Furhat Robotics
Robot Owners Guide

Product Documentation

Version 1.5

Contents

Introduction

The Robot Owners Guide is intended to serve as a guide to your Furhat Robot. It covers:

- *Getting Started*: Introduces the Robot and helps you get your robot set up

- *Using Your Robot*: Takes you through all of the robots features, controls, and interfaces

- *Caring For Your Robot*: Describes the recommended care instructions for your robot

- *Furhat Skills*: Introduces the concept of Skills and describes pre-loaded Skills

- *Troubleshooting*: Provides helpful information on troubleshooting your robot

- *Support*: Describes how you can get support when you need it

For information relating to the comprehensive technical specifications of your robot, please refer to the *Furhat Robotics Technical Product Overview*

Furhat Robotics

Getting Started

This chapter describes how to unpack, set up, and get your robot up & running.

Your Robot

Your robot comes packaged in its own protective hardshell case which includes the Furhat Robot Unit and all basic accessories. The product package includes the following items:

	Protective Hardshell Case
	Furhat Robot Unit
	Standard Adult Mask Model
	Robot Power Supply AC Mains Cable USB Microphone

Unboxing

Following these steps will enable you to get your robot safely and correctly unpacked

- Remove the cardboard shipping packaging from the exterior of the protective hardshell case

- Place the case on a firm, flat surface, with its feet down and the Furhat logo facing up

- Locate the 4 lid locking clasps, open them one by one, by firmly pulling up on each clasp

- Open the lid of the case, revealing the white robot cover plate with Furhat logo cut-out

- Lift off the white robot cover plate, safely store it to the side, placing it back in the case later

- Carefully lift the robot unit out, taking care to protect the neck articulation as you lift

- Place the robot unit on a firm, flat, uncluttered surface, with access to AC power

- If the face mask is not already mounted, locate the mask, and mount it to the head

- Seat the mask carefully, snapping it into place, using the 4 magnetic location tabs

- Visually check that your robot is clean and free of damage

Preparation

After unboxing, follow these steps in order to complete initial setup of your robot:

- Locate the USB microphone and plug it into one of the USB ports at the rear of the robot

- If you are planning to configure your robot to connect to a wired ethernet network

    - Connect a live ethernet cable to the ethernet network port at the rear of the robot

- If you are planning to configure your robot to connect to a password protected WiFi network

    - You will require an input device for password entry (see input devices below)

- Locate the Power supply module & firmly insert the DC plug into the power port of the robot

- Connect the AC mains cable to the power supply module & an appropriate AC outlet

Start Up

Once your robot has been prepared, you are ready to startup & configure your robot as follows:

● Push the Power button on the rear of the robot once to start the robot

● Your robot's face will illuminate, and after a few seconds, the robots face will be displayed

● The face will display natural face movements such as eye movements after startup

Shut Down

In order to shutdown your robot, please do as follows:

● Push the Power button on the rear of the robot once to shut down the robot

● Disconnect the robot from its AC power source[1], unless you plan to use it soon thereafter.

---

[1] Currently shipping robots continue to power the projector system as long as the robot is connected to an AC power source.

Robot Type

A Furhat robot can be of two types: `Production` or `Research`, these types are configured in software by Furhat Robotics. The different types enable specific software functions; for example, research robots have access to the full library of voices from *Acapela* and also have the Camera Feed feature enabled. You can check your robot's type in the settings tab of the Web-Console, robots configured as type `Research` have a camera settings panel visible in the Web-Console.

Using The Rotary Controller & On-Face Menu

Your robot has a built-in rotary controller, located at its rear. The rotary controller is used to control the audio volume of the robot, as well as to activate and use the robots on-face menu.
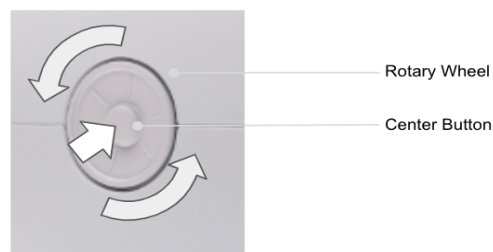
Rotating the controller wheel raises and lowers the robot's audio volume, with the robot's LED ring increasing in brightness in proportion to the set audio volume. Audio volume levels can also be adjusted in software using the robots Web-Console.

Selecting the center button of the rotary controller has two functions. The first is to activate the on-face menu, the second is to select an item that has been highlighted on the menu.
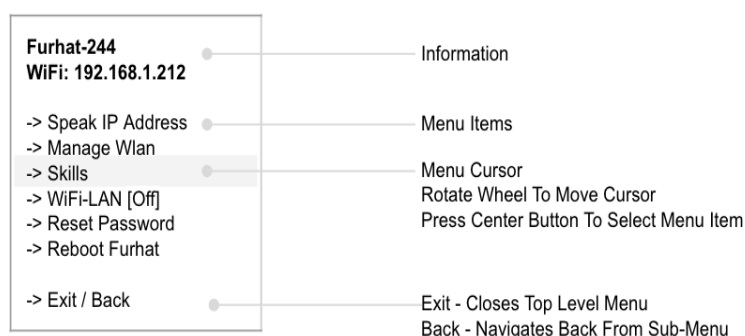
Within the on-face menu, rotating the controller wheel moves (scrolls) the menu cursor to any desired menu item. Pressing the center button selects that menu item and navigates to the related sub-menu or action. Selecting the `Back` or `Exit` menu item enables you to navigate up a level in the menu or close the menu. Double pressing the center button also closes the menu.

On-Face Menu Functions

The On-Face menu provides access to the following features on your robot:

- `Speak IP Address`: Selecting this menu item will cause your robot to speak the IP address which it has been assigned from it's currently connected network.

- `Manage Wlan`: This menu item will enable you to view the currently available WiFi networks, as well as select and connect/disconnect from a particular network.

- `Skills`: Selecting this menu item allows you to view the currently installed skills, stop any running skill, and start any specific skill on your robot.

- `WiFi-LAN`: This menu item enables you to use your robot to create a WiFi hotspot, to which you can connect a device of your choosing, and then access the robots Web-Console.

- `Reset Password`: This menu item will reset your robots password to the default (`admin`)

- `Reboot Furhat`: Selecting this menu item will restart your robot.

Using Other Input Devices

In addition to the built-in rotary controller, your robot also supports a number of additional input devices that can be used to configure as well as enter data into the robot.

External Keyboard

You can connect an external keyboard to your robot via one of the robot's USB ports. The keyboard can then be used to control the on-face menu, to enter text into password fields, and so on. Note that your robot always assumes a US Keyboard layout for connected keyboards.

External Screen/Touch Panel

It is possible to connect an external screen/touch panel to your robot via using the robot's USB[2] ports. This screen/touch panel can be used to access the robots Web-Console and also enable data entry via touch and on screen/panel virtual keyboard. For details on connecting an external screen/touch panel, please see the separate section below.

