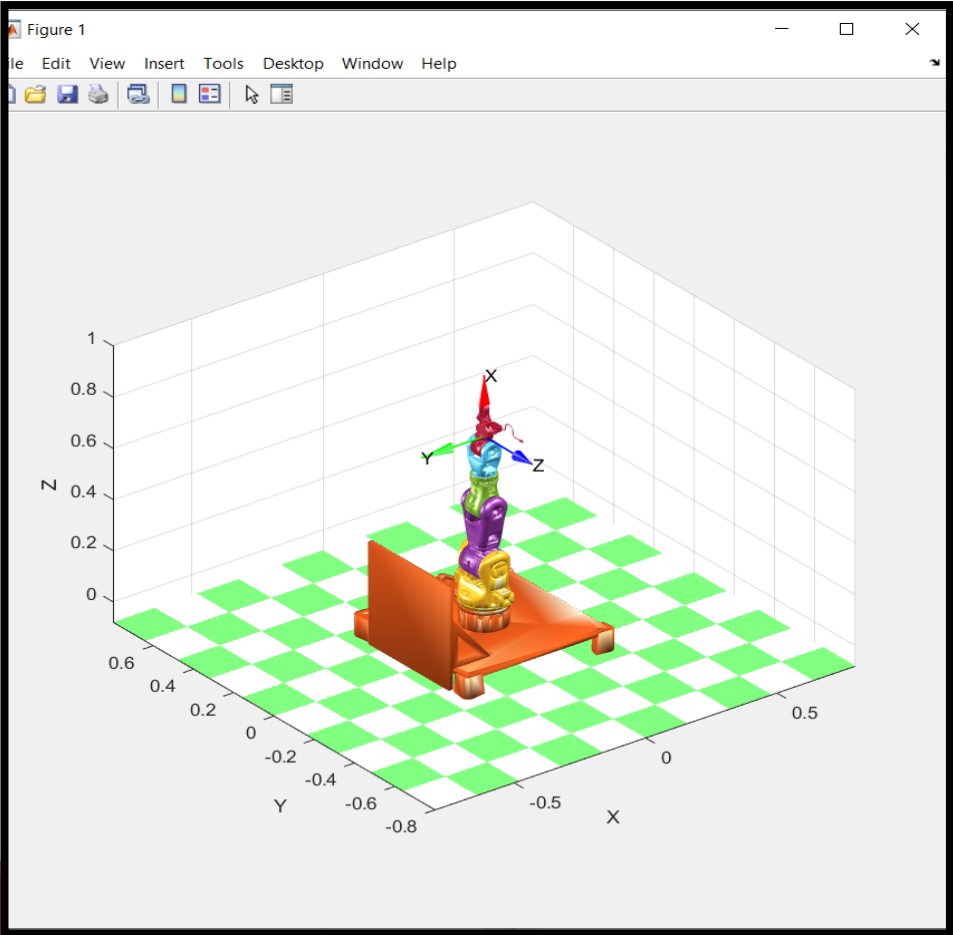


Autores: Gattás Samir  
Torres Rodrigo

# DESARROLLO DE SISTEMA ROBÓTICO EDUCATIVO



Autor: Eric Sánchez



# PFE: Laboratorio Virtual de Robótica

The image is a collage illustrating a virtual robotics laboratory. It features several key elements:

