



UNCUYO
UNIVERSIDAD
NACIONAL DE CUYO



**FACULTAD DE
INGENIERÍA**

ROBOTICA I



UNIDAD VI:



Simulación

Prof: Carolina Díaz

JTP: Eric Sanchez

Contenido UNIDAD 6

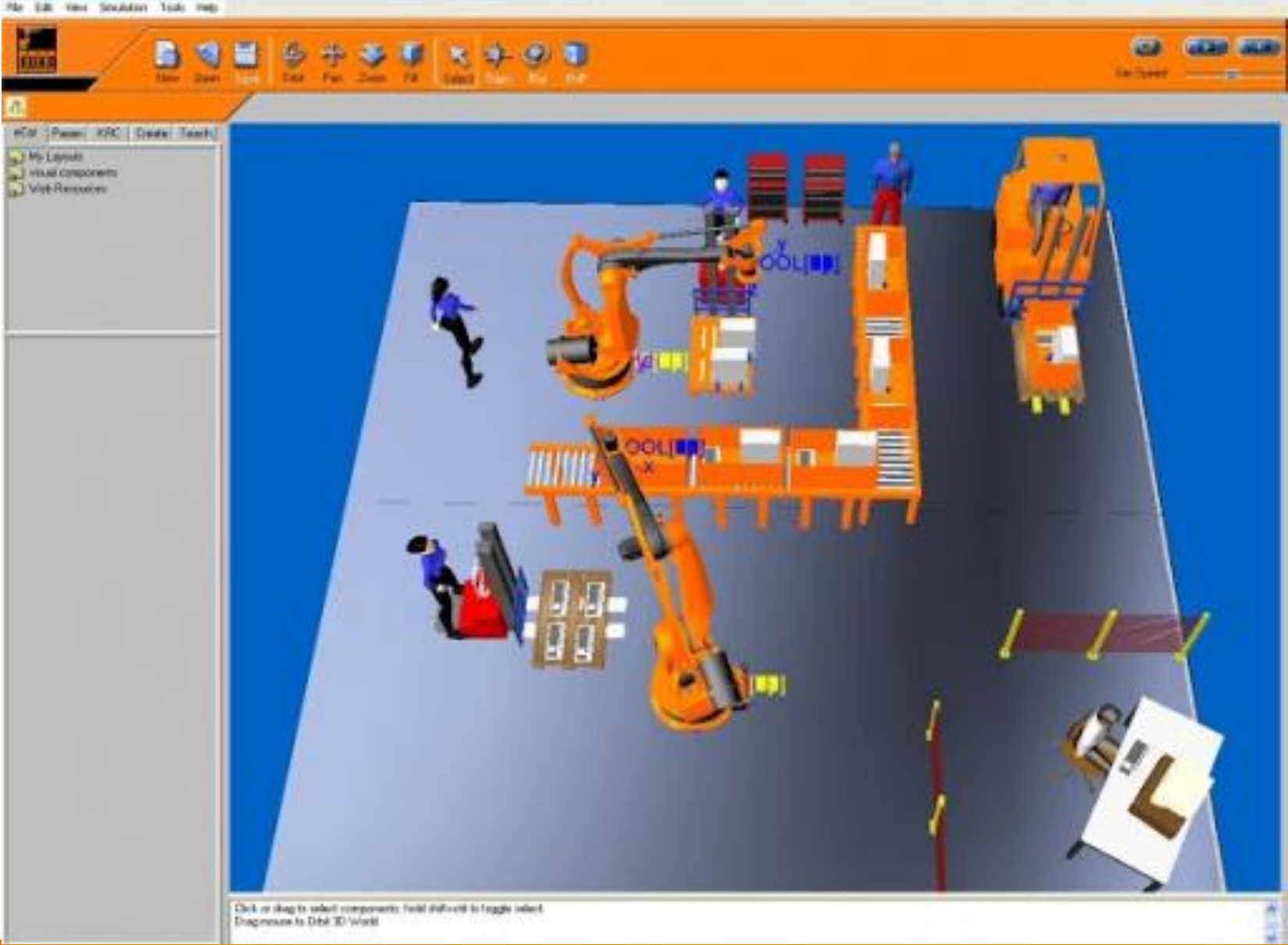
- Modelado y Simulación.
- Métodos de Programación.
- Lenguajes de Programación