---

[2] Generally the USB-C port is used to supply HDMI signal (using an adapter) to the screen, and an additional USB-A port is used to handle input data (e.g. touch events, virtual keyboard input) from the screen to your robot

Furhat Robotics

First Time Network Connection

Your robot requires a connection to the public internet to access cloud based services such as speech synthesis, speech recognition, software update, remote support functions etc.

You can connect the robot to your fixed ethernet or WiFi network, and the robot supports fetching it's network parameters via DHCP[3]. One you have configured a network connection, your robot will remember it's settings for future use

Fixed Ethernet Connection

● If the robot is connected to a fixed ethernet network via an ethernet cable, it will attempt to configure its network settings via the fixed ethernet connection using DHCP

● Once the robot has started, press the center button of the rotary controller in order to access the robot on-face menu, the menu displays the robot's IP address if successfully configured.

WiFi Connection

● Press the center button of the robot's rotary controller in order to access the robot on-face menu. Rotate the controller wheel in order to scroll up or down on the menu, select the `Manage WLAN` menu option by clicking the center button.

● Use the controller wheel to navigate to your desired WiFi network and click the center button in order to select that network. If the network requires a password: an input field will be shown on the menu, use a USB connected keyboard (not included) to enter the password and confirm its entry. Password entry is also supported by using an external screen.

● Use the controller wheel to navigate to the `Back` menu item and select it, you will return to the top level menu, where the robot's IP address is displayed if successfully configured.

● Select the `Exit` menu item to remove the on-face menu from the robot's face.

Beyond the use of the rotary controller and a keyboard, there are two additional ways in which you can configure the first time network settings.

● Use the WiFi-LAN feature on the on-face menu in order to create a WiFi hotspot hosted by your robot. Then use a device of your choice to connect to that WiFi hotspot and use the Web-Console to configure the robot network settings.

---

[3] Please ensure that your ethernet or WiFi connection supports DHCP & admits/routes traffic as required by standard devices

Furhat Robotics

- Connect An external screen, and login to the Web-Console using the screen, then use the Web-Console to configure the robot network settings.

Verifying Internet Connection

In order to verify that your connection is working, simply follow these steps:

- Enter the on-face menu by clicking on the center button of the rotary controller. The on-face menu should display an IP address at the top of the menu.

- Log in to the robots Web-Console and use the `Test The Speech Recognizer` Panel on the Home Tab. The speech recognition features require a working internet connection.

Using An External Screen With Your Robot
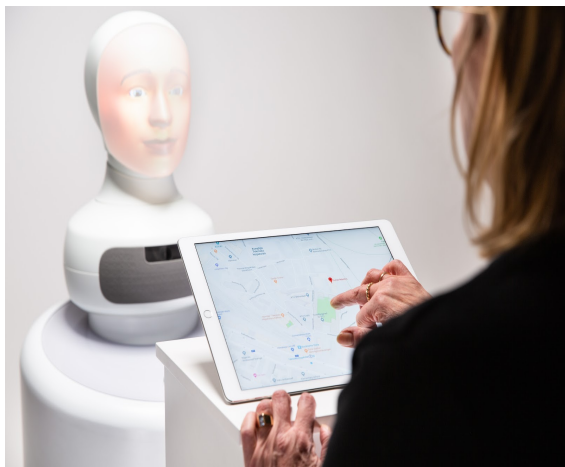
You can connect an external screen/touch panel to your robot via using the robot's USB ports.

This screen/touch panel can be used to access the robots Web-Console and also enable data entry via touch and on screen/panel virtual keyboard.

An external screen can also be used by Skills to extend their user interactions beyond the robot to GUI based interactions on the screen.

Setting Up External Screen

Always observe the instructions that come with your external screen in relation to its operation and connections, as a large variety of screens and connectivity options exist. With your robot switched off, connect the screen to your robot as follows:

- Some screens support video, power and touch via single USB-C cable. For such screens, simply connect the screen to the robots USB-C port using the single USB cable.

- For screens that use HDMI, connect the screen's HDMI port to your robot USB-C port (using an appropriate USB-C/HDMI adapter)

- For screens that use HDMI and support touch capabilities, a USB cable is used to transmit touch events from the screen to the robot, connect this cable to a USB-A port on your robot.

- Connect the screen to an appropriate power source and switch on the screen using the appropriate control/power button on the screen.

- Switch on your robot. The robot will detect the attached screen and present the Web-Console login page on the screen.

- On screens with touch capabilities, you can login using the virtual keyboard function. Touching and holding down the password field on the screen will bring up the virtual keyboard. Enter the appropriate password (default = `admin`) using the virtual keyboard and select the continue icon to log in to the Web-Console landing on the Home Tab.
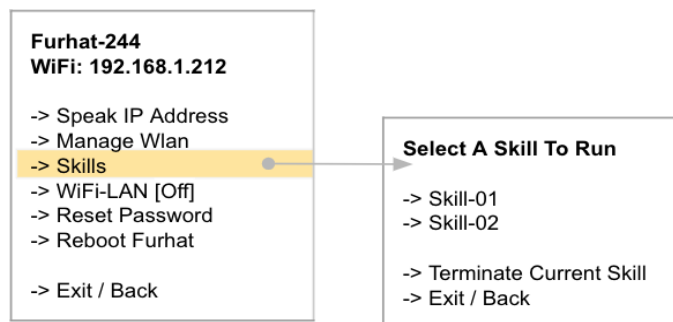
Using Your Robot

Running Skills On Your Robot

Skill is the name given to applications that run on your robot. Skills enable the robot to interact with users in the robot's interaction space using speech input and output, facial expressions, gestures and motor movements, tapping into the full expressive power of the robot.

If you have skills installed on your robot, you can `View`, `Start` and `Stop` any of these using the skills sub-menu in the on-face menu.

You can also `View`, `Start`, `Stop`, `Install` and `Uninstall` skills from your robot using the Skills features within the robots Web-Console.

Developing On Your Robot

If you are using your robot as part of a Robot Development Kit (RDK), you will need the Furhat SDK and can access all of the SDK documentation, as well as documentation relating to the use of your robot with the SDK at www.furhat.io

Operating Your Robot Using Web-Console

Your robot has a Web-Console that allows you to access, control, and configure the robot remotely using a web browser. In order to access the Web-Console you should connect the Computer / Tablet / Device from which you intend to access the Web-Console to the same network as you have connected your robot in the earlier configuration steps.

Your robot uses its robot name as it's formal host name on your network, so simply typing the robot name into your browser URL pane should navigate you to the robot login page
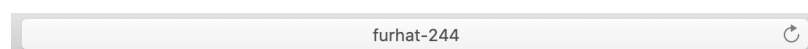
Note that some browsers or devices do not support the use of the robot host name as shorthand in the browser URL, and may require you to enter the IP address (see on-face menu) and http:// prefix in order to access the Web-Console.

Once on the Web-Console login page you can use the default password `admin` to login.

You can change the default password to a password of your choosing using the on-face menu or the security settings page of the Web-Console itself.

