GAZEBO

ROS

THALMICLABS™

Myo ROS Controller

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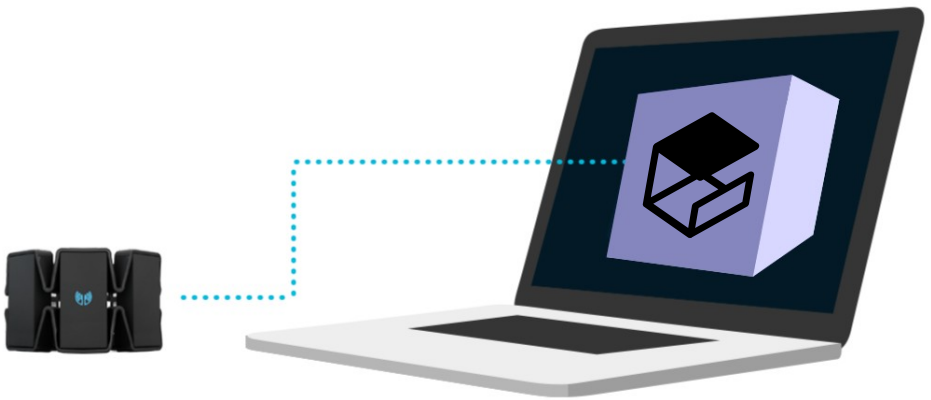
The Goal of this Project

The purpose of this project was to develop an interface with a remotely physical controller and the GazeboSim, to control the motion and interact with a simulated Robot inside the Gazebo world.

My choice for this project was the Thalmic Labs Myo Armband.



What is Myo?

Myo is a Gesture Control Armband, that contains:

- 9-Axis IMU Tracks for arm motion and rotation recognition.
- 8 EMG perimeter Sensors for hand gesture recognition.

And connects wirelessly to PC via Bluetooth dongle.

As you can see , Myo is an ideal controller for simulating and direct interference to a robotic arm or hand just by wearing it and doing poses and motions with your arm.

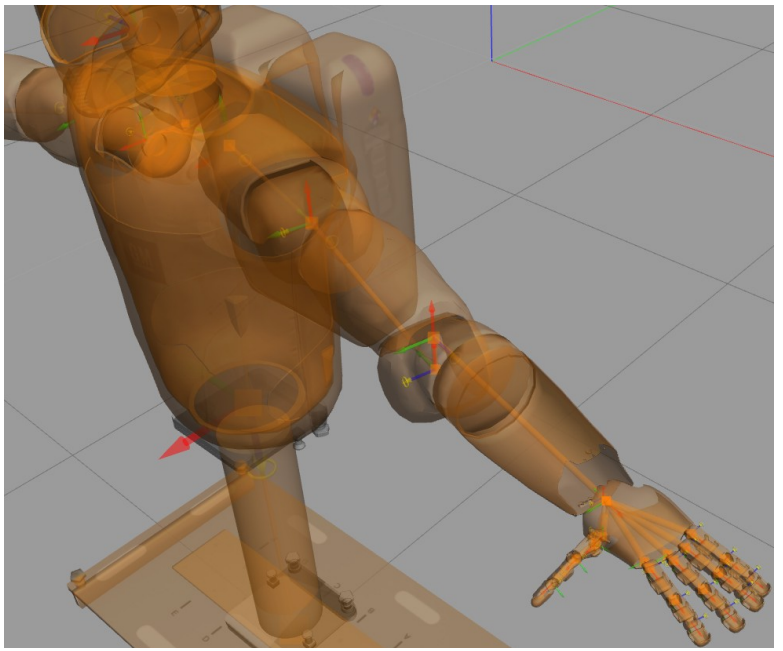
Robonaut 2 -R2-

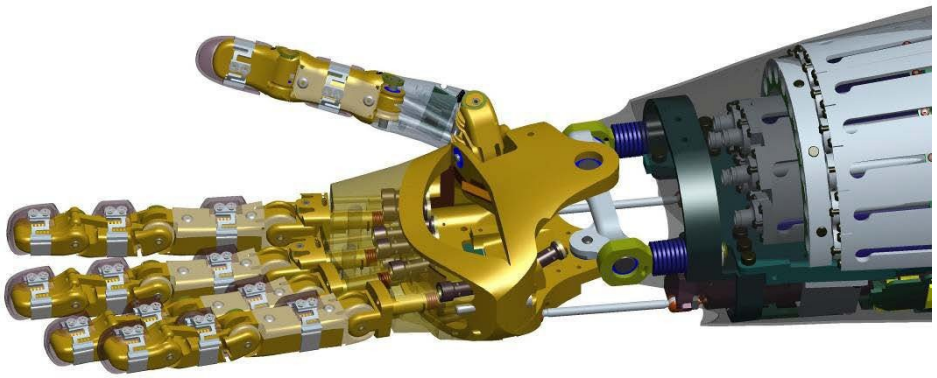
For this project I used the General Motor's Humanoid **Robonaut 2** (a.k.a **R2**), because as “humanoid” robot built, his Arms and Hands stucture resemble aesthetically and function like the Human's.