Modelado y Simulación: Solidwork

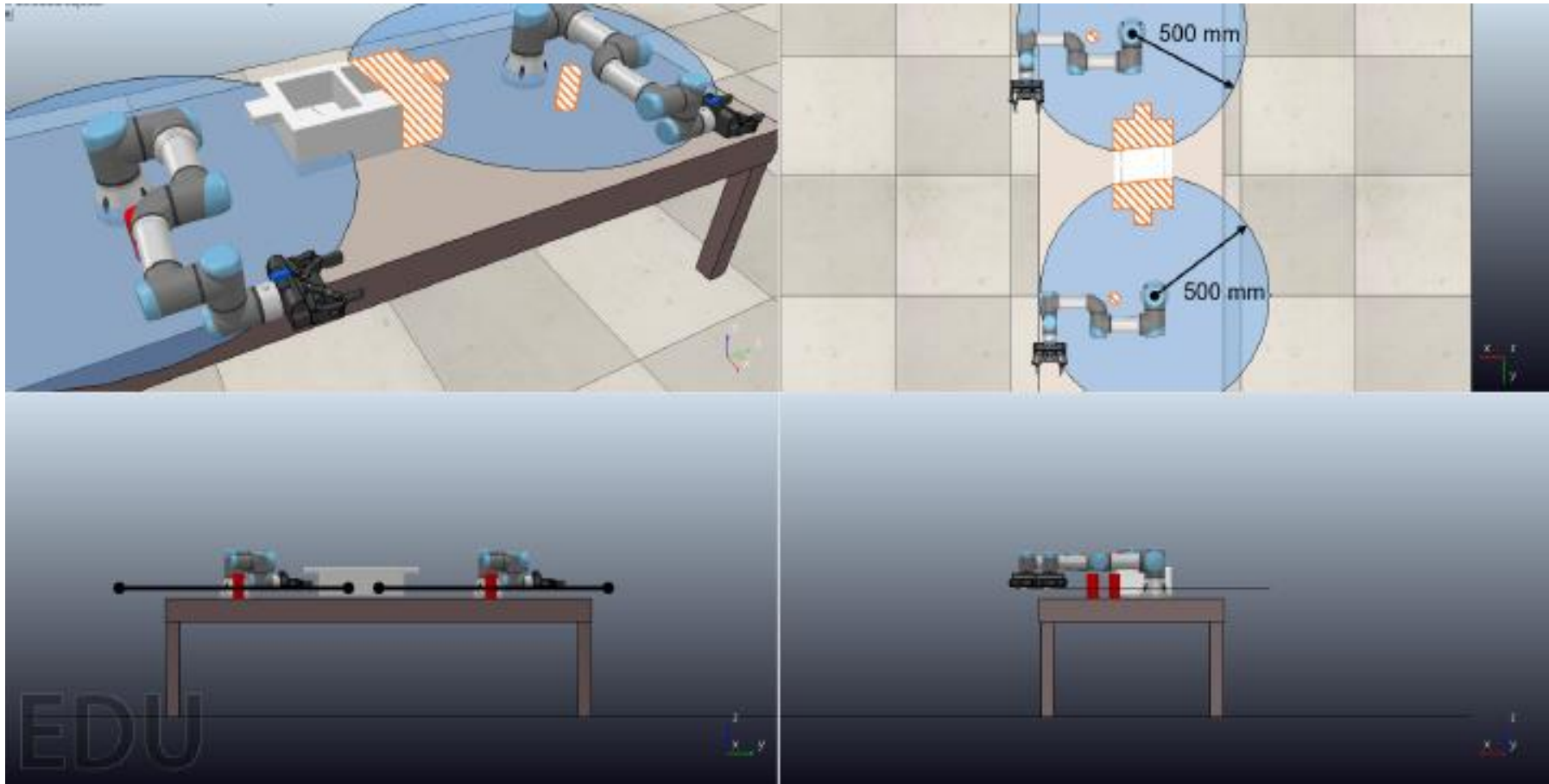
The image displays the SolidWorks software interface for a motion study. The main workspace is split into two views of a mechanical assembly, showing a blue cylindrical component and a grey base. The left view shows the assembly from a perspective, while the right view shows it from a different angle. Below the workspace is a motion study timeline with a scale from 0 to 22 seconds. The timeline shows various motion events, including three rotary motors (RotaryMotor 1, 2, and 3) and a translation (medio<1>). The timeline is currently set to 0 seconds. On the right side, the 'Apariencias, escenas y calcomanías' (Appearances, Scenes, and Stickers) panel is visible, showing a list of appearances (color), scenes, and stickers. A yellow box in this panel contains the text 'Seleccione elementos para arrastrar y colocar.' (Select elements to drag and place.). The bottom status bar indicates 'Insuficientemente definida' (Underdefined) and 'Editando Ensamblaje' (Editing Assembly).