Home Tab

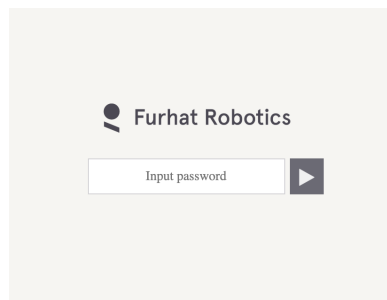The Home Tab provides access to basic remote control features for your robot, as well as enabling a few of the most high level configuration options.

At the top of the home panel you can see information on which skill is running on your robot, as well as the `user account` icon and the `console log` icon. The system audio volume can also be controlled using the `volume slider` at the top of the page.

Selecting the `user account` icon reveals the options to `Logout` the current user which will return to the Web-Console login page. Selecting the `Restart System` menu item will restart FurhatOS, note that selecting restart will also result in you being logged off the Web-Console requiring you to login again once the system has completed its restart.

Selecting the `console log` icon will expand the console log view within the page. The console shows important log messages from your robot, and is especially useful when developing Skills or assessing the performance and actions of the system
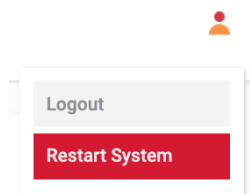
The console log also enables you to include or exclude log entries using `type` and `origin` filters.

The `type` filter enables you to show log entries according to their severity level.

The `origin` filter enables you to show log entries according to their origin. Selecting origin `skill` results in only log messages from Skills being displayed. Selecting origin `system` results in only log messages from FurhatOS being displayed

The Home Panel also contains a number of additional features as follows
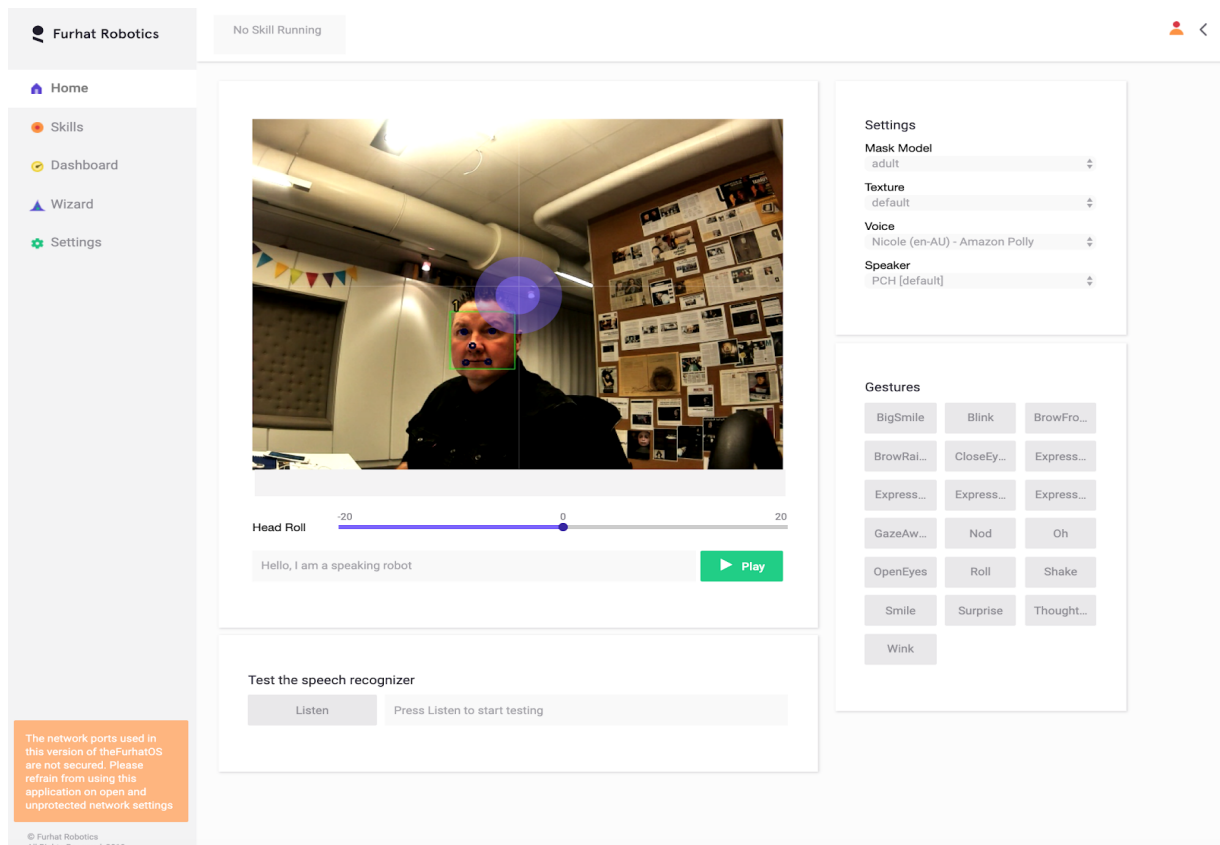
Video Panel

The Video Panel shows live video from the robots onboard camera. The video feed is overlaid with marker boxes when the robot has identified the presence of users in the interaction space of the robot.

Gaze Control

The Video Panel also enables you to remotely direct the gaze of the robot via motor movements of the robot's neck motion platform.
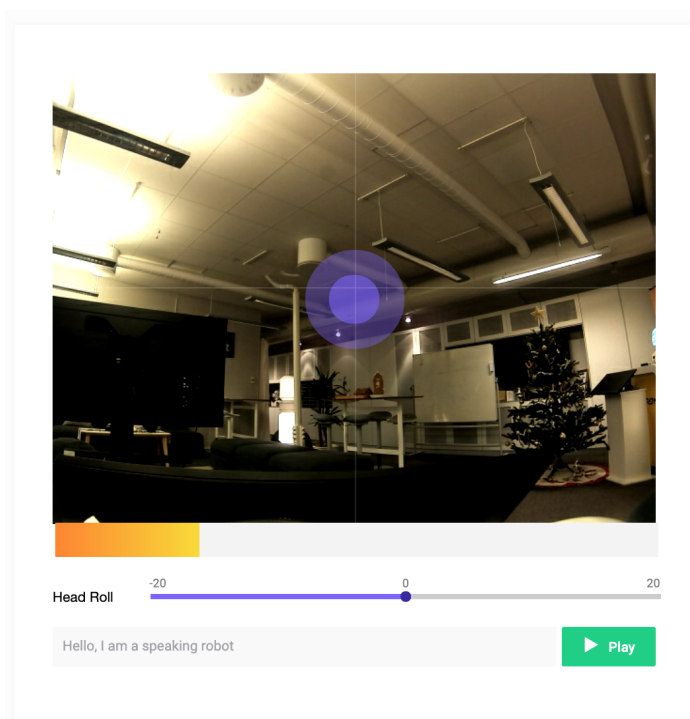
You can direct the gaze of your robot using a mouse inside the video panel.