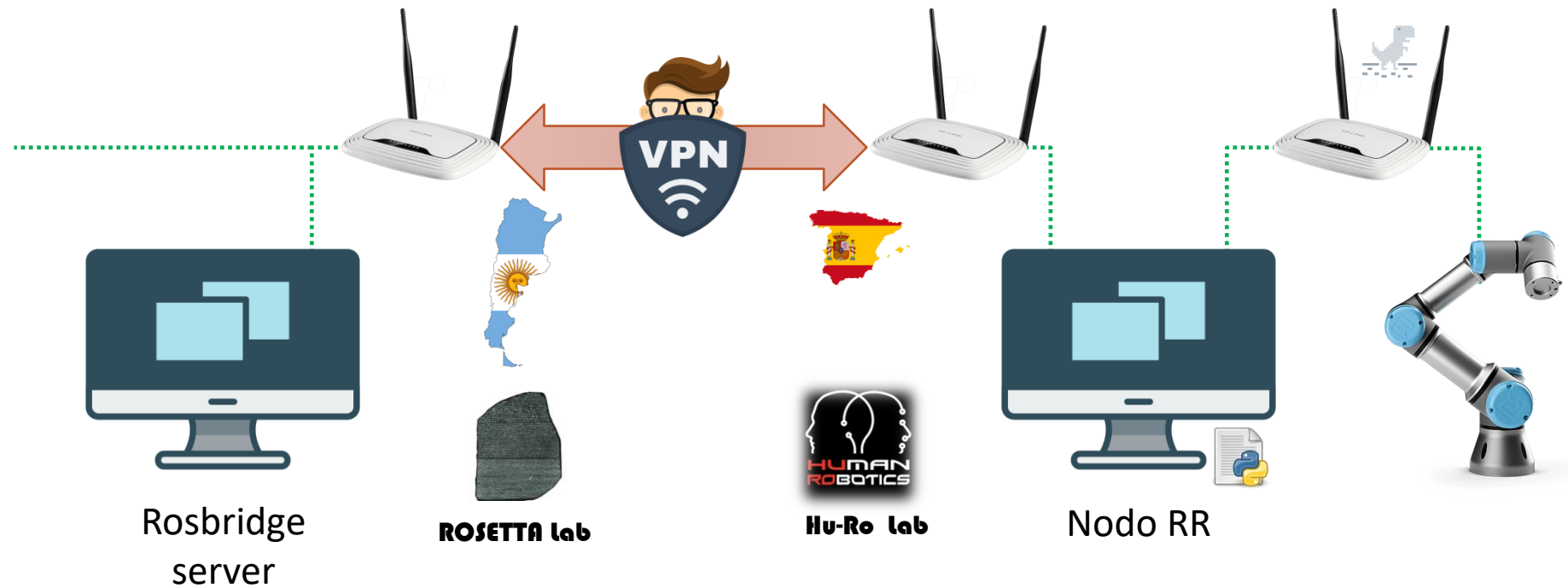
- Top Left:** A screenshot of the CoppeliaSim software interface. It shows a 3D simulation of a red and black robot arm on a white platform. A 'Control Panel' is overlaid on the left, displaying 'State: Connected as Subscriber' and 'Joint1 Position: 20.30'. Below the simulation is a terminal window with Lua code: `Posiciones articulares [0.0020 / 0.0020 | 0.0004 / 1.0000 / 0.0020 | 0.0004 / 1.0000 / 0.0020]` and `Input Lua C "help()" (use`.
- Bottom Left:** A photograph of a physical robot arm, which is black and blue, mounted on a wooden base.
- Center:** A screenshot of the 'A.R. ENGINE' interface. It shows a 3D simulation of a robot arm on a white platform. The interface includes a 'Plot' button, a 'Programación' section with 'Cargar' and 'Ejecutar' buttons, and a 'Movimiento Articular' section with sliders for joints q1 through q5. Below this is a 'Cinematica' section with a table of joint positions and orientations.
- Right:** The ROS logo, consisting of a grid of dots and the letters 'ROS' in a large, white, sans-serif font.
- Bottom Right:** A screenshot of the A.R. ENGINE interface showing a control panel with the following text: 'State: Subscriber', 'Ros Master IP', '192.168.1.106', a green 'Disconnect' button, and a purple 'Request Control' button.

