Contents

Welcome ............................................................................................................................................................................ 4

Navigating the application ............................................................................................................................................... 15
- Application layout.......................................................................................................................................................... 15
- Upper left menu............................................................................................................................................................ 15
- Sidebar menu............................................................................................................................................................... 17
  - Dashboard................................................................................................................................................................. 17
  - Profile......................................................................................................................................................................... 19
  - Trajectory............................................................................................................................................................... 20
  - Health center.......................................................................................................................................................... 21

Configuring the application ............................................................................................................................................. 24
- Online and offline configuration.................................................................................................................................... 24
- Change robot connectivity......................................................................................................................................... 25
- Changing language setting......................................................................................................................................... 26
- Professional and user access.................................................................................................................................... 27
  - Switching from User to Professional access level............................................................................................. 28
- Unlocking User functionality....................................................................................................................................... 29
- Unlocking the profile remotely.................................................................................................................................. 31

Configuring the robot ..................................................................................................................................................... 32
- Configuration state....................................................................................................................................................... 32
- Discarding configuration changes............................................................................................................................ 33
- Sending configuration changes to the robot controller.......................................................................................... 34
- Import profile from computer................................................................................................................................... 34
- Export profile to computer....................................................................................................................................... 35
- Import a profile from Jacosoft................................................................................................................................... 36
- Restore factory settings............................................................................................................................................ 38
- Updating the robotic arm firmware.......................................................................................................................... 39
- User information......................................................................................................................................................... 42
- General Configuration............................................................................................................................................... 43
- Retract position......................................................................................................................................................... 44
  - Retract position (Basic)......................................................................................................................................... 44
  - Retract position (advanced).................................................................................................................................. 45
  - Unlocking the arm............................................................................................................................................... 46
  - Angular mode......................................................................................................................................................... 47
  - Changing from Cartesian to Angular control...................................................................................................... 47
- Setting advanced retract position.............................................................................................................................. 48
  - (Optional) Adding a secondary retract position.................................................................................................. 51
- Protection zone......................................................................................................................................................... 53
Setting no go zone......................................................................................................................................................54
Setting slow zone..........................................................................................................................................................56
Deleting the protection zone..................................................................................................................................56
Control mapping......................................................................................................................................................................... 58
Defining a new control mode................................................................................................................................59
Configuring trajectories..........................................................................................................................................................65
Defining a new trajectory........................................................................................................................................65
Save trajectory.................................................................................................................................................................67
Load trajectory from computer............................................................................................................................67
Running a trajectory.....................................................................................................................................................67
Creating a health report........................................................................................................................................................68
Export all health parameters - User mode...........................................................................................................68
Export all health parameters - Professional mode.................................................................................................69
Export selection of health parameters........................................................................................................... 69
Record health center data......................................................................................................................................70
Welcome

This page gives an overview of the purpose and functionalities of the KINOVA® Assistive robot Configurator tool.

The KINOVA® Assistive robot Configurator tool is a GUI tool used to configure the KINOVA JACO® Assistive robot (as well as earlier Kinova robot models) so that it is customized to the preferences and needs of the user.

The tool is installed and runs on a desktop or laptop computer. The computer connects to the arm controller via a USB connection. The tool is used to:

- update robotic arm firmware
- set up and activate configuration changes
- import existing configurations and export the current configuration file
- restore factory settings
- set, save, and load trajectories
- create new trajectories for retract position
- define new control mappings
- create reports on robotic arm health parameters

The tool is intended for two groups of users:

- Client - the end user of the assistive robotic arm
- Professional - professionals who help the end user in configuring and maintaining the arm
Getting started

This section gives an overview of how to get started with the tool. This includes installing the software, connecting the robot to the computer, and launching the application.

The following section describes the basic setup and overview for the Assistive robot Configurator tool.

The topics that will be discussed in this section are:

- Installing the software
- Connecting the robotic arm to the computer
- Launching the tool
- Tool layout

Installing the application

This page describes the procedure to install the application on the computer you will be using to configure the arm.

About this task

Instructions for Windows installation. The tool is currently only available for Windows computers.

Procedure

1. Locate the installation file for the application, AssistiveConfigurator-setup.exe. This will be provided in the USB key that comes with the robotic arm. If the software is already installed, you will be prompted to uninstall first. Follow the prompts to start the uninstall, and then click finish when the uninstall is completed. The installation of the application will proceed. **Note:** This uninstall process is only for previous installations of the Assistive robotic arm configurator tool. If you have Jacosoft installed, the program and any files associated with it (e.g. Jacosoft configurations) will not be removed.

2. For the installation, you will be prompted first to choose a folder location. If you want to proceed with the default destination folder, click install. Otherwise, click browse, choose a destination folder for the installation, and then click install.
3. You will be prompted to install the Kinova Usb Drivers. These are required for the application to communicate with the arm over the USB connection. Click Yes to proceed.

4. You will be prompted next to choose an install location for the USB drivers. Click install to proceed with the default destination folder. Otherwise, browse to choose a folder, and then click install to proceed. You may get a Windows Security prompt confirming that you want to install. Click install to continue.
5. When the USB driver installation is complete, click close to continue. The rest of the installation will proceed.

6. When the installation is complete, you'll be prompted to create a desktop shortcut. Click yes or no as you prefer, then click close to complete the installation.

**Results**

The application will be installed on the computer.

---

**Connecting the robot to the computer**

This page describes how to connect the robot to the computer. A wired (USB) connection between the computer and the robot is needed to perform configuration.

**Before you begin**

The robot base controller should be plugged into a power source.

You will need a USB-A to USB Mini-B cable.

**About this task**

**Procedure**

1. Connect the USB-A end of the cable into the USB-A port on the robot base controller.
2. Connect the USB Mini-B end to the controller.

**Results**

The robot is now connected to the computer over USB.

**Launching the application**

This page describes how to launch the application.
Before you begin

The application must already be installed on the computer. The robot should be connected to the computer with the arm controller connected to a power supply and switched on.

Procedure

1. Locate either the desktop shortcut or the start menu listing for the Assistive robot Configurator.

2. Click to launch the application. The application window will appear on screen, with the robot arm initially not detected.

3. Wait for the application to establish a connection with the robot. When a connection has been established, the robotic arm icon should appear in green rather than greyed out. Also, the dashboard should show data about the robot, and the sidebar menu on the left will no longer be greyed out.
Results

You now have the application launched with the arm detected. You're now ready to use the application to configure the robotic arm.

**Note:** If the robot is not detected after about 30 seconds, reboot the robot and try again. If the robot is still not detected, close the application, restart it, and try again.

**Note:** If you are still not able to get the application to connect to the arm, and you have a previous installation of Jacosoft on the computer, then you may have a problem with your computer trying to use the old Jacosoft USB drivers instead of the newly installed USB drivers. If you have an earlier Jacosoft installation on the computer, and you’re having trouble connecting to the arm, carry out the Manual USB Driver Update procedure.

Manual USB Driver Update

This page describes how to manually update the USB driver

**About this task**

If you have Jacosoft installed on your computer, you may experience difficulties connecting to the arm because Windows is trying to use the older USB driver. This procedure takes you through the steps to fix the problem by manually updating the driver.

**Procedure**

1. Open the Windows Control Panel and open the Device Manager.

   ![Device Manager](image)

   2. Find the old JACO driver. It should be under "Custom USB Devices." Right click on the driver and select Update Driver Software.
3. You will be asked how you want to search for driver software. Select “Browse my computer for driver software.”