The targeting double circle visible in the video panel indicates the current gaze position of the robots head

Clicking on a position within the video panel will result in the robot's head moving to direct its gaze to that position, in its field of view

Clicking and dragging your mouse within the video panel will result in the robots head following the drag movements of your mouse.

Roll Control

Your robot's neck motion platform supports 3DOF (3 degrees of freedom motion). The Roll Control enables you to remotely direct the roll angle of the neck from the Web-Console.

Clicking on the roll control enables you to adjust the roll angle from `-20 degrees` of vertical to `+20 degrees` of vertical.

Speech Output Panel

The Speech Output Panel enables you to enter text of your choosing, and on selecting the `Play` button, having the robot speak the entered text, using it's speech synthesis features

Hello, I am a speaking robot	▶ Play

Note that the voice used in speech output is the voice selected in the Home Settings Panel.

Speech Recognition Panel

The Speech Recognition Panel enables you to test the function of the robot microphones as well as speech recognition features.

When you select the `Listen` button, the robot will indicate that it is listening. Simply speak some words or a sentence of your choosing (in English), and the robots' understanding of your speech will appear in text on the Speech Recognition Panel. The orange bar dynamically indicates the amplitude (volume) of audio detected by the robot's microphone, as you speak.

If the robot does not register your speech - check the settings tab to verify your microphone settings and verify your internet connection, as internet connectivity is required by the speech recognizer features.

Home Settings Panel

The Home Settings Panel gives you access to some of the most frequently used settings on the Home Tab (these settings are also all available under the Settings Tab).

`Mask Model` enables you to select a face geometry, the standard mask model is called `Adult,` and this matches the default physical mask shipped as standard with your robot. Other mask models may require different physical masks in order to function correctly.

`Texture` enables the selection of a face texture set, which is used to *paint* the mask model, giving your robot different facial identities. Your robot includes a

set of different textures allowing you to vary your robots look, with the default physical mask

`Voice` enables you to configure your robot's voice. A large number of male and female voices in a large selection of international languages is available for your robot. Your robot supports voices from providers such as *Amazon Polly*, *Acapela* and *Cereproc.*

`Speaker` allows you to select the sound output device. Your robot includes a built-in loudspeaker system (`PCH Default`) while also allowing you to connect and use additional output devices such as those connected to the line-out jack or USB connected audio devices.

Gesture Panel

The Gesture Panel enables you to remotely direct all of the built-in gestures on your robot. For example you can direct your robot to:

Gestures

BigS...	Blink	Brow...
Brow...	Close...	Expre...
Expre...	Expre...	Expre...
Gaze...	Nod	Oh
Open...	Roll	Shake
Smile	Surpr...	Thou...
Wink		

Smile
Blink
Frown
Raise Brow
Express Anger
Express Disgust
Express Fear
Gaze Away
Nod
Express Ohh
Close eyes,
Open Eyes
Roll
Shake
Smile
Surprise
Look Thoughtful
Wink

Skills Tab

The Skills Tab gathers features related to skill management. This includes viewing the list of installed skills, importing/deleting skills, starting/stopping skills, and configuring skills.
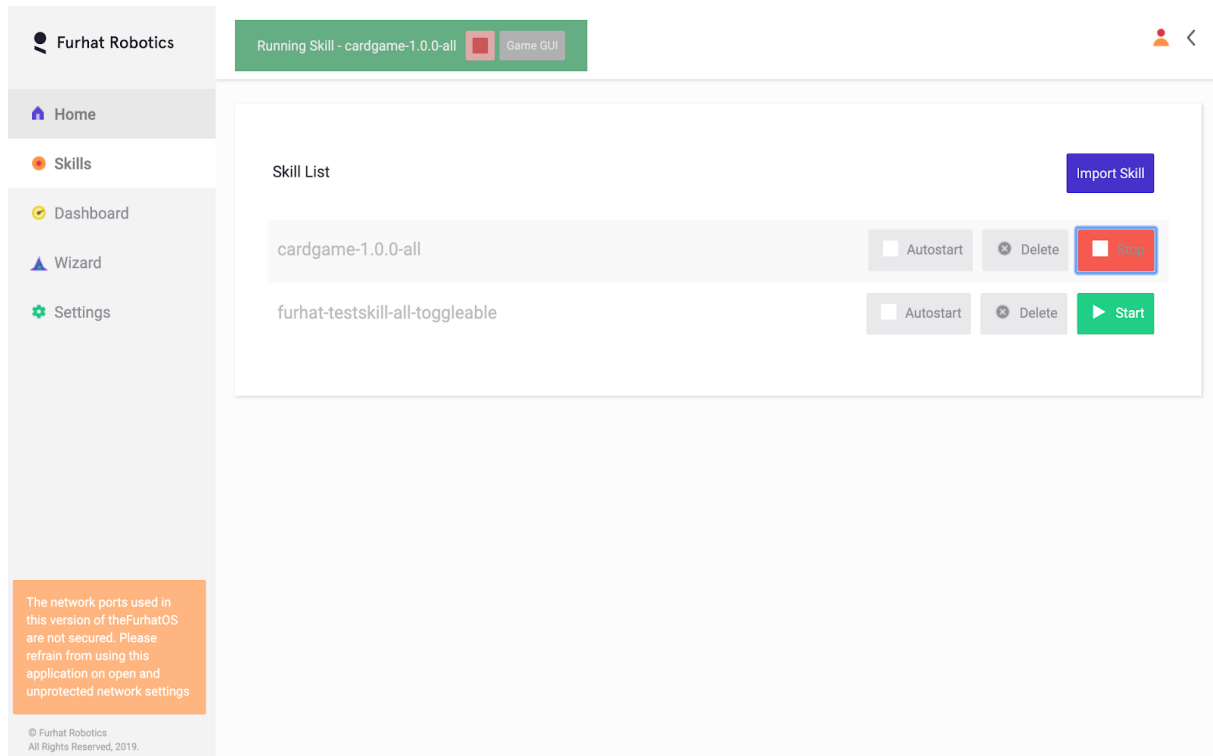
The top bar of the Skills Tab indicates the name of the currently running skill. The top bar also includes a `Stop` button which will stop the currently running skill. In addition, a skill can include a GUI component which provides additional skill features via a browser based GUI, this GUI (if present) is accessed by pressing the grey `GUI` button.
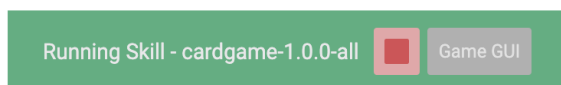
Installing Skills

The Skills Tab enables you to import new skills on your robot. This feature is accessed using the `Import Skill` Button.