SOLIDWORKS Archivo Edición Ver Insertar Herramientas Ventana ? Buscar archivos y modelos Ensamblaje3 *
SolidWorks Office
Ensamblaje Diseño Croquis Calcular Productos Office
Apariencias, escenas y calcomanías
Apariencias(color)
Escenas
Calcomanías
Seleccione elementos para arrastrar y colocar.
Análisis de movimiento
0 seg 2 seg 4 seg 6 seg 8 seg 10 seg 12 seg 14 seg 16 seg 18 seg 20 seg 22
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
Modelo Estudio de movimiento 1
SolidWorks Premium 2014 Insuficientemente definida Editando Ensamblaje MMGS

Modelado y Simulación: KukaSim

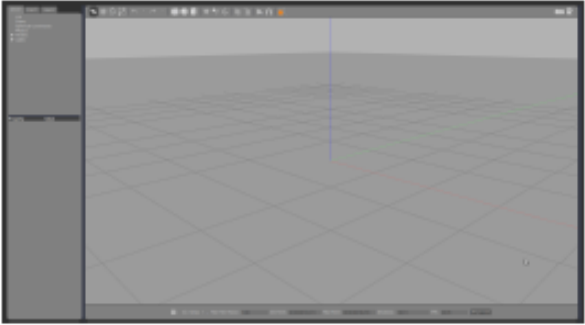
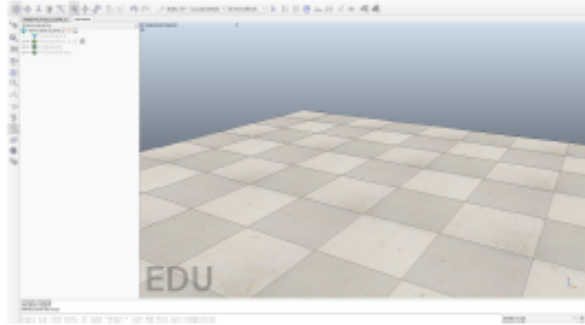


