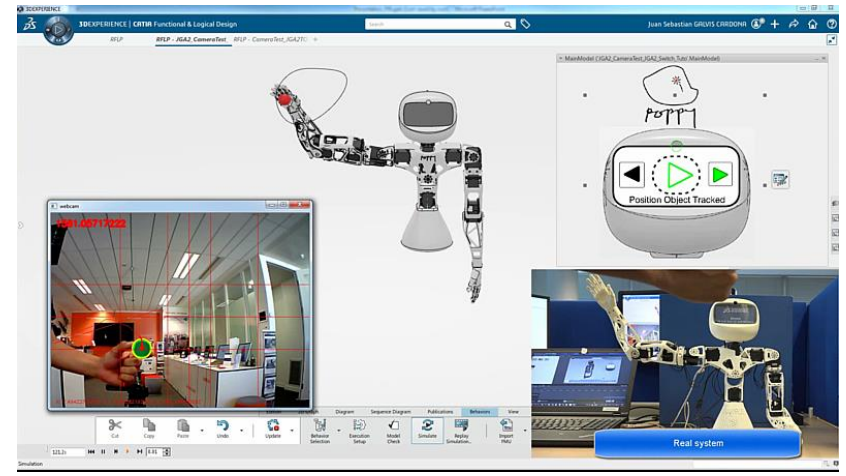




Learning Virtual Universes with Poppy Humanoid Poppy Parallel



Package Content

► In this package you will find:

1. Workshop

2. Resources

▷ 3DEXPERIENCE:

- Poppy DYMOLA Library
- Initial model (Parallel_Poppy_Logical_Root A.1)
- Final model (Final_Parallel_Poppy_Logical_Root A.1)
- Poppy Time Table

▷ FMI : Poppy Functional Mockup Unit model for the communication between the 3DEXPERIENCE and Python.

▷ PYTHON:

- Primitives applications
- Poppy Torso's Python Script
- Initial record movement

About this course

The objective of this course is to explore the Virtual Twin concept, the making and the launching of the Poppy Parallel scenario in the **3DEXPERIENCE** platform .

► Upon completion of this course, the learner will be able to :

- ▷ Make the Poppy Parallel Scenario creating a Virtual Twin controller with the Poppy Robot Library
- ▷ Set up and launch the scenario Poppy Parallel and use the primitive Poppy Gestures Tracking

► Keywords

- ▷ Systems Engineering: Virtual Twin controller, Co-Simulation,
- ▷ Mechatronics: Control Systems, Modeling, Moving detection

► Audience

- ▷ Educators and students interested in systems engineering and the virtual twin concept in the control field.

► Prerequisites

- ▷ Knowledges about Python
- ▷ CATIA Functional and Logical Design Fundamentals
- ▷ CATIA Dymola Behavior Modeling Essentials
- ▷ Making the Poppy Compliant scenario tutorial
- ▷ Learning Virtual Universes with Poppy Humanoid tutorials, available at 3DSAcademy's YouTube channel.

Environment Requirements

In order to practice, you must have access to a software installation and environment that include:

- ▶ The **3DEXPERIENCE R2017x** platform
- ▶ Roles granted :



- ▶ Access to the following applications :