Selecting the button will allow you to select a skill file from any file system reachable from the device from which you use your robots Web-Console. The skill file must be in FurhatOS `.skill` format as generated by an appropriate version of the Furhat SDK (www.furhat.io)

Running & Managing Skills

The Skills Tab also allows you to run, configure, and manage your skills as follows

cardgame-1.0.0-all	☐ Autostart	⊗ Delete	■ Stop
furhat-testskill-all-toggleable	☐ Autostart	⊗ Delete	▶ Start
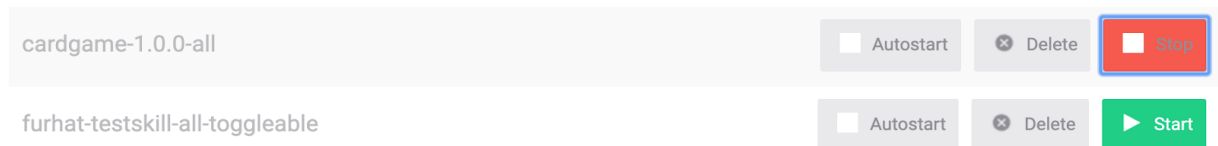
If you want a particular skill to run each time you start your robot, you should select the `Autostart` option on the relevant skill. Note, that only one skill at a time can be marked as `Autostart` as FurhatOS currently runs one skill at a time.

If you wish to start a particular skill, or stop the currently running skill, then select the `Start` or `Stop` buttons for the relevant skill as desired.

If you wish to uninstall a skill from your robot, then select the `Delete` button and confirm the removal of the skill in the confirmation dialog that follows.

Dashboard Tab

The Dashboard Tab is primarily used to monitor and inspect the actions of the running skill on your robot. It delivers these insights primarily via the Attention Panel and the Skill Log Panel.
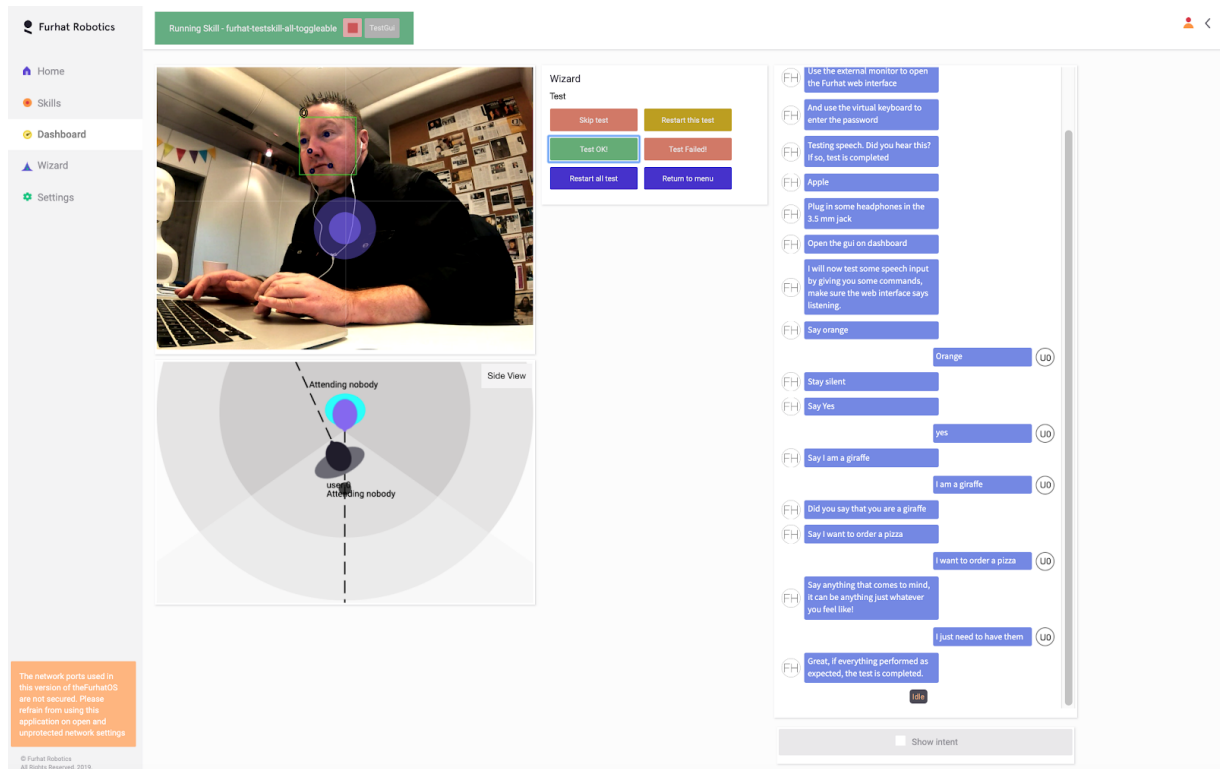
Video Panel

Please refer to the related Video Panel information in the earlier Home Tab chapter.

Gaze Control

Please refer to the related Gaze Control information in the earlier Home Tab chapter.

Wizard Panel

The Wizard Panel enables skill specific actions to be controlled from the Web-Console. The contents of the Wizard Panel are defined by the skill and are not a generic part of the system.
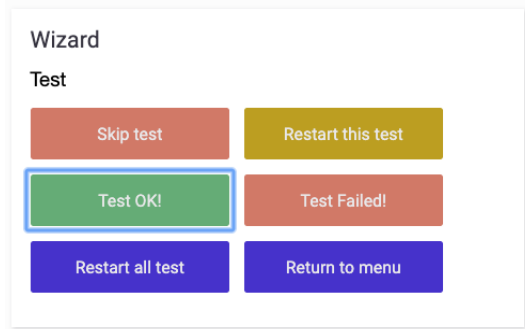
In this example, the Wizard Panel is populated by the Furhat Robotics Test Skill, the skill provides a number of buttons inside the Wizard Panel that allow certain aspects of the Test Skill to be controlled from within the Web-Console.

Attention Panel

Your robot can detect and track the presence of users within the robots interaction space[4] using it's onboard camera and the sensory perception features of FurhatOS. The Attention Panel provides an abstract graphical representation of the robot's attention model and supports viewing the model from a top down (plan) and side (elevation) view point.
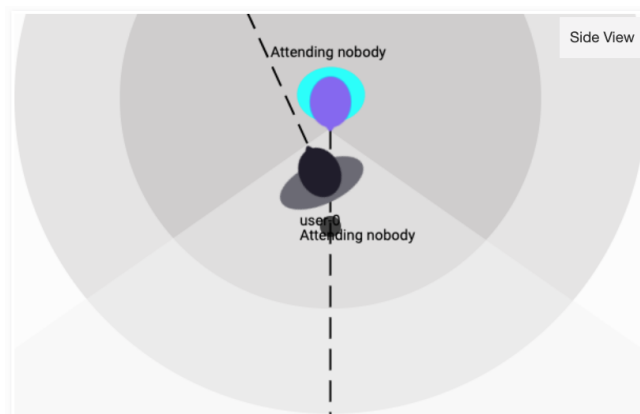
The Attention panel represents your Robot using the blue/purple icon at the top dead center of the representation.

Users that have been detected by the robot are denoted using a gray/black icon and given a sequential identity of the form `User-N`. As the users move about the interaction space the attention panel updates their position dynamically.