Specifically, R2 has:

- 18 Joints for Each Hand
- And 7 Joints for Each Arm

So the simulated robot's motion experience , with the Myo armband as an arm motion and hand gesture controller, must be almost similar to the human's arm motion in the real world.





Robonaut_myo

ROS Package

Structure and Implemetation

The ROS package Creation and Goals

To establish this communication from Myo armband to Bluetooth dongle to the Simulated Robot in the GazeboSim, I used the **ROS Jade** software and libraries.

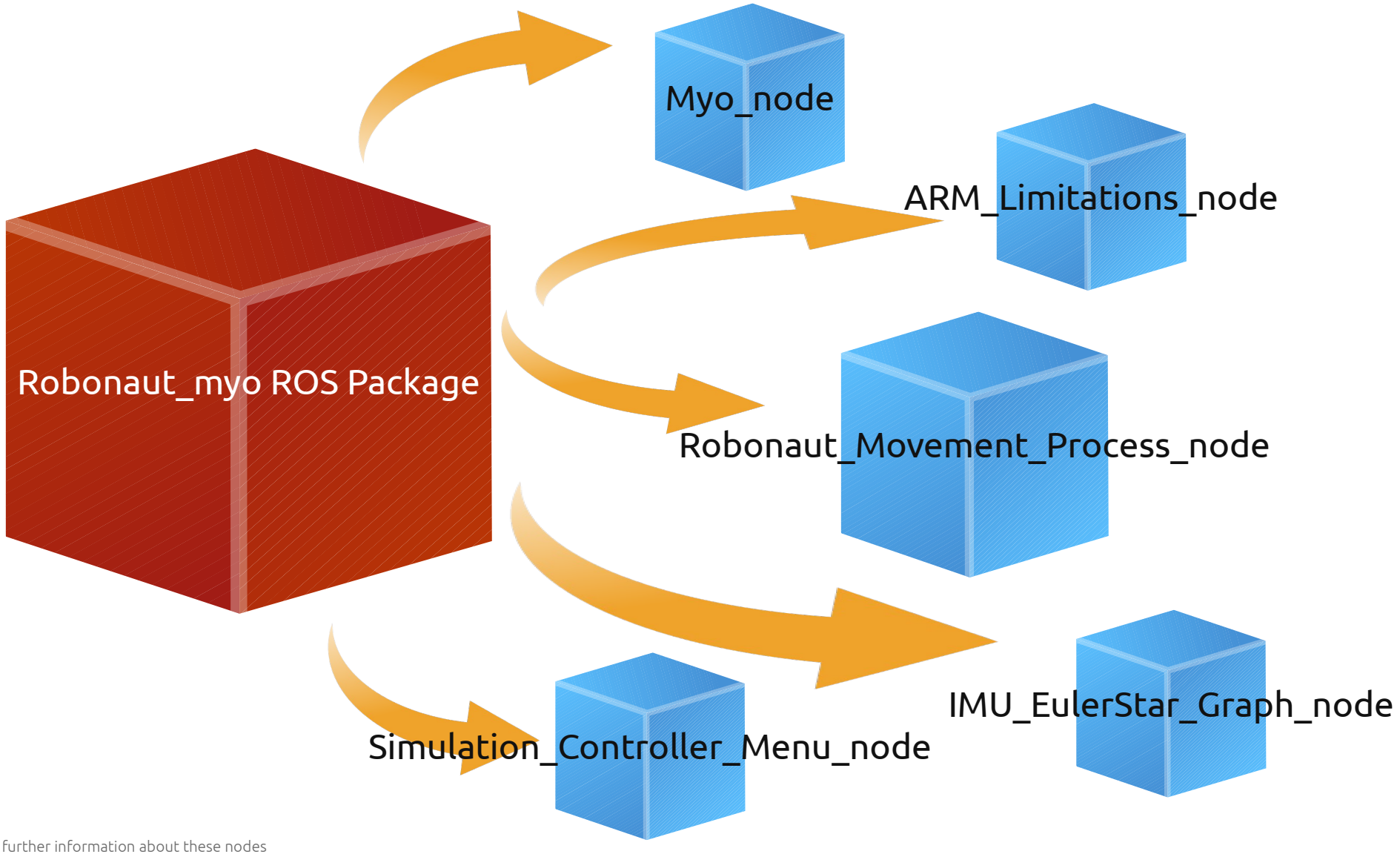
Basically, the raw information which Myo produced, was transfered by ROS Topics into several ROS Nodes to be processed and finally these processed information were published into GazeboSim world, with ROS Services, targeting specific Robot's joints and links.