Modelado y Simulación: V-rep, copelia Sim

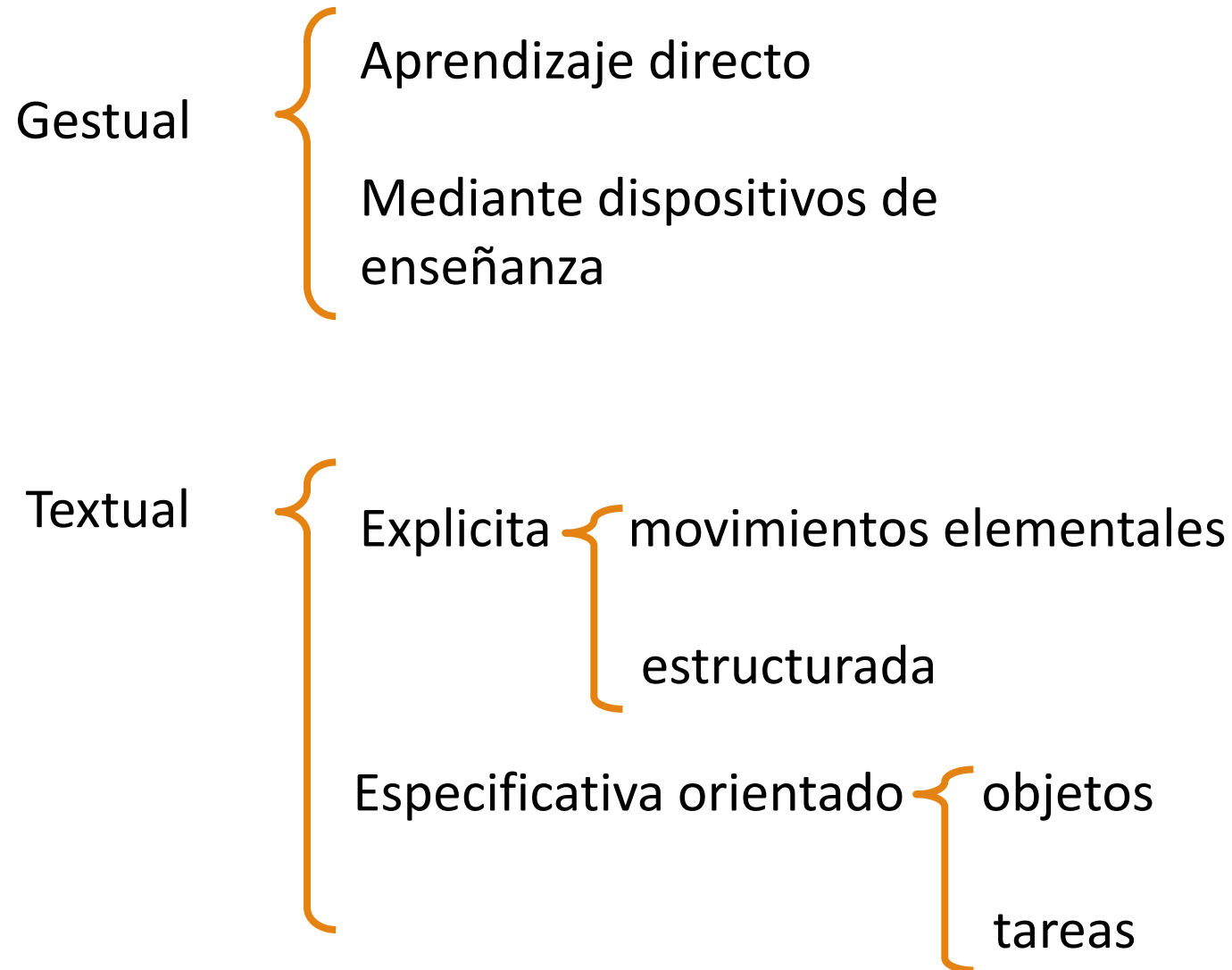


Autor Proyecto Intercambio Thibaud Hiltenbrand

Cuadro comparativo Gazebo vs V-Rep

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

Métodos de Programación









12:51:18 CCCC ?

Archivo Programa Instalación Mover E/S Registro

Mover herram.

Robot

Función

Ver

TCP

X	132.77 mm
Y	-77.43 mm
Z	97.95 mm
RX	0.2858
RY	-3.1227
RZ	-0.0870

Origen

Mover juntas

Base	102.25 °
Hombro	-104.12 °
Codo	36.95 °
Muñeca 1	-19.59 °
Muñeca 2	-89.63 °
Muñeca 3	1.83 °