In order to support interactive testing of skills, the Attention Panel enables you to add or remove virtual users by double clicking within the interaction space, these users are given a sequential identity of the form `Virtual-User-N`. To add a virtual user, simply double click inside the interaction space, to remove the same virtual user simply double click the relevant virtual user icon inside the interaction space.

If the running skill is attending to a particular user in the robots interaction space, the attention panel will indicate this state with the label `Attending User-N`

---

[4] Note that the interaction space can be defined and configured from within the skill
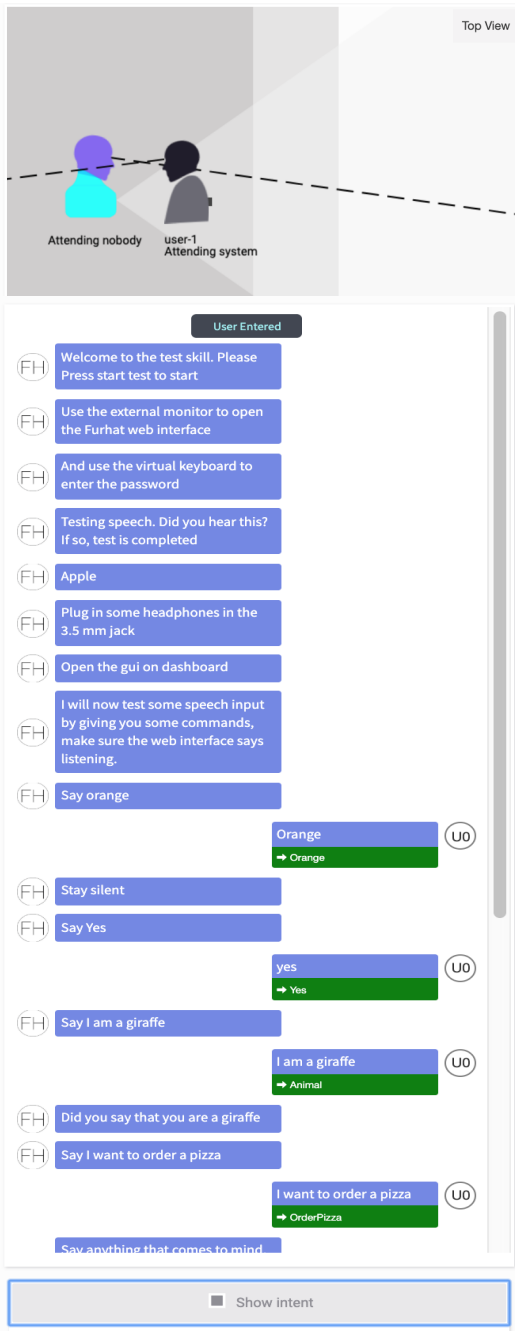
You can toggle between `Top View` and `Side View` using the toggle button in the top right of the Attention Panel

Skill Log Panel

The Skill Log Panel shows key details of the interaction flow within the currently running skill.

States, actions and utterances made by your robot are denoted with the label `(FH)` and left justified within the log panel.

Utterances detected from users are denoted with a label of the form `(U-N)` and are right justified within the log panel.

Additional key events within the dialog flow are displayed with center justified labels within the log panel. Examples of these are events such as `User Entered`, `User Left`, `Idle`, `Listening` etc.

If the `Show Intent` option at the bottom of the panel is selected then the log panel will annotate user utterances with the `intent` that the system matches the utterance with.

Wizard Tab

The Wizard Tab offers many of the same features as the Dashboard Tab, with the key difference that the Wizard panel, that is defined and populated by a Skill, allows more freedom for the skill developer to control the layout of the buttons and controls within the Wizard Tab (as compared to the Dashboard tab where the skill developer has no control over the layout)
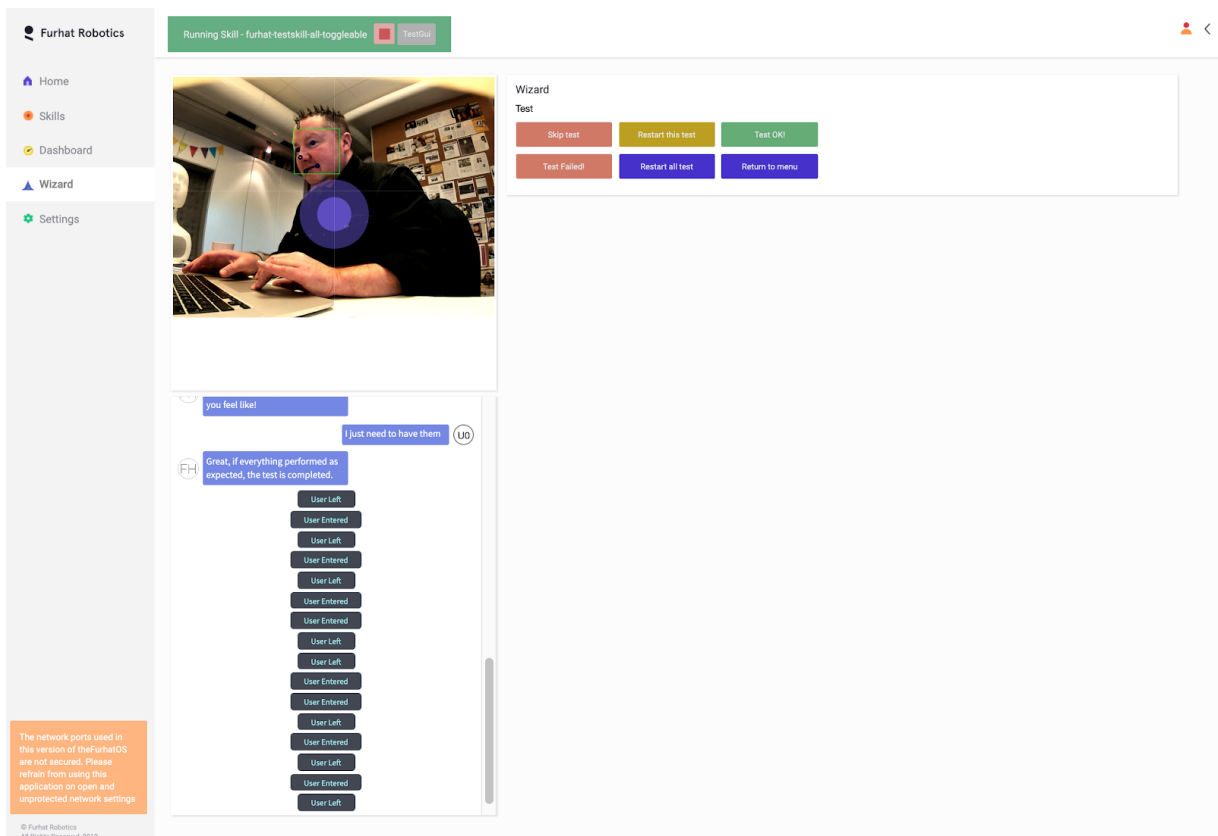
Settings Tab

The Settings Tab enables you to view and change all the operator level settings on your robot.