More precisely, my goals were:

1) Successfully extract all the Raw data from the Myo (including EMG data, IMU data, which Arm it is worn and the Recognized Hand Gesture).
2) To Transform and Normalize the Quaternion IMU Orientation data to Euler Angles, ie Roll , Pitch and Yaw, for the Arm orientation info.
3) Create a Userfriendly Main Menu node , to let him control the Simulation Process and the ROS Topics Publications and Subscriptions (like enabling Hand Control, enabling Arm Control , disambling one off them or both, reseting the simulation,etc...)
4) Create a User Pose Limitation Setup node, because each user wearing the Myo, may have different hand limitation poses and so Myo's orientation differs.
5) Create the Main Robonaut controlling node, which collects all the precious data from topics, from the above nodes, and determine the correct efforts and joints sets that need to be sent to the Simulated Robonaut in the Gazebo World.

Robonaut_myo Nodes

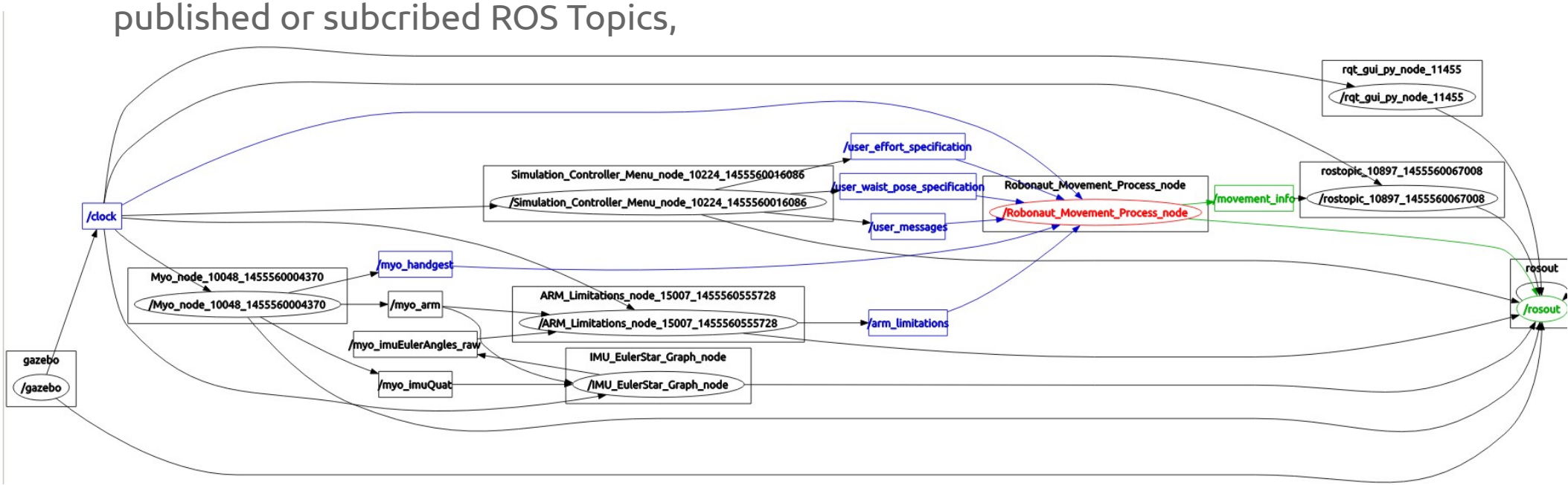
So the package's nodes, as stated before, are:



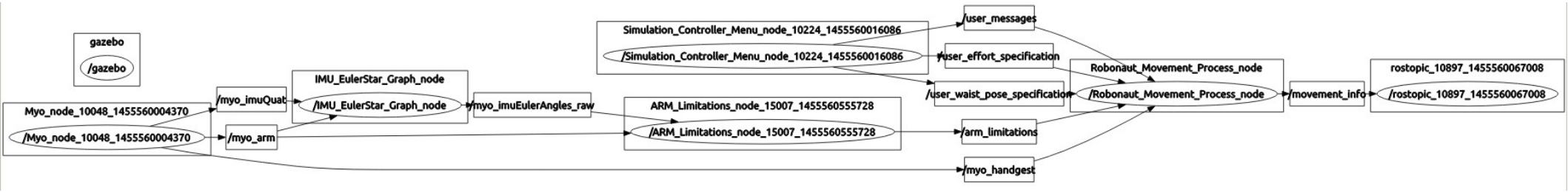
* For further information about these nodes and their fuction, please see the detailed reference.

The RQT Graph on ROSLaunch

Below you can view all the realations between the ROS Nodes with their published or subcribed ROS Topics,



And more cleary,without the rosout and rostopic Nodes,



(Robonaut_Movement_Process node communicates with Gazebo Node via ROSService Calls. This is why, you can't see any relations between them, in this graph.)

For further information, about the package details or installation, please check the detailed report that is uploaded to the site and also see the videos and the simulation screenshots.

Do not hesitate for any contact at

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