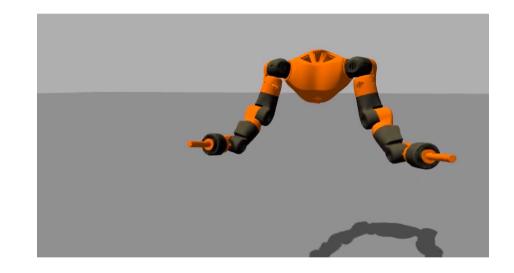
### Real-time plugin tutorial

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#### **Final goal**

## Write a simple RT plugin which

- Brings the robot to a homing configuration in low impedance mode
- Allows to enable/disable gravity compensation using the plugin built-in command port



#### **Steps**

- 1) Enable PholusWorkshop package inside superbuild
- 2) Add a subdirectory to the project
- 3) Generate the plugin **skeleton**
- 4) Build & install
- 5) Implement init\_control\_plugin
- 6) Implement on\_start
- 7) Implement control\_loop
- 8) Build & install
- 9) **Simulate** the plugin!

#### **Enable PholusWorkshop package**

- check that PHOLUS project is enabled
  - cd \$ROBOTOLOGY ROOT/build
  - type ccmake .
  - enable PH0LUS flag, press "c" to configure
- enable PholusWorkshop package
  - enable SUPERBUILD\_PholusWorkshop, press
     "c" until "g" is available, then press "g"
  - type make PholusWorkshop

# Add subdirectory and generate skeleton

- go inside PholusWorkshop main directory:
   cd \$R0B0T0L0GY\_R00T/external/PholusWorkshop
- mkdir FOLDER\_NAME
- inside CMakeLists.txt, type "add\_subdirectory(FOLDER\_NAME)"
- cd FOLDER\_NAME &&
   generate\_Xbot\_RT\_Plugin.sh PLUGIN\_NAME
- edit the plugin's .h and .cpp in some IDE

### Implement the plugin

- init\_control\_plugin: initialize/preallocate all required variables, define a homing
- on\_start: save initial robot configuration and initial time, set a low impedance value using setStiffness/setDamping
- control\_loop: compute reference joint values from q0 to q\_home & gravity compensation torques

**Advanced:** enable/disable gravity compensation via the command port

#### References

- Superbuild tutorial
   https://github.com/ADVRHumanoids/advr-superbuild/wiki
- XbotInterface documentation
   https://advrhumanoids.github.io/XBotInterface/index.html
- XbotInterface tutorial
   \$ROBOTOLOGY\_ROOT/external/XbotInterface/examples/src/ik\_example.cpp
- XCM readme with video on how to generate/run a plugin: https://github.com/ADVRHumanoids/XCM
- Already implemented plugin \$ROBOTOLOGY ROOT/external/PholusWorkshop/PholusPlugin