⚙ Settings

You can access the Settings Tab by clicking on the `Settings` button, you will then be presented with a range of settings arranged in functional groups

Face & Neck Settings Panel

The following settings are available for your robots Face and Neck. The Change Face Panel enables you to change the `Mask Model` and `Texture`. Please refer to the description in the earlier Home Tab chapter.

Change Face

Select the default face(mask) model and texture for Furhat. If a skill doesn't set its own model and texture, this setting will be used.

Mask Model
adult

Texture
default

The Face & Neck Settings Panel also enables you to calibrate a wide array of additional face settings.

Calibrate Face
Calibrate the face projection of Furhat.

Left/Right	4.8
Relative room scale	-128.57
Up/Down	-23.18
Horizontal scaling	1.12
Vertical scaling	2.08
Tilt	0
Roll	0.22
Left eye	0
Right eye	0
Top mask	0

The `left/right` setting determines the centering of the face on the horizontal plane

The `relative room scale` setting calibrates the face position in space relative to lighting sources in the model

The `up/down` setting enables you to center the face on the vertical plane

The `horizontal scaling` setting enables you to scale (stretch/shrink) the face in the horizontal direction.

The `vertical scaling` setting enables you to scale (stretch/shrink) the face in the vertical direction.

The `tilt` setting enables you to *pan* the face in the horizontal direction.

The `roll` setting enables you to *pitch* the face in the vertical direction.

The `left/right eye` setting allows control of the respective eyes pupil centering.

Fine grained adjustment of an array of face settings is also facilitated[5] via the Configure Face Panel. The panel displays and allows the editing of the lower level face configuration attributes expressed as a JSON document.
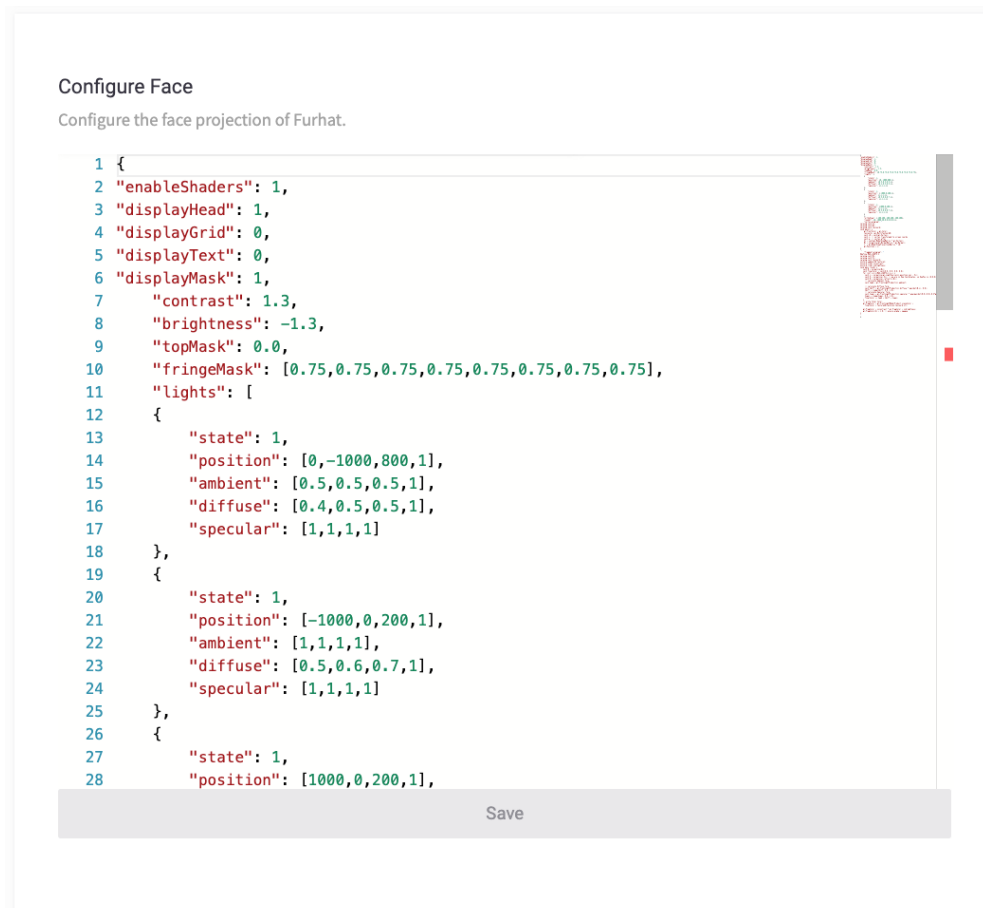
Changes are made by making valid edits to the JSON document and then selecting the `Save` button. We advise you to make a copy of your settings in advance of making any changes.

Fine grained adjustment of an array of neck settings is also facilitated via the Configure Neck Panel. The panel displays and allows the editing of the lower level face configuration attributes expressed as a set of discrete parameters.

---

[5] Note that changes to this model require specialised knowledge and care.

Furhat Robotics

Configure Neck

Configure the neck parameters of Furhat

```
 1  pan.center = 500
 2  pan.id = 1
 3  pan.max = 20
 4  pan.min = -20
 5  pan.speed = 40
 6  pan.type = MX
 7  tilt.center = 500
 8  tilt.id = 2
 9  tilt.max = 20
10  tilt.min = -20
11  tilt.speed = 40
12  tilt.type = MX
13  tilt2.center = 500
14  tilt2.id = 3
15  tilt2.max = 20
16  tilt2.min = -20
17  tilt2.speed = 40
18  tilt2.type = MX
19
```

Save

Changes are made by making valid edits to the discrete parameters and then selecting the `Save` button. We advise you to make a copy of your settings in advance of making any changes.

Robots equipped[6] with the Furhat Projection System (FPS) which supports software based focus control from within FurhatOS have an additional focus control panel inside settings.

Adjust Projector Focus

Control the focus of Furhat's face projection.

▲

▼

FPS focus adjustment may be required in conjunction with the use of custom face masks, or as part of periodic maintenance activities. Select the `Up-Arrow` and `Down-Arrow` buttons one

---

[6] Robot Hardware revisions of 2.3.1 and later / Robots from Furhat-319 and onwards

step at a time, and using visual methods adjust the focus to your robot setup and/or application (skill) needs.

Microphone Settings

Your robot has an on board stereo microphone setup, however it also ships with a USB connected microphone array. and supports the use of additional USB microphones if you desire.

