

MotionPlus for PS5

Reference Designs for URCaps

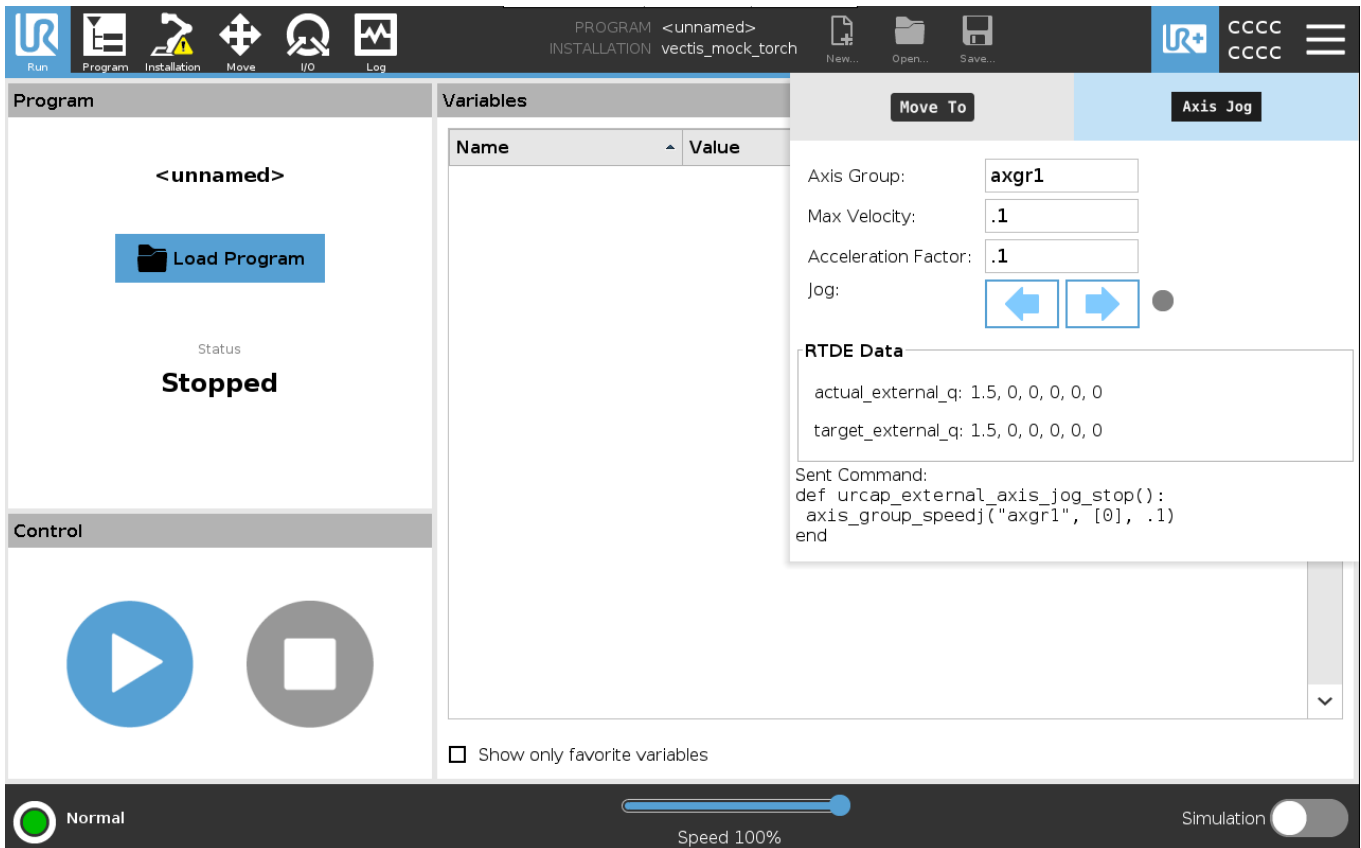
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Note

These reference designs are examples only. They are not intended for production use, but rather as an education tool to learn how to create URCaps that interface with the back-end of MotionPlus.

This bundle includes five reference designs that demonstrate the integration of MotionPlus URScript and EtherCAT calls for creating URCaps.

Axis Group Jogging: Demonstrates how to jog an axis in a group.



The screenshot displays the Universal Robots MotionPlus software interface. The top menu bar includes icons for Run, Program, Installation, Move, I/O, and Log. The main window is divided into several sections:

- Program:** Shows the current program as "<unnamed>" and a "Load Program" button.
- Status:** Indicates the robot is "Stopped".
- Control:** Features a large blue play button and a grey stop button.
- Variables:** A table with columns "Name" and "Value".
- Move To:** A panel for configuring movement parameters.
- Axis Jog:** A panel for configuring axis jogging parameters.

The **Axis Jog** panel is currently active, showing the following settings:

- Axis Group:
- Max Velocity:
- Acceleration Factor:
- Jog: Two blue arrows pointing left and right, with a grey dot in the center.

Below the jog controls, the **RTDE Data** section displays:

```
actual_external_q: 1.5, 0, 0, 0, 0, 0
target_external_q: 1.5, 0, 0, 0, 0, 0
```

The **Sent Command** section shows the following URScript code:

```
def urcap_external_axis_jog_stop():
  axis_group_speedj("axgr1", [0], .1)
end
```

At the bottom of the interface, there is a "Normal" status indicator, a "Speed 100%" slider, and a "Simulation" toggle switch.

Move To: Demonstrates how to move an axis to a given position and allows for enabling frame tracking while performing the move.