4. Next, select “Let me pick from a list of device drivers on my computer.” There is no need to enter a path. Just click on the button below.
5. Select the Jaco Arm Robot (libusb) driver, and then click Next to proceed.

Results

You should get confirmation that Windows has successfully updated the driver software.
What to do next

Try launching the application again to see if the application will now connect to the robot.

Terminology

This page is a reference for technical terms used in the guide.

List of technical terms and definitions

**Cartesian mode**

Cartesian mode is the default user control mode for the robot. The user uses controls to direct the hand of the robot. The robot software determines the combination of rotation of robot joints to produce that effect.

**Angular mode**

Angular mode is an alternate control mode. In angular mode, the rotation of the robot joints is controlled directly, joint by joint.

**Retract position**

A retract position is the position the arm can be set to when it is not in use. The robot is in standby mode and is positioned in a compact, out-of-the-way fashion. There are two forms of retract: basic and advanced. Generally, the robot can be put into retract position by holding down a defined control.

**Basic retract**

Basic retract is a simple retract position where the robot is folded back on itself at the third joint with the second joint at a set angle from the horizontal. (Imagine curling a bicep so that the hand touches the shoulder and then tilting the upper arm backwards) This provides a range of simple, pre-set retract setting options.

**Advanced retract**

An advanced retract is a more complicated retract position set manually by an installer with guidance from the user. This allows more precise configuration of a retract position, considering the specifics of the wheelchair setup. The advanced
retract defines a trajectory from the home position to the fully retracted position. This can only be set with professional access level.

Control mapping
A control mapping is a definition of the effect (robot movement type or other effect) of each control on the powered wheelchair interface. Because the number of movements is usually more than the number of mappings defined.

Control mode
A control mode consists of one control mapping for the robot. This will include some controls reserved to change control modes.

Online mode
Online mode is a configuration mode where configuration changes are saved directly to the robot.

Offline mode
Offline mode is a configuration mode where configuration changes are saved to the computer where the application is running rather than the robot.

Professional level access
Professional level access provides unrestricted access to all configuration settings. This level of access is only intended for installers and distributors and can only be accessed with a password.

User level access
User level access is the default access level to the application. It is intended for end users of the robot. This access level provides restricted access to configuration settings. Configuration items are locked by default unless unlocked by a professional level user.

Trajectory
A trajectory is a defined path for the robot gripper to take through space. To define a trajectory with the software, the starting point, end point, and a few intermediate points are defined along the desired path. The arm software interpolates (fills in) the path to make one smooth motion that passes through the points.

Configuration
The configuration is the collection of robot settings as customized to the user. Configuration information is stored as an XML file on the robot. The application allows a professional (or user) to modify these settings and save them to the robot.

Protection zone
A protection zone is a defined safety zone around the user where the movement of the robot is limited to protect the user. The protection zone is made up of a no-go zone and a slow zone.

No-go zone
The no-go zone is a rectangular volume immediately around the user. The robot is programmed not to move into a no-go zone.

Slow zone
A slow zone is a secondary protected zone immediately outside the no-go zone. In the slow zone, the robot can move, but only at a reduced speed.

Health report
A health report is a snapshot, or set of snapshots of specific robot parameters. Health reports are useful in diagnosing the source of issues.

Robot firmware
The robot firmware is the internal arm control software running on the robot base.

Secondary retract position
A secondary retract position is an intermediate point in a retract trajectory defined to allow a position such that the robot is out of the way, but not fully retracted.
Navigating the application

Basic information on how to navigate the application, including layout of the application and the different configuration pages.

This section of the manual gives an overview of navigating the application. This includes the layout of the application and the major navigation menus and configuration pages.

Application layout

This page describes the user interface of the application.

The graphic below shows the user interface of the application.

The screen is divided into several sections:

1. Upper left menu
2. User name label
3. Client / Professional mode toggle
4. Language toggle
5. Robotic arm detected indication
6. Configuration panel name
7. Sidebar menu
8. Main panel

Upper left menu

This page describes the layout of the Upper left menu of the tool.

The upper left menu allows some high level controls and information about the application.
Profile - Groups together all operations related to the user profile:

- **Apply all changes** - Sends all configuration data to the robotic arm. This only works when the arm is connected to the computer.
- **Discard all changes** - Discards all pending configuration changes in the application. The configuration inside the robot remains unchanged.
- **Restore factory settings** - Resets the robotic arm configuration to factory settings. This only works when the arm controller is connected to the computer.

  **CAUTION:**
  - Loss of configuration data
  - Any configuration that was previously in the robotic arm will be lost.
  - If you are not sure, export your profile as a backup before doing a factory restore.

- **Export the profile** - Export the current configuration settings to your computer as an XML file.

  **Note:** This may be used to create a local backup of the configuration or to share the configuration.

- **Import the profile** - Open an XML configuration file from your computer and send it to the robotic arm automatically. A reboot of the arm will be required.

  **CAUTION:**
  - Loss of current configuration settings
  - The current arm configuration will be lost.
  - If you are not sure, export your profile as a backup before doing a factory restore.

- **Import a profile from Jacosoft** - Import a profile that was created using Jacosoft software.

Advanced options - Groups together more advanced functionalities.

- **Set the arm model (Professional access level only)** - This function is for Kinova use only and should not be used unless you are told to do so by the Kinova support team.

  **Warning:**
  - Possibility of hazardous situations and disabling of safeties
  - DO NOT CHANGE THE MODEL! If you have changed it accidentally or are not sure, contact Kinova to get instructions.
User guide - Launches the HTML user guide in your default browser.

About - Launches a pop-up with information about the software version.

Change robot connectivity - Changes the robot connectivity state from online to offline and vice versa.

Note: Changing the robot connectivity state will cause pending configuration changes to be discarded.

Sidebar menu

This page describes the options in the left hand sidebar menu. This menu gives access to top level summary information, options to configure the arm, trajectory definition, and arm health data.

The sidebar menu is located on the left hand side of the application window.

The sidebar menu has four main headings:

- Dashboard
- Profile
- Trajectory
- Health Center

Dashboard

This page describes the dashboard page of the tool. The page contains top level summary information about the connected robotic arm.

The Dashboard displays top level summary information about the connected robotic arm. The Dashboard displays in the main panel, and is accessed by clicking "Dashboard" in the left sidebar menu.
The dashboard displays information about the robotic arm status:

The color of the circles indicates the status of the value.

<table>
<thead>
<tr>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Everything is good</td>
</tr>
<tr>
<td>Yellow</td>
<td>The values are near the limits; your arm may be in a special position and condition. It is normal to be in this state for a short period of time but it should go back to normal when moving to another position. If one of the circles is yellow permanently, contact your technical support.</td>
</tr>
<tr>
<td>Red</td>
<td>Something is wrong - contact your technical support.</td>
</tr>
</tbody>
</table>
The top right section displays information about the internal components’ code versions for the joint actuators, fingers, and communication (CAN) interfaces.

<table>
<thead>
<tr>
<th>Component</th>
<th>Code Version</th>
<th>CAN Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator 1</td>
<td>0.0.0</td>
<td>1.0.7</td>
</tr>
<tr>
<td>Actuator 2</td>
<td>0.0.0</td>
<td>0.0.0</td>
</tr>
<tr>
<td>Actuator 3</td>
<td>0.0.0</td>
<td>0.0.0</td>
</tr>
<tr>
<td>Finger 1</td>
<td>0.0.0</td>
<td></td>
</tr>
<tr>
<td>Finger 2</td>
<td>0.0.0</td>
<td></td>
</tr>
<tr>
<td>Finger 3</td>
<td>0.0.0</td>
<td></td>
</tr>
</tbody>
</table>

The middle right section displays the currently installed robotic arm software (firmware version) and allows you to update the firmware of the robot.