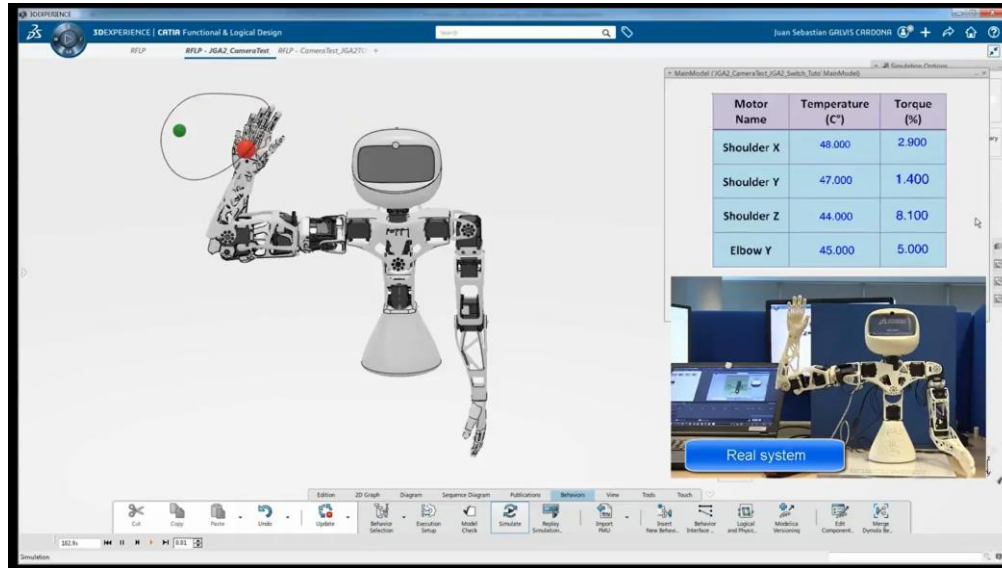


Table of Contents

1. Case of Study
2. About the Virtual Twin controller
3. Poppy Gestures Tracking
4. Tutorial

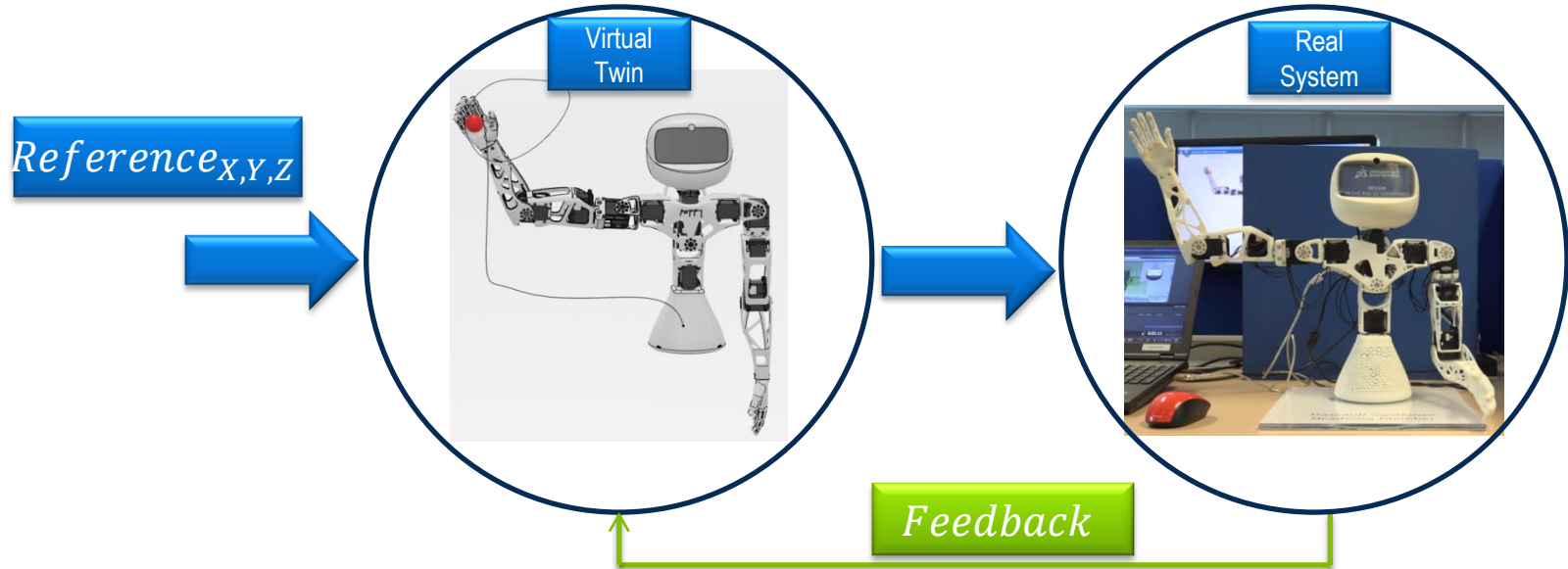
1. Case of Study : Poppy Parallel Scenario

In this workshop we will illustrate the main steps to realize the Poppy Parallel Scenario using the virtual twin concept in the robot control domain.