Run

Program

Installation

Move

I/O

Log

PROGRAM <unnamed>
INSTALLATION vectis_mock_torch

New...Open...Save...

UR+

CCCC
CCCC

Program

<unnamed>

Load Program

Status

Stopped

Control

Variables

Name	Value
------	-------

☐ Show only favorite variables

Move To

Axis Jog

Axis Group: axgr1

Set Axis Group Position: [1.5]

Current position: [1.5]

Move axis to new position

Speed 30%

Frame: ☐ Frame Tracking

Last Sent Command(s):
axis_group_speedj("axgr1", [0.0], 1)

Normal

Speed 100%

Simulation ☐

Calibrate Axis: Provides a GUI interface for calibrating an axis using the robot TCP.

UR

Run

Program

Installation

Move

I/O

Log

PROGRAM <unnamed>
INSTALLATION vectis_mock_torch

New...Open...Save...

UR+ CCCC CCCC

> General

> Safety

> Features

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> URCaps

EtherCAT Axis Config

Rotary Axis Calibration

MotionPlus

Rotary Axis Calibration

Calibration Steps:

Calibration involves sampling at least 4 points around the rotation axis. The four points must lie on a circle - i.e. on a plane with equal distance from the center of the axis of rotation. The points should be approximately 90 degrees apart. If looking at a clock the sample points would be at 3, 12, 9 and 6 o'clock, in that order.

1. Hold down the freedrive button on the Teach Pendant

2. Move the robot to the desired point and release the freedrive button

3. Press the Sample button below

4. Repeat this process until at least 4 points have been sampled.

5. Press the Calibrate Axis button.

p[-0.77147, 0.57276, 0.21770, -0.59583, 2.89795, -0.32862]

p[-0.75088, 0.40710, 0.03590, -1.48121, 0.35570, 0.32984]

p[-0.73739, 0.54704, -0.08189, -1.22777, -0.90076, 0.42716]

p[-0.72986, 0.69677, 0.02063, -0.88004, -1.69878, 0.18259]

Sample Pose

4/4

Clear

Calibrate Axis

Copy pose to clipboard

URScript Command:

calibrate_rotary_axis([
p[-0.7714, 0.5727, 0.2177, -0.5958, 2.8979, -0.3286],
p[-0.7508, 0.4071, 0.0359, -1.4812, 0.3557, 0.3298],
p[-0.7373, 0.5470, -0.0818, -1.2277, -0.9007, 0.4271],
p[-0.7298, 0.6967, 0.0206, -0.8800, -1.6987, 0.1825]])

Calibration Result:

pose=p[-0.7501,0.5547,0.0688,1.9932,0.0445,2.2560],
radius=0.1513,
max_error=0.0059,
mean_error=0.0047

Normal

Speed 100%

Simulation

Coordinated Motion Programming: Showcases coordinated motion using *MoveP* and *MoveC* program nodes.

The screenshot shows the UR+ software interface with the 'Coordinated Move' configuration screen. The left sidebar displays a tree view with 'Basic', 'Advanced', 'Templates', and 'URCaps' categories. Under 'URCaps', 'Coordinated Move' is selected. The main panel is divided into 'Command', 'Graphics', and 'Variables' tabs, with 'Command' active. The 'Coordinated Move' configuration includes:

- Axis Group:** A dropdown menu set to 'axgr1'.
- Frame/Axis Tracking:** A dropdown menu set to 'axis1'.
- Motion Parameters:** Input fields for Speed (m/s) at 0.25, Acceleration (m/s/s) at 1.2, and Blend Radius (m) at 0.0.
- Add Waypoint:** Two buttons labeled 'Add' for 'MoveP with Axis' and 'MoveC with Axis'.

The bottom status bar shows 'Normal' mode, a speed slider at 100%, and a 'Simulation' toggle switch.

The screenshot shows the UR+ software interface with the 'MoveP with Axis Group' configuration screen. The left sidebar shows the tree view with 'Coordinated Move' selected. The main panel is divided into 'Command', 'Graphics', and 'Variables' tabs, with 'Command' active. The 'MoveP with Axis Group' configuration includes:

- Axis Waypoint:** A 'Target' input field set to '[1.5]' and a 'Set to Current Position' button.
- Robot Waypoint (in tracked frame):** A 'Target' input field set to '[21,-0.564807,-0.257176]' and a 'Set to Current Position' button.
- Motion Parameters:** Input fields for Speed (m/s) at 0.25, Acceleration (m/s/s) at 1.2, and Blend Radius (m) at 0.0.

The bottom status bar shows 'Normal' mode, a speed slider at 100%, and a 'Simulation' toggle switch.

EtherCAT Axis Configuration: Illustrates the configuration parameters needed to configure an axis using EtherCAT.

UR

Run

Program

Installation

Move

I/O

Log

PROGRAM <unnamed>
INSTALLATION vectis_mock_torch

New...Open...Save...

UR+CCCC
CCCC

≡

> General

> Safety

> Features

> Fieldbus

> URCaps

EtherCAT Axis Config

Rotary Axis Calibration

MotionPlus

EtherCAT Axis Config

Axis Group: axgr1Axis Group Pose: p[0,0,0,0,0,0]

Axis: axis1Axis Pose: 65,1.2561,1.0422]

Axis Type: ☒ Revolute☐ Prismatic

Max Velocity: 1.57Max Acceleration: 30

Counts per Rev: 4194304Gear Ratio: 120.4

Feed Constant: -6.28318531Zero Offset: 0

Position Limits: ☐

Min: 0Max: 1

Apply

☒ Normal

Speed 100%

▶⏮⏹

Simulation ☐