Movimiento libre

Velocidad 100%

Simulación Robot real

UNIVERSAL ROBOTS

E-STOP

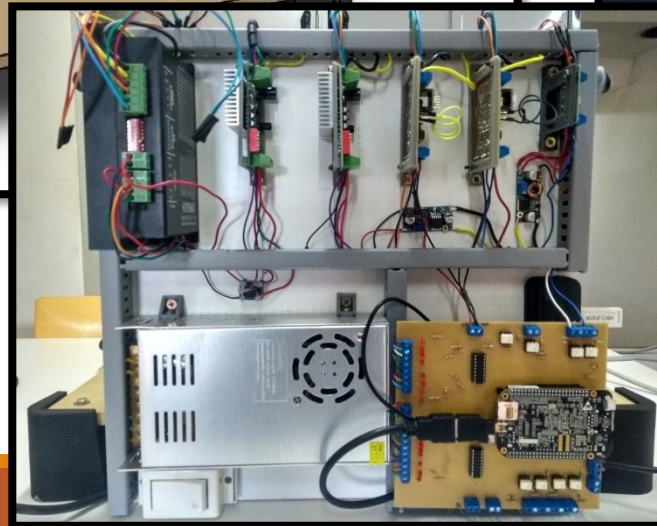
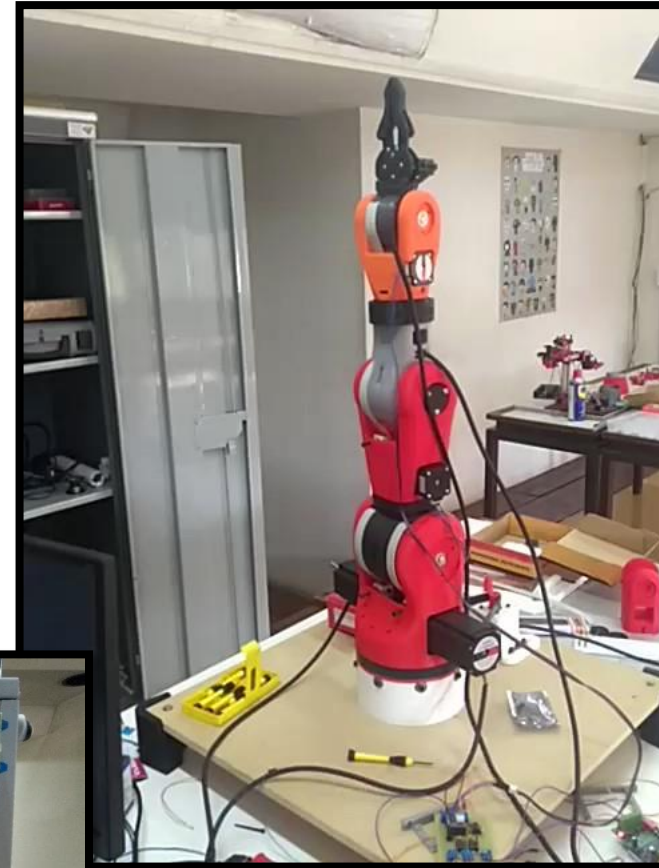
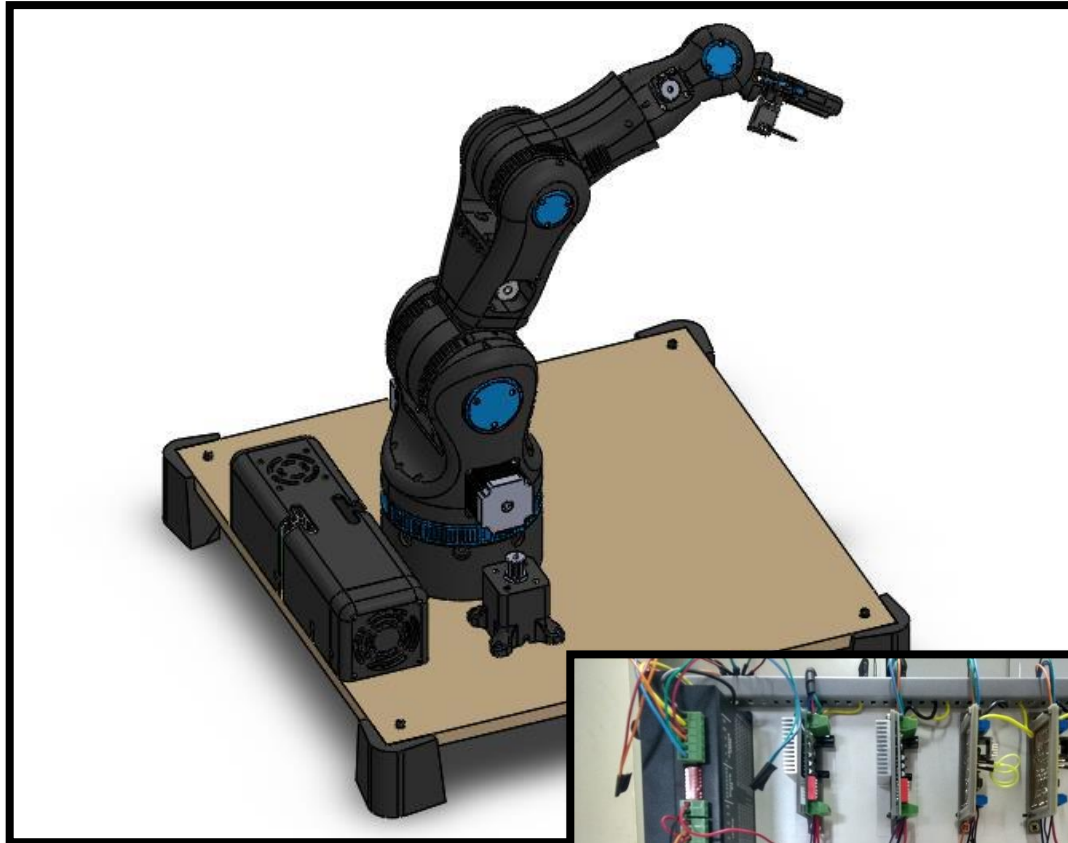


Principales Fabricantes de Robots Industriales			
Lenguaje de programación (nivel de usuario)	RAPID	KRL	TPE
Lenguaje de programación (nivel experto)	RAPID	KRL	KAREL
Programación Off-Line	RobotStudio	KUKA Sim	Roboguide
Controlador	SC4+	KRC 2	RJ3iC/R30iA
Sistema Operativo	Windows XP	Windows XP	propio (RISC)
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

