

# 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 PHOLUS 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 $ROBOTOLOGY_ROOT/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  $q_0$  to  $q_{\text{home}}$  & 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**

[\\$ROBOTOLGY\\_ROOT/external/XbotInterface/examples/src/ik\\_example.cpp]($ROBOTOLGY_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**

[\\$ROBOTOLGY\\_ROOT/external/PholusWorkshop/PholusPlugin]($ROBOTOLGY_ROOT/external/PholusWorkshop/PholusPlugin)