The bottom right section displays the serial number and hardware configuration (robot model) of the robotic arm.

**Profile**

This page gives an overview of the Profile pages of the tool. These pages give access to set user information, general configuration settings, retract position, protection zones definition, and control mappings.

The Profile section is a grouping of five pages for viewing and modifying basic profile configuration settings. These pages are:

- User information
- General configuration
- Retract
- Protection zone
- Mapping

The individual pages can be accessed from the sidebar menu.

On each page, there are various items that can be configured. In User mode, some items may be greyed out. All items are available to be modified in Professional mode.

On each page in the Profile section, there is a set of controls at the bottom of the page allowing the user to:

- Export the current configuration profile to the computer
• Import a configuration profile from the computer
• Apply pending configuration
• Discard pending configuration

**Trajectory**

This page describes the purpose of the Trajectory page and the concept of defining a trajectory.

The Trajectory page is only available in Professional mode.

On the Trajectory page, a professional user can predefine a movement of the arm through space. This can allow a complex series of smaller movements to be labeled as one integrated unit. This trajectory can then be assigned to a single control input. This is useful for demos, but could also be configured for particular purposes for an end user. For example, to easily get the arm into position to:

• Push an elevator button
• Turn a door knob
A trajectory is set by defining a small set of at least two intermediate points along the desired trajectory. As long as the path passes through a reasonable sequence of points (some orientations of the robot can be awkward to get into, making it difficult to have a smooth movement between some pairs of points) the arm can interpolate between the points and trace out the trajectory.

Trajectories can be saved to the computer on which the application is running, or loaded from the computer.

Health center
This page describes the purpose of the Health center pages and the information available there.
The Health center page allows you to monitor various data related to the robot. The Health center can be used to capture either one instantaneous snapshot or a series of snapshots over a period of time at set intervals.

This data can be saved to your computer and sent to Kinova support for analysis. In the User access level, only certain basic information is available. When logged in with Professional access level the health center data is divided over a number of tabs which capture particular sets of information:

- Sensors
  - Temperatures
  - Detailed current
- Communications
  - Errors and warnings
  - Actuators errors
- Angular data
  - Angular positions
  - Angular commands
- Cartesian data
  - Cartesian positions
  - Cartesian commands
- General information
  - Firmware version
  - Actuators version
  - General information
- Other parameters
  - Limitations
  - Accelerations
  - Control increments
- Input
  - Buttons
Axes
Configuring the application

This page describes high-level configurations to apply across the application session. This includes online/offline configuration, application language settings, and professional /user access toggle.

There are three high level configurations that apply across the application session. These settings can be modified on any page of the application: online / offline configuration, language settings, and professional / user access.

Online and offline configuration

This page describes the difference between online and offline modes.

The configuration tool can work in either Online mode or Offline mode. A small pencil icon and the word Offline on the arm detected indication tells you that you're in Offline mode.

The arm can be connected to the computer while still working in Offline mode. In Offline mode, information is saved to the computer and not the robotic arm. Online mode saves the data directly on the arm and does not create a file on the computer automatically. In Offline mode some configuration options are not available.

When working Offline, pending changes cannot be applied to the robotic arm.

However, while in offline mode, you can import a profile into the application from the computer, modify it, and then save the profile to the computer again. One application of this would be in remote support.

For example:

1. The user exports the profile from the arm.
2. The user emails the XML configuration file to a professional level user providing remote support.
3. The professional downloads this configuration file and then imports the profile in Offline mode.
4. The professional modifies the configuration file.
5. The professional exports the modified profile.
6. The professional emails the modified profile to the user as an attachment.
7. The user imports the modified profile while in Online mode, saving the new profile to the robotic arm.
Change robot connectivity

This page describes the process of changing the robotic arm connectivity.

Procedure

1. Click on the Robotic arm detected icon or select Change robot connectivity in the upper left menu.

2. A pop-up warning will appear, indicating that changes you have made will be discarded. Click YES to continue.

Results

The robot will change connectivity.
Changing language setting

This page describes the process of changing the application-wide language setting.

About this task

The language of the interface and menus of the application can be customized. Currently, the available languages are English and French, although other options may be available in the future.

Procedure

1. Click on the language toggle in the upper right corner of the screen.
2. Choose one of the language options from the list.

3. A popup will appear in the chosen language explaining that you need to restart the application to apply the new settings. Click OK.
4. Close and re-open the application.

**Results**

The menus of the application will now be in the chosen language.

**Professional and user access**

This page describes the difference between Professional and User access.

The tool has two levels of access:

- **User**
- **Professional**

Professional level offers the least restrictive level of access for configuring the arm. This level of access is intended for distributors and any healthcare professionals (physiotherapists or occupational therapists) assisting the user with the arm. At this access level, all software functionalities are unlocked. This access level also enables the professional user to configure the access rights to some of the software functionalities for specific users.

User level access is for the end user of the arm to make smaller changes to the configuration of the arm. By default, the software will not allow any configuration modifications by the user. It will mainly be used to monitor the configuration of the robot and perform robot software updates. If the professional has unlocked some functionalities, they will become available to the user. Other locked functionalities will be greyed out.

<table>
<thead>
<tr>
<th>Unlocked example</th>
<th>Locked example</th>
</tr>
</thead>
</table>
Switching from User to Professional access level

This page describes the process of changing from User to Professional access level. Professional mode is intended for Professional users, and offers a higher level of control over configuration after logging in.

About this task

The default mode on opening the tool is User mode.

Procedure

1. To switch from User to Professional, click on the User / Professional access level toggle in the top right of the screen and then click on Professional.

2. You will be prompted to enter a password to switch the mode to Professional mode. Enter the password and click OK.

Note: The password will be provided by your distributor. If you have lost the password, please contact your distributor. Passwords are to be used by professional users only and should NEVER be shared with the end user.

Note: To switch back to user access level, select User from the top menu.
**Note:** For convenience during configuration, the password will only be asked once per session. Once you have successfully logged into professional mode, you will be able to switch back and forth to test your configuration without having to enter the password every time.

**Important:**
- If you leave the application open on the user's computer after finishing the configuration, the user will be able to switch to Professional access without a password. The user will be able to unlock access to all configuration items. The user could configure the robotic arm incorrectly, putting the user at risk of injury or damage to the equipment.
- When you are finished configuring the user mode on a user’s computer, you MUST close the application.

**Results**
You will now have access to Professional mode for the remainder of the session.

**Unlocking User functionality**
This page describes the procedure for a Professional mode user to unlock User mode functionality. This allows a professional user to give a user some configuration access if appropriate.

**About this task**
By default, the software will not allow any configuration items to be modified by the user. All configuration items by default are greyed out.

Some users may require or benefit from more control over configuration. It is possible for a professional to unlock configuration items for the user, either in person during installation, or remotely. It is up to the professional to determine what the user should have access to.

**Warning:**
- Unlocking some configurations may create dangerous situations or generate unwanted support calls depending on the users.
- Make sure a proper evaluation of the user and the potential risks has been made before unlocking some configuration.

Once an item is unlocked by a Professional user, that item will be open whenever the application is opened in the future.

This operation can be done while connected to a robotic arm or in offline mode.