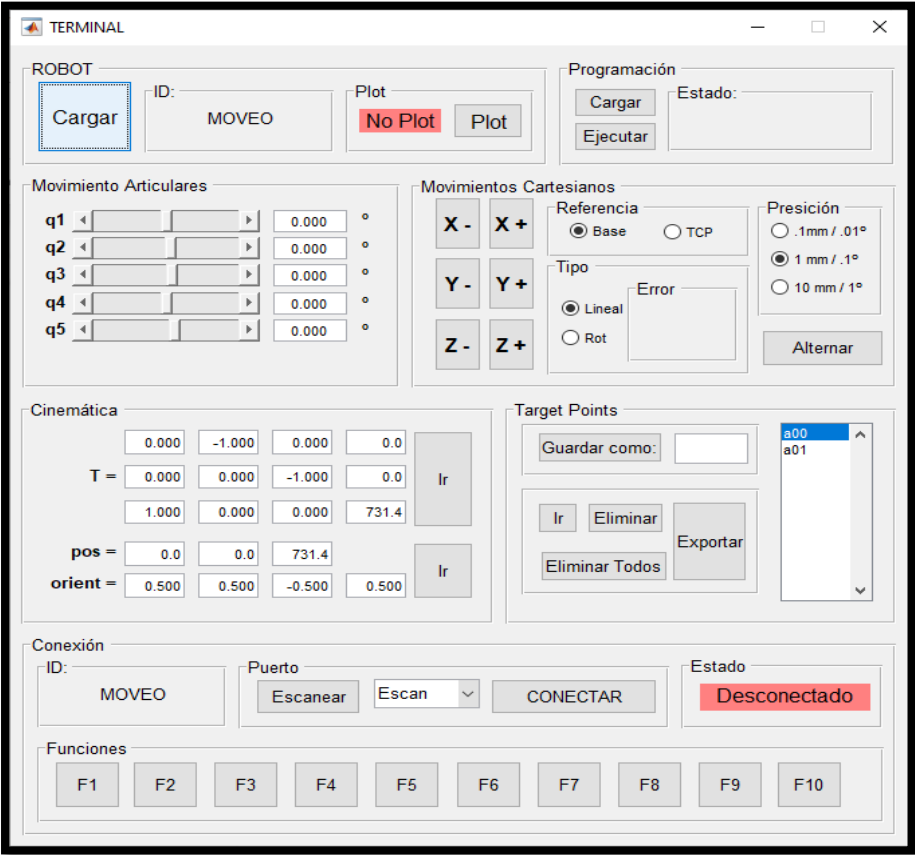


PFE: DESARROLLO DE SISTEMA ROBÓTICO EDUCATIVO

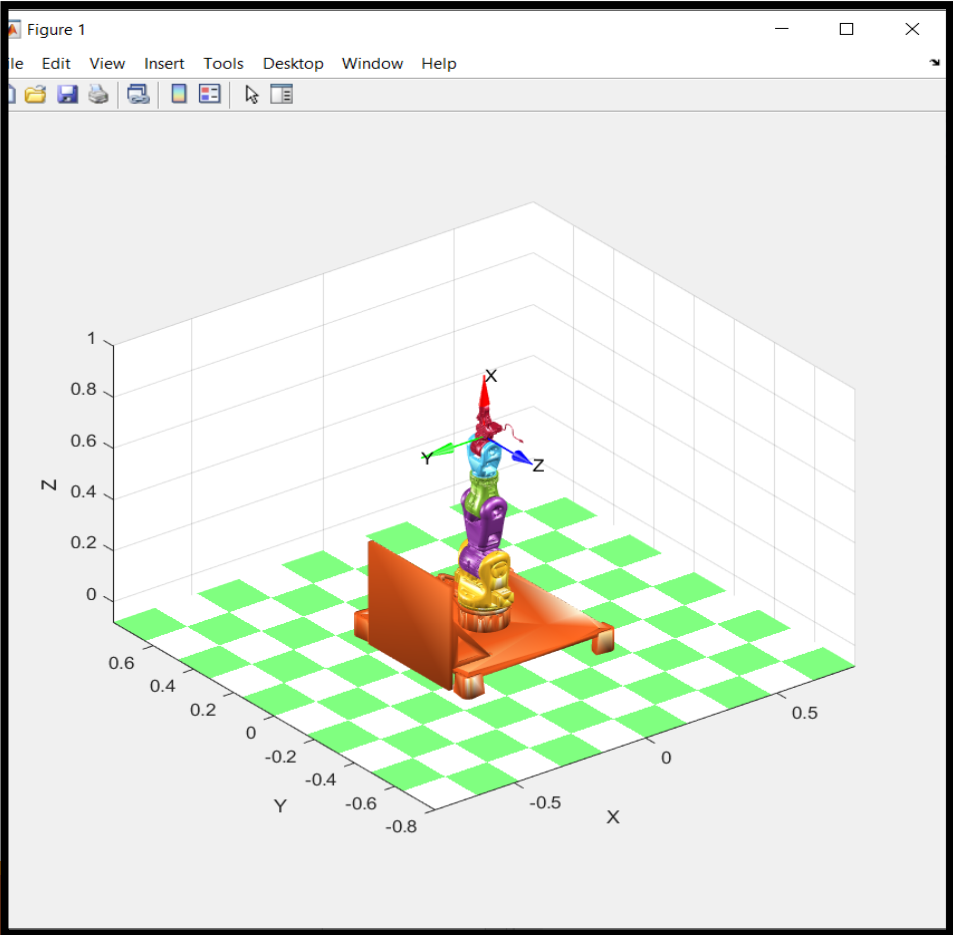


Autores: Gattás Samir
Torres Rodrigo

DESARROLLO DE SISTEMA ROBÓTICO EDUCATIVO



Autor: Eric Sánchez



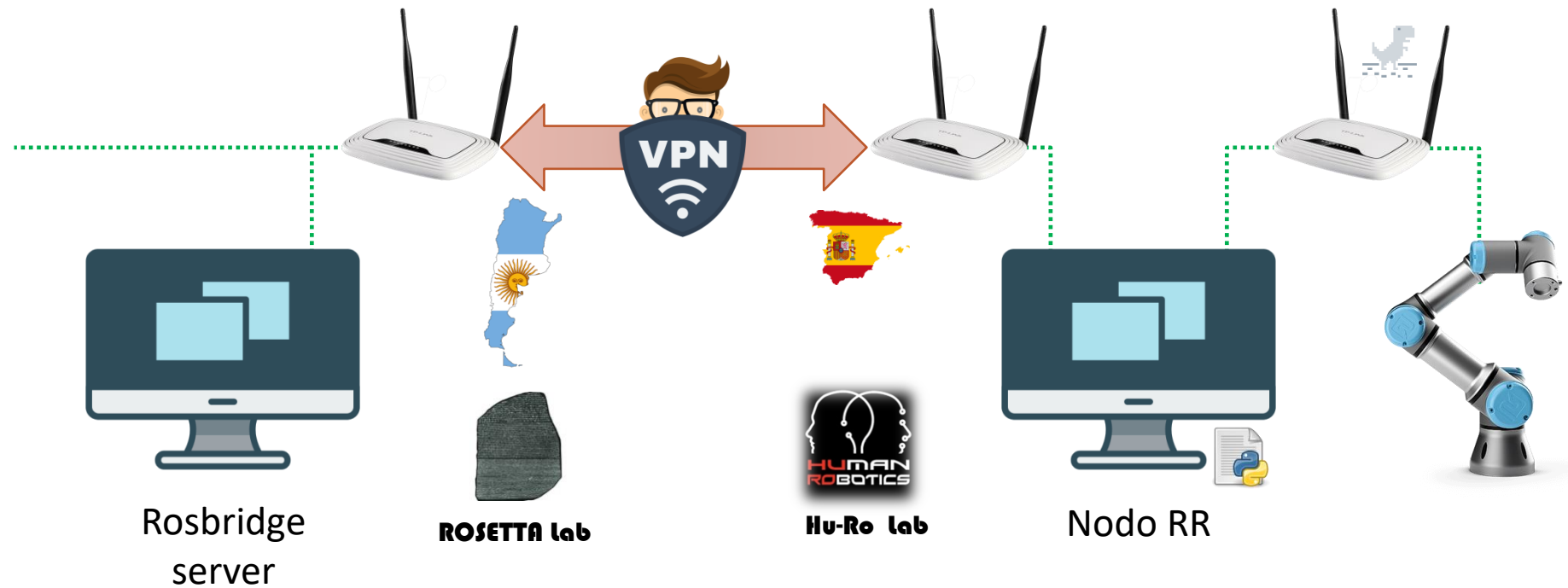
PFE: Laboratorio Virtual de Robótica

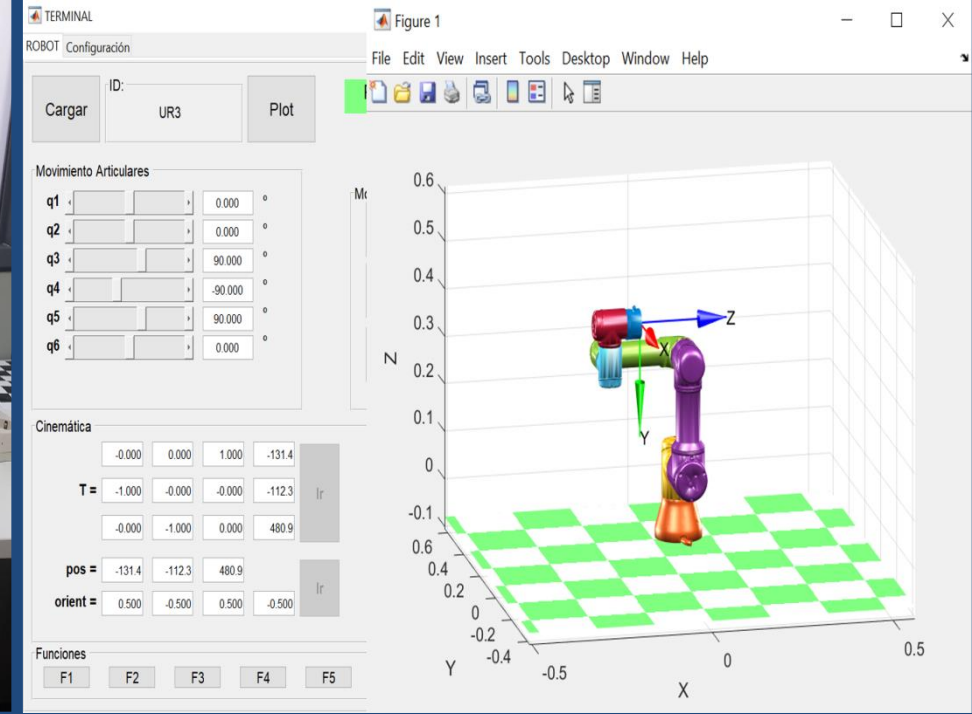
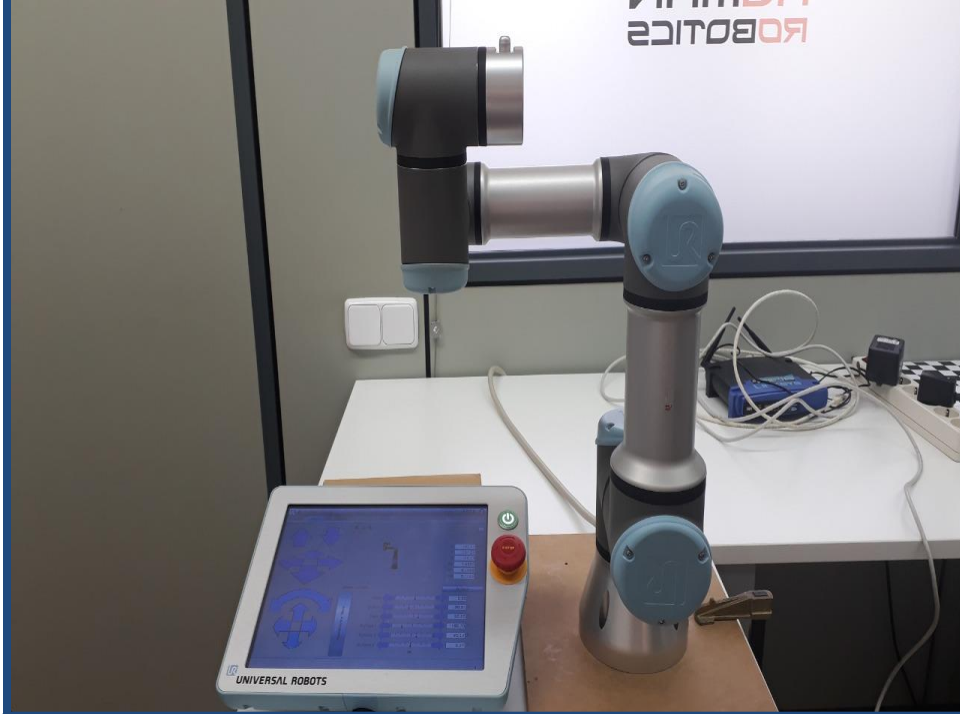
The image displays a virtual robotics laboratory setup. On the left, a physical robotic arm is shown. The central part features a screenshot of the CoppeliaSim software interface, which includes a 3D simulation of a red and orange robotic arm, a 'Control Panel' with joint position controls, and a 'TERMINAL' window. On the right, there is a screenshot of the 'A.R. ENGINE' software interface, which shows a 3D model of a robotic arm, a 'vuforia' logo, and control buttons such as 'Disconnect' and 'Request Control'. The background is dark blue with the ROS logo and the text 'ROS' in large white letters.

Autores: Tinelli, Francisco
Salassa, Airel

PFE: Laboratorio Virtual de Robótica

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 detectors: 0 (0 ms)

Distance handling enabled

Calculations: 0 (0 ms)

Proximity sensor handling enabled

Calculations: 0 detectors: 0 (0 ms)

Vision sensor handling enabled (FBO)

Calculations: 0 detectors: 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?