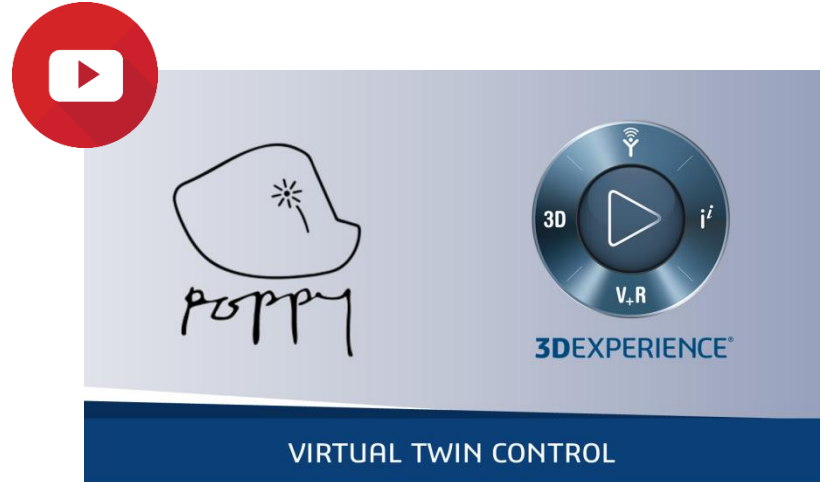
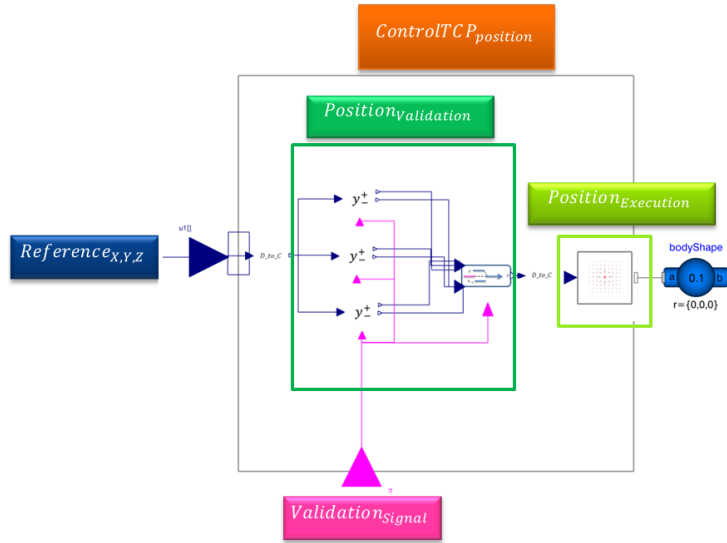
2. About the Virtual Twin controller

The control systems use the Virtual Twin to obtain the correct motor's positions needed to position the virtual point in different Cartesian coordinates (Reference). Then, the angular positions are sent to the real system to replicate the same movement. Finally, the control's feedback is made by the real system.



2. About the Virtual Twin controller

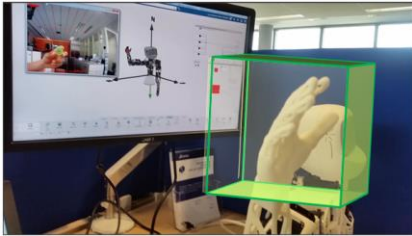
The control systems take the reference and based on the Validation Signal Section, it sends the reference to the *PositionExecution* block that allows to position the virtual point in space. The Validation Signal Section analyzes the motor's torque and according to a defined limit, it makes a decision on the viability of the movement.



3. Poppy Gestures Tracking

This application transforms the detected object's coordinates into a framework. The result of translation is used like a reference in the control systems, allowing the robot to track the object with his hand into the framework.

Concept



$$X_{WorkFrame} = (-0.0833 * X_{PositionCamera}) + 25$$

$$Y_{WorkFrame} = (-0.1111 * Y_{PositionCamera}) + 25$$

$$Z_{WorkFrame} = (-0.063 * Z_{PositionCamera}) + 50.63$$

Illustration



For more information about this application, please see : [Ressources\Python\Primitives\Library\Vision_Primitives.py](#)

4. Tutorial

In this video we will illustrate the main steps to realize the Poppy Parallel Scenario:

1. Make the Virtual Twin Controller.
2. Make and launch the Virtual Twin Scenario in the **3DEXPERIENCE** platform.
3. Use the Poppy Gestures Tracking applications