**Procedure**

1. Switch to professional access level.
2. In Professional mode, configuration items will have a small black lock icon in the upper right of the box containing the configuration item. This icon will have two states, a closed lock for a locked item and an open lock for an unlocked item.

   ![Locked](icon_locked.png)  ![Unlocked](icon_unlocked.png)

3. Find the configuration item that you wish to unlock for the client.
4. Click the lock icon, changing the icon from a closed lock to an open lock. The item will then be configurable at the User access level.

5. Repeat steps 1 to 3 for all configuration items that need to be unlocked.

6. Switch back to User access level and validate that the user's access is properly set. The Unlocked configuration items will now be available.
7. Close the application so that the user will not retain Professional level access.

Results
The functions will be unlocked.

Unlocking the profile remotely
This page describes how a professional can remotely unlock functionality.

Before you begin
You will need the client's current XML profile. The user can export his profile to his computer and email the file to you.

Warning:
- If you don't start from the user's current profile, you may change the settings of the robot inappropriately.
- Always start with the user's current profile.

About this task
It is possible for a professional user to unlock some functionality for users remotely without being connected to the robot.

Procedure
1. Start the software.
2. Switch into offline mode.
3. Import the user's XML profile.
4. Change to Professional level access.
5. Unlock the desired functionality.
6. Export the profile on your computer.
7. Send the exported XML profile to the user electronically.
8. Have the user import the profile. (The user may be connected to the robot or in offline mode)

Results
The unlocked items will remain available on future reboot of the application unless another profile with different settings is imported.
# Configuring the robot

This section describes how to configure the robot with the help of the application.

The configuration of the robot is carried out using two main menus:

- The upper left menu, where various high level controls and information are available
- The sidebar menu, where more detailed customization of configuration parameters can be carried out

## Configuration state

This page describes the concept of configuration state for the robot arm, as well as the difference between pending configuration and active configuration.

The settings of the robotic arm are stored on the robotic arm in an XML configuration file. The application allows users to set up new configurations using a graphical user interface (GUI).

Changes made in the application are initially in a **pending** state. Changing settings to fields within the application does not by itself make modifications to the current configuration on the arm controller.

Pending changes selected within the tool only become active on the arm controller when the user clicks to Send or Apply the changes. Choosing to Send or Apply changes will create a configuration and import it to the controller. This will only work if the controller is connected to the computer. You need to reboot the controller (switch off and then on again) for the changes in configuration to take effect.

Clicking to discard changes will reset the interface of the tool and discard pending changes.

Configuration files can also be saved on the computer where the application is running. This would, for example, allow the user to try out different configurations while making it easy to go back to an earlier configuration. Saved configuration files can also be imported from the computer to the robotic arm.
Discarding configuration changes

This page describes how to discard pending configuration changes.

Procedure

1. Discarding pending configuration changes can be done in one of two ways. Either click the discard button at the lower right of any profile section page, or go to the upper left menu and click Profile > Discard all changes.

2. If you use the first option, the pending changes will simply be discarded. If you go through the upper left hand menu, a pop-up warning will verify that you want to reset pending configuration changes. Click YES to continue.

Results

The pending configuration changes will be discarded.
Sending configuration changes to the robot controller
This page describes how to send configuration changes to the robotic arm to be applied.

Before you begin
The robotic arm must be connected to the computer and powered on.

About this task
You have adjusted the profile settings and are ready to apply it to test it out. You do this by applying the pending configuration change, sending it to the robotic arm. If you’re setting up a robotic arm to get it so that it feels right to the user, you might go through a few cycles of setting a configuration, applying the new configuration, and trying it out.

Procedure
1. Sending pending configuration changes can be done in one of two ways. Either click the Send button at the lower right of any profile section page, or go to the upper left menu and click Profile > Apply all changes.
2. If you use the first option, the pending changes will simply be sent and applied. If you go through the upper left hand menu, a pop-up note appears telling you that you will need to restart the arm for the changes to take effect and asking if you want to continue. Click YES to continue.

Results
The new configuration that was pending in the application is now applied to the arm.

What to do next
Restart the robotic arm controller for the new configuration to take effect.

Import profile from computer
This page describes how to import an existing profile from the computer.

Before you begin
The robotic arm needs to be connected to the computer and needs to be powered on. You need to have an existing XML profile saved on the computer where the tool is running.
About this task
Procedure to import and apply a configuration file saved on the computer where the application is running. For example, to restore a known preferred configuration after trying out a new configuration and finding it didn't work as well. Another example would be for a user to import a profile sent from a distributor which has user functionality unlocked.

Procedure
1. Importing a configuration can be done in one of two ways. Either click the import profile button at the lower left of any profile section page, or go to the upper left menu and click Profile > Import profile.
2. A pop-up notification will appear informing you that you need to reboot for changes to apply and confirming that you want to proceed. Click YES to continue.
3. A file explorer window will pop up so that you can browse to find the configuration XML file. Locate the configuration file and select it.

Results
The configuration will be imported from the computer to the robotic arm.

What to do next
Restart the robotic arm controller for the configuration to take effect.

Export profile to computer
This page describes how to export the current profile from the robotic arm to the computer.

Before you begin
The robotic arm needs to be connected to the computer and powered on.

Note: When you export the profile, the current control mode will be saved rather than the default control mode. If the user is not in default mode when exporting the profile, the profile will behave differently from how the user might expect when re-importing the profile later. To capture your default profile in the export, change the current mode to the default mode before exporting the profile.
About this task

The current robotic arm profile can be saved to the computer where the application is running. This is a good idea when you have a configuration that is working well, but you want to experiment with a new configuration. You can save the old configuration, make changes, test them out, and if you don't like it, you can restore the old saved configuration.

Procedure

1. Exporting a configuration can be done in one of two ways. Either click the export profile button at the lower left of any profile section page, or go to the upper left menu and click **Profile > Export profile**

2. A file explorer window will pop up allowing to to select a folder where you want to save the configuration. Select a folder and click Save to export the configuration file from the robotic arm and save it on the computer.

Results

The configuration file will be saved on the computer.

![Diagram](image)

**Import a profile from Jacosoft**

This page describes how to import an existing *Jacosoft* profile to be converted and applied to the robotic arm. This lets most of existing *Jacosoft* profiles be reused.

**Before you begin**

The robotic arm needs to be connected to the computer and powered on. There needs to be a *Jacosoft* configuration file on the computer.

**About this task**

Existing users who previously used *Jacosoft* to configure their Kinova robotic arms might have previous *Jacosoft* profiles saved on their computer. While the new application doesn't use exactly the same format for storing configurations as *Jacosoft*, the previous work put into setting configurations for the arm is not lost. The new application can read and convert a *Jacosoft* profile into a profile understandable by the new application, and then apply it to the robotic arm.

**Procedure**

1. Go to the upper left hand menu and select **Profile > Import a profile from Jacosoft**.
2. A pop-up notification will inform you that after importing your profile, you will need to restart the arm for the profile to take effect and asking if you want to continue. Click YES to continue.

3. A file explorer window will pop up so that you can browse to find the Jacosoft profile folder. Locate the Jacosoft profile folder and select it.

**Results**

The configuration will be imported from the computer, converted from a Jacosoft profile to an XML profile, and then sent to the robotic arm. This profile will take effect the next time the arm boots up.

**Note:** When you are in Online mode, the imported profile will be applied directly to the robot. If you don't want to apply the converted profile to the robotic arm, but just want to convert and save it to your computer, make sure to go into **Offline mode** before importing the profile. Then export the profile to save it to the computer.