Autores: Tinelli, Francisco  
Salassa, Airel

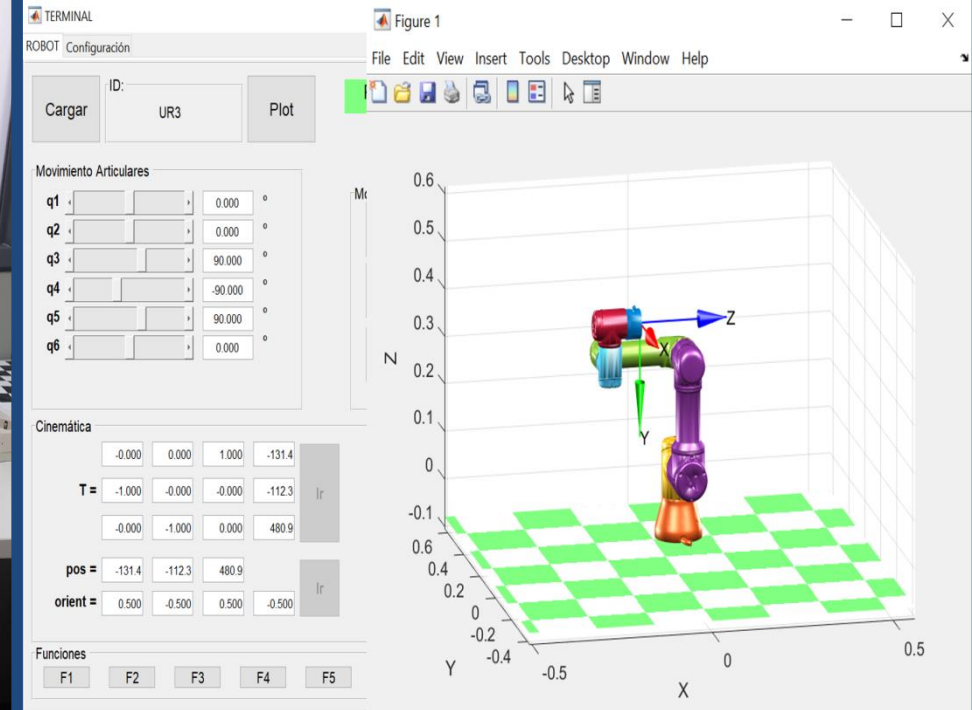
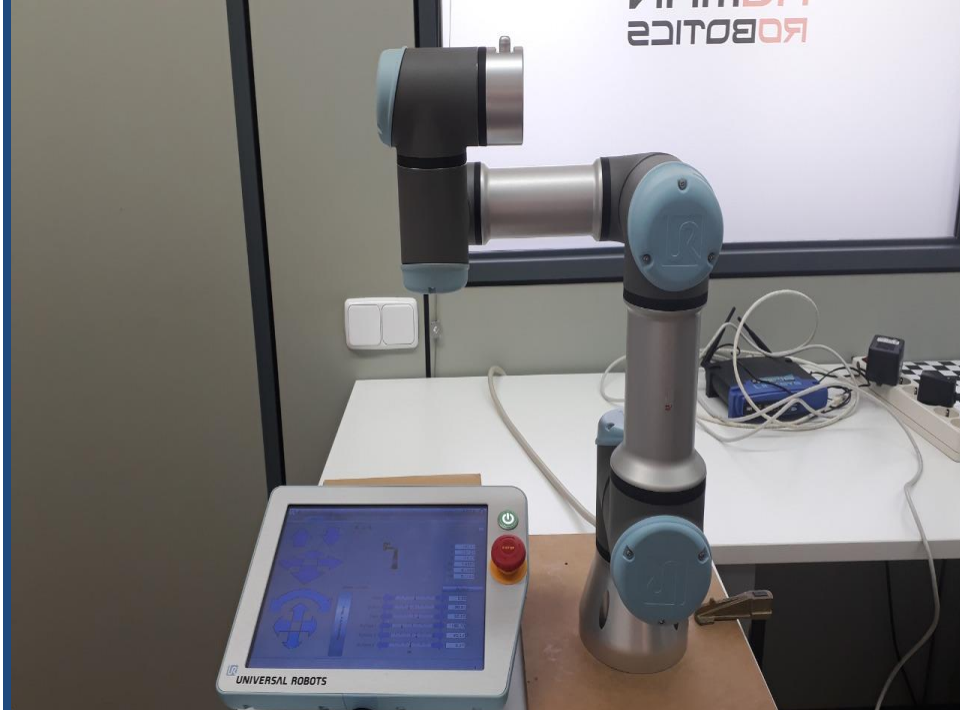
# PFE: Laboratorio Virtual de Robótica

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Esquema de conectividad remota con UR3







**A.R. ENGINE**

Universal Robots -UR3-

Joint 1 Position: 0°

Joint 2 Position: 0°

Joint 3 Position: 90°

Joint 4 Position: -90°

Joint 5 Position: 90°

Joint 6 Position: 0°

State: Subscriber

Ros Master IP: 10.66.18.143

Disconnect

Request Control

vuforia

Francisco Tinelli  
Ariel Salassa

CoppeliaSim

File Edit Simulation Tools Plugins Addons Scenes Help

Selected objects: 0

Simulation time: 00:18:46.30 (H:50.0 ms)

main: 1 (2 ms), non-threaded 1 (0 ms), running threads: 0 (0 ms)

Collision handling enabled

Calculations: 0 detections: 0 (0 ms)

Distance handling enabled

Calculations: 0 (0 ms)

Proximity sensor handling enabled

Calculations: 0 detections: 0 (0 ms)

Vision sensor handling enabled (FBO)

Calculations: 0 detections: 0 (0 ms)

if\_group handling enabled

Calculations: 0 (0 ms)

Dynamics handling enabled (Bullet 2.78)

Calculation passes: 10 (2 ms)

Control Panel

State: Connected as Publisher [OrchID: v1]

Joint1 Position: 0.00

Joint2 Position: 0.00

Joint3 Position: 90.00

Joint4 Position: -90.00

Joint5 Position: 90.00

Joint6 Position: 0.00

Disconnect

Realise Control

EDU

Connection request accepted for 10.66.18.143 (vrep). ID assigned: v1

Publisher mode forced by orchestrator

Input Lua code here, or type "help()" (use TAB for auto-completion)

Sandbox script

Muchas Gracias por su atención.

Preguntas?