**Note:** When importing an existing Jacosoft profile, the Jacosoft spasm filter and the Jacosoft reference frame conversion are not handled automatically during the import. You will need to configure these values manually after importing the Jacosoft profile.
**Note:** When importing an existing profile from Jacosoft, numerical values will not import with the right format if the PC region format is set to French. (decimal places will be marked with a comma rather than a period). See application release notes for more details on how to address this.

**What to do next**

Restart the robotic arm controller for the new configuration to take effect.

**Restore factory settings**

This page describes how to restore the robotic arm to factory settings.

**Before you begin**

The robotic arm needs to be connected to the computer and powered on.

**About this task**

This procedure returns the robotic arm configuration back to factory defaults.

**Procedure**

1. Go to the upper left hand menu and select **Profile > Restore factory settings**.

2. A pop-up warning will appear asking if you are sure you want to restore factory settings in the arm. Click YES to continue.
3. A pop-up will appear reminding that you need to reboot the arm for the changes to take effect.

**Results**
The robotic arm will be reset to factory default settings the next time it boots up.

**What to do next**
Restart the robotic arm controller for the new configuration to take effect.

**Updating the robotic arm firmware**

This page describes how to update the robotic arm firmware on the Dashboard screen.

**Before you begin**
- The computer has to be connected to the robotic arm by USB cable to perform this task.
- The new version of the firmware has to be downloaded to the computer.
- You will need to have the right .hex file.
CAUTION:
• Data loss risk
• Before updating the robot arm’s firmware, it is always a good practice to make a backup copy of the profile using the export function.

Warning:
• Incorrect file risk
• Make sure you have the right file provided by your vendor to update your robot arm. Using the wrong file or a file of the wrong version may damage your robot or create undefined behaviors.

CAUTION:
• Firmware corruption risk
• Do not turn off or unplug the robot arm during the firmware update.

Procedure
1. Navigate to the Dashboard using the left-hand menu.
2. In the Robotic arm software section, click on the "..." button to bring up the file browser window.
3. Find the new version of the firmware and click to select it.
4. The file name of the new firmware version will appear on the Dashboard screen to indicate that the new firmware version is pending to be sent to the arm. Click the Send button. This will launch a confirmation window.

5. Click YES to proceed with the firmware update. An animated progress indicator will appear while the update is ongoing. Once the update is completed, a confirmation pop-up will appear prompting you to reboot the arm controller.
Results
The new firmware is installed on the robot arm.

What to do next
Reboot the arm to complete the update and launch with the new firmware.

User information
Describes page for entering user information – name, ID, distributor / organization.

The User information page displays basic user information:

- First & Last Name
- Unique Identifier (ID)
- Distributor / Organization

By default, this information can only be modified in Professional mode, but a Professional user can unlock these settings for users.
General Configuration

Describes the functionality of the General configuration Profile page.

The General configuration page allows the configuring of various basic settings.

**Controller sensitivity** sets the responsiveness of the movement of the arm in response to control inputs. Controller sensitivity is a ratio that can range from 1.0 to 5.0 in increments of 0.5. The higher the sensitivity, the more response the arm will have to a control input, and the smaller the input required to produce an effect.

**Tremor dampening** allows the software to smooth out any shaking movements in the user’s hand when transforming control inputs into movements. Tremor dampening can be set in 4 levels, L1 to L4.

**Speed** allows the setting of the maximum speed for movement of the arm. The user can either choose from one of four presets (5, 10, 15, or 20 cm/s) or use a slider control to choose any whole number from 4 cm/s to 20 cm/s.
Drinking mode allows the user to adjust the settings for drinking mode to the drinking glass size they will be using. Configuring the size helps with avoiding / minimizing spillage when using the arm to drink from a glass. The user can either choose from one of three presets (small, medium, or large), or select the height and diameter of the glass using the slider controls.

Other options allows configuration of three settings.

1. The hand orientation can be toggled between fixed (pointing in a fixed direction regardless of the orientation of the arm) and automatic (points in the same direction as the arm).
2. The robotic arm installation side can also be selected. The default is a right side installation, but choosing "left" switches the software configuration of the arm to left hand mode.
3. Finally, bottom pinch mode can be toggled on and off. This toggle makes it possible to invert the finger pinching to make it easier to grasp objects. Toggled to the left, the gripper will be in "top pinch" mode, while toggled to the right, it will be in "bottom pinch" mode.

Note: For a switch of arm installation side to take effect, you will need to reboot the arm.

Note: Changing the arm side also requires mechanical adjustments to the fingers of the hand to ensure that the pinching of the fingers follows the expected "mirror image" to the opposite side configuration.

Retract position

This section describes the retract position page. This page lets a Professional level user set a retract position for the arm.

The retract position page lets you set the retract position of the arm. The retract position is the position of the arm when it is not in use. In the retracted position, the arm is in standby mode and the joystick features are disabled.

The retract position page has two modes for setting the retract position:

- Basic
- Advanced

To switch between Basic and Advanced modes, use the drop-down menu in the upper right of the page.

Retract position (Basic)

This page describes the Basic mode of Retract position setting.
In Basic mode, you can make basic changes to the retract position by modifying the retracted angle (between -5° and +89°).

You can set the angle in one of two ways:

- Entering an angle (in degrees) in the space provided using the keyboard
- Clicking and dragging the white marker over the range of angles

Retract position (advanced)

This page describes the purpose of the Retract position (advanced) page.

The advanced retract position selection lets a professional user have more control over the retract position. The advanced retract position is only available in Professional mode. Setting an advanced retract position is done by defining a trajectory containing two or more points that takes the arm starting from the desired retract position to a position where the arm is ready for use.
You can also modify an advanced trajectory to add a secondary retract position in the middle of the trajectory. An example would be for use in school, setting a position that is out of the way, but not fully retracted.

The process to set an advanced retract position is similar to that used for setting a trajectory. The advanced retract position setting can be accessed by clicking the drop-down menu in the top right of the page and selecting Advanced.

To set an advanced retract position, you either need to unlock the arm or change the arm control to Angular mode.

**Unlocking the arm**

This page describes the purpose and concept of unlocking the robotic arm. Unlocking the arm lets you manipulate the arm joints manually. This is useful in setting an advanced retract position.

Generally, when the arm is powered on, the actuators at the arm joints will only rotate under control inputs. In the absence of active control inputs, there is a control torque applied on the joints to resist motion and prevent the arm pose from slipping under the influence of external forces - for example, gravity. This means, however, that the arm can not be easily moved manually.

When setting an advanced retract position, the simplest way to define the trajectory is to manipulate the arm position manually. To be able to do this, it is necessary to unlock the arm.

To unlock the arm, click the Unlock arm text button in the upper right of the Retract position (Advanced) page. A confirmation pop-up will appear warning that a reboot will be necessary to recover and that some alerts will be disabled until the software is restarted. Click "Yes" to continue.

It will then be possible to move the arm joints manually. To move the arm manually, you should rotate the joints one by one, starting with the shoulder joint and moving down the arm.

**Note:** It will still take some force to rotate the joints due to internal mechanical resistance within the actuator.

**Note:** Gravity acting on the arm will tend to make the arm fall slowly downwards. If you want to move the arm while unlocked to define positions in a trajectory, you will need to hold up the arm to stay in place while using the Configurator tool to add the position to the trajectory.
Alternatively, you will need to have someone else hold the arm while adding the point using the application.

**Note:** It is possible in moving the unlocked arm manually to move the arm into a new position that is a singularity or which otherwise cannot be easily accessed from the previous position. While configuring the advanced retract trajectory, be cautious to limit each movement to realistic changes in position. Otherwise, the arm software will become "confused" and the resulting trajectory will end up different than expected.

### Angular mode

This page describes Angular control mode as compared to Cartesian control mode.

To set the positions for a trajectory using the powered wheelchair joystick, it is necessary to change the arm from Cartesian mode to angular mode.

There are two modes for control of the robotic arm:

- Cartesian mode
- Angular mode

Cartesian mode is the normal mode of control. In Cartesian mode, the user uses a control device to try to move the hand of the robotic arm in a straight line in the direction of one of the Cartesian axes, whether in the positive or negative direction. The arm controller translates the desired linear velocity into angular motions of the different actuators in the arm.

In angular position mode, the actuators are controlled in their rotational mode directly. That is, the controller is used to make the various individual actuators rotate either in one direction or the other.

Users can not configure control mappings themselves for angular mode, but there is a default mapping between angular mode controls and Cartesian mode controls.

#### Table 1: Angular to Cartesian controls mapping

<table>
<thead>
<tr>
<th>Angular control (direction is in relation to output side of actuator)</th>
<th>Cartesian control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator 1 clockwise</td>
<td>Left</td>
</tr>
<tr>
<td>Actuator 1 counterclockwise</td>
<td>Right</td>
</tr>
<tr>
<td>Actuator 2 clockwise</td>
<td>Forward</td>
</tr>
<tr>
<td>Actuator 2 counterclockwise</td>
<td>Backward</td>
</tr>
<tr>
<td>Actuator 3 clockwise</td>
<td>Up</td>
</tr>
<tr>
<td>Actuator 3 counterclockwise</td>
<td>Down</td>
</tr>
<tr>
<td>Actuator 4 clockwise</td>
<td>Lateral rotation +</td>
</tr>
<tr>
<td>Actuator 4 counterclockwise</td>
<td>Lateral rotation -</td>
</tr>
<tr>
<td>Actuator 5 clockwise</td>
<td>Vertical rotation +</td>
</tr>
<tr>
<td>Actuator 5 counterclockwise</td>
<td>Vertical rotation -</td>
</tr>
<tr>
<td>Actuator 6 clockwise</td>
<td>Wrist rotation +</td>
</tr>
<tr>
<td>Actuator 6 counterclockwise</td>
<td>Wrist rotation -</td>
</tr>
</tbody>
</table>

#### Changing from Cartesian to Angular control

This page describes how to switch from Cartesian control to Angular control.

#### About this task
### Procedure

1. To set the controls to angular mode, go to the Angular / Cartesian dropdown menu in the Current position table, and select Angular.

2. A confirmation / warning pop up will appear. Click Yes to proceed.

### Results

You will now be in Angular control mode.

### Setting advanced retract position

This page describes the procedure for setting an advanced retract position.

### Before you begin

The arm needs to be connected by USB to the computer running the application, and the application needs to be open.

Before beginning, either unlock the robotic arm if you want to set the trajectory positions manually, or set the arm controls into angular mode. If you are setting the trajectory with the
arm unlocked, it may be helpful to have a second person to help you by hold the arm up while you set the positions in the application, or vice versa.

Navigate to the Profile > Retract screen and select Advanced mode from the dropdown list in the upper list of the screen.

**Note:** You need to be in Professional mode to do this.

**About this task**

This task is performed by a professional user, in the presence of the end user and the user's powered wheelchair.

There are two ways to set an advanced retract position:

- Unlocking the arm
- Using the joystick with the robotic arm set in angular position mode.

Unlocking the arm is probably the simplest way to set the advanced retract position, but the steps below apply in general to either approach.

**Note:** When adding new positions to the trajectory, be careful to not make the trajectory go too far wide of the wheelchair to ensure obstacle clearance. Ensure that the arm is not going to hit the user or the wheelchair when going from the previous position to the next position. Try to make the angular movements to go from one position to the next as simple as possible to ensure that the arm will behave as expected when running the trajectory.

**Procedure**

1. The Index 0 position should be selected by default in the position tabs at the top of the screen. Move the arm, whether manually, or with the joystick, to the desired fully retracted position and keep it there.

2. With the arm in the desired retract position, click the Get current position text button, and then click the Apply button to set the position as the retract position.

3. Click the Index 1 position tab at the top of the Retract position (advanced) screen to set the second point.

4. Move the arm to the desired second position and keep it there.

5. With the arm in position, click the Get current position text button, then click the Apply position to set the second point.
6. For the next point, move the arm to the next desired position in the trajectory and keep it there.
7. With the arm in the desired position, click the **Add position** text button to add this position as next in the trajectory.

When you add a new position with the **Add position** text button, you do not need to get the current position or click the **Apply** button. When you click **Add position**, it retrieves the current position and sets that as the position.

8. Repeat steps 6 to 7 as needed, up to the second-to-last position. The last position should be the Default home position.
9. Click the **Add position** text button. Click the Default home position text button to set the home position as the final position, and click the **Apply** button to set the position in the trajectory.

10. Click the **Send** button to send the new advanced retract trajectory to the arm.

**Results**
The new advanced retract position will be defined and sent to the arm.
What to do next

Reboot the arm. Test the trajectory by running through it using the joystick controller. Make sure the trajectory doesn't go too wide of the wheelchair, and ensure that the trajectory does not collide with the wheelchair or the user.

(Optional) Adding a secondary retract position

This page describes the procedure to set an intermediate retract position such that the arm is out of the way, but not fully retracted. This is an optional procedure.

Before you begin

An advanced retract needs to have been defined already. The arm needs to be connected, via USB, to the computer running the application, and the arm needs to be powered on. The Assistive robot Configurator tool needs to be opened to the Retract position (Advanced) page. The tool must be in Professional mode to access this.

About this task

A secondary retract position can be added as a position to an existing advanced retract position, situated somewhere between the ready position and the full retract position. This is useful if you want to be able to retract the arm to be out of the way for a while without putting the arm all the way into the full retract position.

Procedure

1. Use the joystick to move the arm to the position that you want to use for the intermediate retract position.

2. Once you are happy with the position, click the Add position text button to add a new position to the trajectory. The new position will be added at the end of the trajectory. Keep a mental note spatially of the orientation of the intermediate retract position. You can also rename the label of this position tab and color the tab to keep track of which position is the secondary retract.

   Note: Be careful because the robotic arm might behave differently than what you might expect in moving from one position to the other. Watch out to make sure the arm doesn't collide with anything while moving.

3. Next, you need to identify where is the best place in the existing advanced retract trajectory to add the intermediate retract position. One by one, click on the position tabs in the trajectory and then click and hold the Reach position text button to move the arm to the position. For each position, visually compare the arm position to the desired intermediate retract position. Repeat until you find two positions in the existing trajectory such that the intermediate retract position naturally fits in between the two, so that you're happy with the overall trajectory. You can use the Reach position button to try going from the "before" position to the new intermediate retract position and then on to the "after" position to see how well it works.
4. Use the color picker to choose colors to mark the tabs of the positions that go before and after the intermediate position. Click the Apply button to mark the tab of the "before" position with that color. This will make it easier to perform the next steps.

5. Go to the end of the trajectory to find the intermediate retract position. Click on the tab and hold for about half a second, until red x icons appear on the upper right corner of the tabs.

Note: To get rid of the red x icons and return to normal, click on one of the tabs.
6. Drag the tab to the left until it is immediately after the "before" position tab that you previously marked with color. Release the tab to place it in the proper location.

7. Click the Send button to update the advanced retract trajectory on the arm.

**What to do next**

You will need to reboot the arm for the trajectory to take effect. Make sure to test the trajectory to make sure that it works as expected.

**Note:** The colors and names set on the trajectory tabs are only used within the software to help in setting the trajectory and are not stored on the robotic arm itself. On reboot, the names and colors will be lost.

**Protection zone**

This page describes the concept of a protection zone. Setting protection zones guards the user against collisions between the robotic arm and his body.
The protection zone page allows you to set a no go zone and a slow zone for the safety of the user. The protection zone page is accessed from the sidebar menu, under profile pages.

The no go zone is a rectangular box shaped region closest to the end user’s body where the robot is blocked from entering. This is to prevent contact / collisions between the robotic arm and the user’s body.

The slow zone is a region outside the no go zone, and within a larger rectangular box shaped region that contains the no go zone. Within the slow zone, the speed is limited to a fraction of the normal maximum speed. This will limit the speed of the robotic arm as it gets close to the no go zone. The idea is that far from the user’s body, the arm will move normally. As you get in closer, the arm slows down, and then when you start to get too close, the arm stops altogether.

Setting no go zone
This page describes how to set a no go zone around the user for safety purposes.

Before you begin
The robotic arm will need to be connected to the computer and powered on.

About this task
Setting a no-go zone is the first step to setting protection zones for the safety of the user. The purpose of no-go zone is to prevent the robot from entering into the space taken up by the user’s head and torso.

Procedure
1. Place the hand of the robot near the mouth of the user
2. Click the Get position button on the left of the Protection zone page
3. Use a ruler or other measuring device to take the measurements (Make the measurements in relation to the position of the head) required to set the dimensions of the no go zone:
   - head depth
   - head height
   - body height, and
   - body width

4. If the no go zone toggle is off, move the toggle to the right to enable setting the dimensions of the no go zone.

5. Enter the dimensions in the spaces provided. Make sure to enter the measurements in centimeters (cm).

6. Click the Send button at the bottom of the page to apply the new no go zone.

Results
The no go zone will be set on the arm.
What to do next
You will need to reboot the arm controller to activate the change.

Setting slow zone
This page describes how to set a slow zone for the safety of the user.

Before you begin
The no-go zone has to be set before setting the slow zone. The slow zone is defined in relation to the no-go zone.

About this task
Setting the slow zone is the second step to setting protection zones for the safety of the user. It sets up a larger safe zone around the body of the user.

Procedure
1. If the slow zone toggle is off, move the toggle to the right to enable setting the dimensions of the slow zone.
2. Set the desired zone thickness in centimeters and the speed reduction as a percentage of the usual maximum speed.
3. Click Send to apply the changes.

Results
The new go slow zone will be set on the arm controller.

What to do next
You will need to reboot the arm controller to activate the change.

Deleting the protection zone
This page describes how to delete the set protection zone.

Procedure
1. Under the slow zone settings on the protection zone page, click on the blue text "delete the protection zone."
2. A warning pop-up will ask you to confirm that you want to delete the protection zone. Click YES to continue.

3. A pop-up will appear to confirm that the protection zone was successfully erased. Click OK to continue.
**Results**

The protection zone is erased on the robotic arm controller.

**What to do next**

You will need to reboot the arm controller to activate the change.

**Control mapping**

This page describes the concept of making a control mapping.

When controlling the robotic arm, there are many different functions, or "features" that the arm is capable of. These include:

- Move forward/backward
- Move left/right
- Move up/down
- Open/close 2 fingers
- Open/close 3 fingers
- Rotate arm vertically
- Rotate arm laterally
- Rotate wrist of hand
- Enter drinking mode
- Go to retract position
- Go to home/ready position
- Increase speed
- Decrease speed

Different powered wheelchairs will have different control setups with differing levels of complexity as part of the wheelchair. To control the functionality of the arm, it is necessary to integrate the arm with the wheelchair controls, and "map" the wheelchair controls to the control functions.

To use an analogy, a video game system has a standard controller with set controls that have to be assigned to control different functionalities in the game. So for example, left and right arrow to move left or right, up to look up, down to crouch, A button to jump. Generally, in games, the
game is designed to fit the available options for controls, and there is a one-to-one mapping of controls. Each control will always perform one defined function.

There are challenges though with this analogy for using wheelchair controls to control a robotic arm. There are two problems:

1. There are many different control schemes, depending on the wheelchair model and customization options
2. There will not generally be enough control options to make a one-to-one mapping of wheelchair controls to arm functionalities

To overcome this limitation, there needs to be a way to map the same control to more than one functionality, but still have each control only perform one function at any given time. The application solves this problem by letting an assistive professional set multiple modes of operation.

Modes define control mappings that the user can switch between to reach different needed functionalities. The cost of this approach is that, in each mode, some of the controls need to be reserved to enable cycling through lists of modes. But the payoff is that a full set of controls is potentially available, even with a very constrained set of control inputs.

An assistive professional is able to define up to two lists of modes that a user can cycle through, list A and list B. Usually the B list will contain the modes containing the most commonly used controls. The A list modes will hold more rarely used controls. That way, the user saves time and energy by not having to continually toggle past rarely used modes.

Within each list, the modes are listed by number, i.e. {A1, A2,...} and {B1, B2,...}. Part of the control mapping in each mode must be an option to cycle through the current list and to jump to the other list. The arm will keep track of the last mode accessed in each list. When a user applies the control to cycle through one of the lists, the control mode will pass to the next mode in that list. When the user is in the mode at the end of a list, cycling again will return the user around to the beginning of the list.

**Defining a new control mode**

This page describes how to set a new control mode for the robotic arm.

**Procedure**

1. Navigate to the Control mapping page using **Profile > Mapping** in the left-hand menu.
2. On the Control mapping page, click the area labeled Configured controller in the upper right to launch a menu to select the controller to configure. Choose the appropriate Configured controller type from the list and then click Apply.

3. In the box below this, find the Mode list to which you want to add a new mode.
4. Click the + button at the end of the list. A new mode will be added. If you add a mode to the wrong list by accident, you can delete the mode. Simply click on the mode icon. Options to set as default and delete will appear. Click the delete text button to remove the mode.

Note: Deleting a mode will also delete any modes that have been created, but are empty.

5. Click on the new mode button to select the mode to set. You will see that the new mode’s control mapping (located beneath the mode selection) is empty, since the mode is not yet defined. If you want to set this mode as the default mode, click Set as default. In that case you will need to reboot the arm at the end of this procedure for this change to take effect.

6. In the box below, click Add a new function. This will add a new blank line in the control mapping table for this mode.
7. Under the Function heading of the table, click **Select the desired function**. This will launch a UI menu to define the control for one feature.

8. Click on the Select the desired function button on the top of the menu. This will allow you to pick a feature to configure from one of six sub-menus:
   a) Basic functions
   b) Motion
   c) Fingers
   d) Recorded positions
   e) Trajectories
   f) Configuration
9. Select a function from one of the sub-menus to map to a control. Once selected, the name of the feature being mapped to is displayed.

10. Use the tabs in the middle part of the menu to choose whether to configure a button or joystick control. Then select the input and the behavior below. For the joystick controls, you will need to select the joystick axis, and the direction of motion (positive or negative) that you want to map to the feature. For button controls, you will need to select the button as well as the button behavior (Hold 2 seconds, Hold 4 seconds, Hold down, Single click) that you want to map to the feature. Alternatively, click the Scan the controller input button, and then use the physical controller to indicate the control input to which you want to map the function.
11. At the bottom of the menu, select the modes in which you want this control to be active. For some features, you will only want the control to be active in the current mode you are defining. For other features (such as cycling through mode lists), you will want to make the control available in several or even all modes.

12. Click the Apply button to complete the mapping of the feature to the control.

13. Repeat steps 6 through 12 until the mapping is completed. You will receive warnings if you try to map more than one feature to the same control.
14. When you are done, click the Send button at the bottom right of the Control mapping page to send the new control mapping to the robotic arm.

**Results**

A new control mode will now be defined.

**What to do next**

You will need to reboot the arm for the changes to take effect.

### Configuring trajectories

This section describes procedures related to configuring trajectories.

From the Trajectory page, a professional user can carry out several tasks related to defining trajectories. The pages that follow describe procedures for configuring trajectories.

#### Defining a new trajectory

This page describes how to define a new trajectory.

**About this task**

To define a trajectory, at least two points need to be defined.

**Procedure**

1. Navigate to the Trajectory page using **Trajectory** in the left hand side menu.
2. Click the Add position text button to set the first position for the trajectory.

3. **Note:** The first position in the trajectory can be either:
   - a. Default home position
   - b. Default retract position
   - c. User-defined position

Select the starting position for the trajectory.
- If you want to use the default home position as the starting point, click on the Default home position text button.
- If you want to use the default retract position, click on the Default retract position text button.
- If you want to start at your own chosen point, use the controls to move the hand to the desired starting point. Then click the Get current position text button. Alternatively, edit the joint angles manually in the table on the right.

4. Click the Add position text button to add an additional position to the trajectory.

5. **Note:** After defining the initial position, you can add either:
   - a. A delay
   - b. An additional position

Choose the next element to add to the trajectory.
- Adding a delay to the trajectory (to have the arm pause at a point in the trajectory before continuing) click the Add delay text button at the top of the Trajectory page.
- Adding a new position, use the controls to move the hand to the desired starting point. Then click the Get current position text button. Alternatively, edit the joint angles manually in the table on the right. Click the Use fingers and / or Activate speed limitations to add finger positions and speed limitations for the arm, forearm, and fingers to this step of the trajectory. The table will expand, letting you set the angular positions of the fingers and the speed limitations in deg/s and % max for the arm, forearm, and fingers.

6. When you are happy with the position, click the Apply button to set the position in the trajectory.

7. Repeat steps 4 - 6 until the trajectory is defined.

8. When you are finished with the last position, click the Save button to save the trajectory to the computer.
Results
The new trajectory is defined and saved to the computer.

Save trajectory
This page describes how to save a defined trajectory.

Before you begin
A trajectory needs to have been previously defined.

About this task

Procedure
1. Click the Save button in the Trajectory page. This will launch a file explorer window where
   you can browse to select a folder to save a trajectory file.
2. Browse to find the folder you want to use. Click Save to save the trajectory on the computer
   as an XML file.

Results
The trajectory will be saved on the computer.

Load trajectory from computer
This page describes how to load a trajectory from the computer.

Before you begin
A trajectory file needs to be present on the computer where the Configurator tool is
saved.

About this task

Procedure
1. Click the load button. This will launch a file explorer window.
2. Browse to find the XML trajectory file you want to load. Once you have located the file you
   want to load, click Open.

Results
The trajectory file will be loaded and visible in the application Trajectory page.

Running a trajectory
This page describes how to run a defined trajectory. This is useful in demos and trade
shows.

Before you begin
A valid trajectory must already have been defined, saved, and loaded.

About this task
This procedure is used to run a predefined trajectory. This is useful in demos or trade
shows.

Procedure
1. With the trajectory loaded in the Trajectory profile page, click the play button (black triangle)
   in the Media bar. This will cause the trajectory to be executed once. To loop the trajectory
   and have it play continuously press the loop button.
2. If the trajectory is playing once, click the stop button (black square) to stop the trajectory. If the trajectory is on continuous loop, click the loop button again to stop.

**Results**

The trajectory will run on the robotic arm.

**Creating a health report**

This page describes the concept of creating a health report.

Within the Health center panel of the application, Professional users can track all parameters on the connected robotic arm, or select a subset of parameters to track. The Professional user can select to create and export a report on the arm parameters.

There are three choices for exporting a report, depending on the user mode.

- Export a snapshot of data on all trackable parameters (Professional mode and User mode)
- Export a snapshot of data on a chosen selection of parameters (Professional mode)
- Export a series of snapshots on either all parameters or a selection of parameters (Professional mode)

**Export all health parameters - User mode**

This page describes how to export all health parameters in User mode.

**Before you begin**

Must be in User mode.

**About this task**

Captures a snapshot of all health parameters and saves as CSV. User mode records and exports a simplified health report.

**Procedure**

1. Navigate to the Health center panel using the left-hand side menu.
2. Click the Export all button in the upper right.

3. In the file explorer window that launches, select a folder to store the record.
Results
The records will be exported to the selected folder in comma-separated values (CSV) format. This file can be sent to support for analysis.

Export all health parameters - Professional mode
This page describes how to export all health parameters in professional mode.

Before you begin
Must be in Professional mode.

About this task
Captures a snapshot of all health center parameters and saves as CSV. In professional mode, you can capture a far more detailed report of the health status of the robotic arm.

Procedure
1. Navigate to the Health center panel using the left-hand side menu.
2. Click the Export all button in the lower right.
3. In the file explorer window that launches, select a folder to store the record.

Results
The records will be exported to the selected folder in comma-separated values (CSV) format. This file can be sent to support for analysis.

Export selection of health parameters
This page describes how to export a selection of health parameters as a report.

Before you begin
You must be in Professional mode.

About this task
Captures a snapshot of a selection of health parameters and exports a report.

Procedure
1. Navigate to the Health center panel using the left-hand side menu.
2. Select the actuator that you want to monitor from the drop-down list in the lower-left corner of the Health center panel.

3. Navigate amongst the different Health center tabs and select the check boxes of the parameters you want to track. To make it easier, you can select the checkboxes at the top of any table to select all the items in a table.

4. Click the Export selection button in the lower-right corner of the Health center panel.

5. In the file explorer window that launches, select a folder to store the record.

**Results**

The records will be exported to the selected folder in comma-separated values (CSV) format. This file can be imported into MS Excel to be viewed.

**Record health center data**

This page describes how to record all health center data in Professional mode.
Before you begin
Option only available in Professional mode. Must be in Professional mode.

About this task
Captures a series of snapshots at defined time intervals of either some or all health center parameters and saves as CSV.

Procedure

1. Navigate to the Health center panel using the left-hand side menu.
2. Go through the tabs of the Health center page and select the parameters that you want to record. If you want to capture all parameters, click the "Select all" checkbox in the Record sensors section on the left hand side of the Health center page.
3. Select the recording interval in the "Record interval" dropdown in the Record sensors section of the Health center page. This will set the interval between successive snapshots, in seconds. For example, a one minute recording session with an interval of 5 seconds would capture 12 snapshots.
4. Click the red circular record icon in the Record data section. This will start the recording. A moving progress bar and a counting timer will confirm that the recording is in progress and how long the recording has been going.
5. When you want to finish the recording, click the black square stop icon in the Record data section.
6. Click the Save record button in the Record data section. This will launch the file explorer.
7. Select a location to save the recording.

Results
A CSV file will be saved in the selected location.
There is no need too small.
No task too great.

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