We recommend the use of the included USB connected microphone to fulfill the audio performance requirements of the speech recognition features. The included USB microphone also enables advanced FurhatOS features such as assigning speech to specific users in the robots interaction space / situation model.
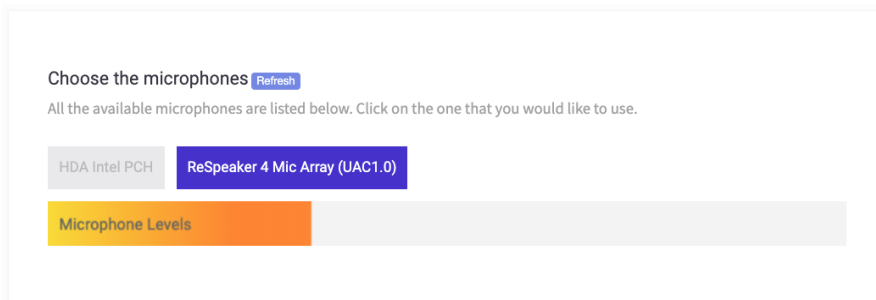
The Choose Microphones Panel allows you to view the list of connected microphone devices, to refresh the list of microphone devices, to select the active microphone, and to check the audio levels picked up by the selected microphone.

If you have connected or disconnected a USB microphone from your robot, use the `Refresh` button in order to refresh the list of connected devices. The connected microphone devices are shown using their own distinct buttons.

In order to select the active microphone, click on the respective button. The active microphone will be highlighted and the passive microphones will be grayed out.
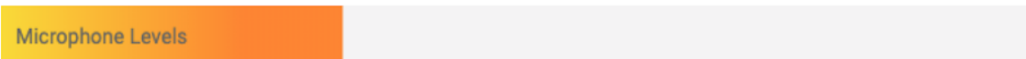
The Microphone Levels bar indicates the volume and sensitivity of the active microphone on a high level.

Recognizer Settings

Your robot comes with built-in support for advanced speech recognition using the *Google Cloud Speech* and the *Microsoft Azure Cognitive Services Speech-to-Tex*t cloud services.

The system allows one recognizer service at a time to be active. The active recognizer is selected using the appropriate button on the `Choose Speech Recognizer` panel.
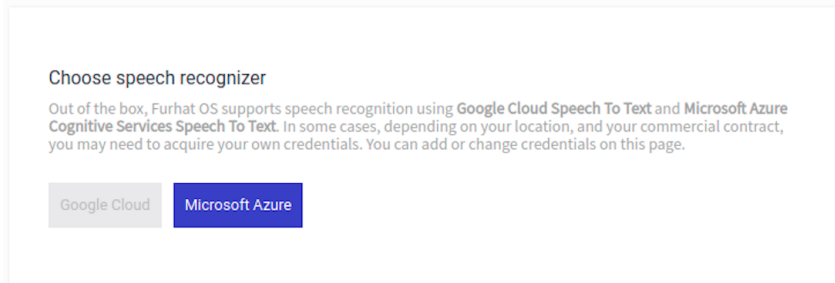
Microsoft Azure support is considered in beta status from release 1.17.0. Where possible, we recommend use of the Google recognizer and it remains the default system recognizer.

Once the recognizer service has been selected, it will be denoted by an Active label on the respective `Recognizer Settings` panel. You can test your settings using the `Test the speech recognizer` function on the Home Tab.

The use of recognizer services requires appropriate *Google*/*Microsoft* service specific accounts and the related account keys/credentials. Depending on your contract, your robot may ship with predefined credentials for one or both services. If you do not have predefined credentials, or you wish to change to an account which you control and administer directly, then you can acquire and configure your own account and substitute the appropriate account data into the service specific recognizer settings panel.
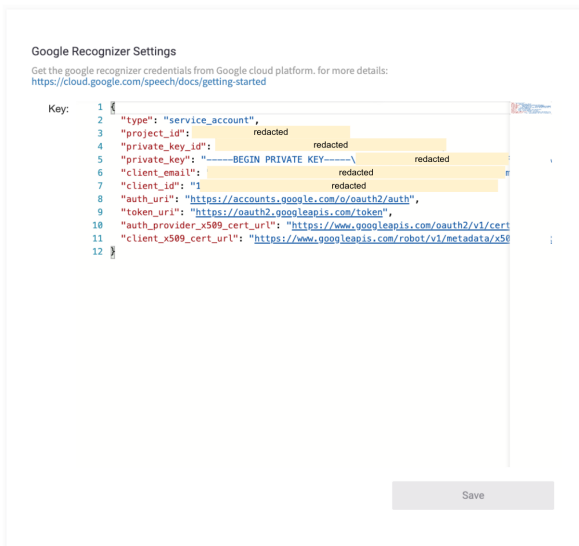
If you are using the Google Recognizer you supply the required key in the `Google Recognizer Settings` panel. Selecting the `Save` button saves the key data into the system

If you are using the Microsoft Azure Recognizer you supply the required key in the `Azure Recognizer Settings` panel. Selecting the `Save` button saves the key data into the system.

Azure Recognizer Settings   Active

In order to acquire your own recognizer credentials for Microsoft Azure Cognitive Services Speech To Text, please visit:https://azure.microsoft.com/en-us/services/cognitive-services/speech-to-text/

Region

northeurope ▼

Key

5b399f0464e645b68cf0e80b54c62a34

Save

Note that the Azure `key` is specific to each `region`.

Voice Settings Panel

Your robot comes with built-in support for advanced speech synthesis using both the *Amazon Polly*[7] service(s) as well as a variety of onboard[8] voices from leading providers.

Choose the default voice

All available voices are listed below. If a skill does not set its own voice, this setting will be used.

Name	Gender	Language	Synthesizer
william	Male	English (United King…	Cereproc
Erik22k_HQ	Male	Swedish (Sweden)	Acapela
Elinfurhat22k_HQ	Female	Swedish (Sweden)	Acapela
Emil22k_HQ	Male	Swedish (Sweden)	Acapela
Freja22k_HQ	Female	Swedish (Sweden)	Acapela
Emma22k_HQ	Female	Swedish (Sweden)	Acapela
Filip22k_HQ	Male	Swedish (Sweden)	Acapela
Elin22k_HQ	Female	Swedish (Sweden)	Acapela
Erik22k_CO	Male	Swedish (Sweden)	Acapela
Elin22k_CO	Female	Swedish (Sweden)	Acapela
Lotte	Female	Dutch (Netherlands)	Amazon Polly

Hej, jag är en talande robot   ▶ Play

The Default Voice Panel allows you to select the voice that will be used by default for speech output on your robot from the list of available voices installed on your robot. The list of installed voices[9] can be sorted by `Name`, `Gender`, `Language` and `Synthesizer` (voice provider). Click

---

[7] The use of this service requires an active *Amazon Polly* account

[8] The set of onboard voices installed on your robot depends on your contract

[9] The set of pre-installed voices on your robot depends on your service contract

● Furhat Robotics

on the desired voice in order to select it as the active voice. You can test your settings using the `Play` function immediately under the list, or on the Home Tab.
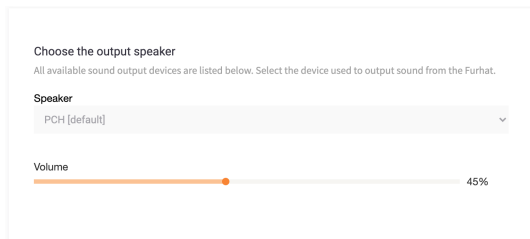
The Output Speaker panel enables you to select the desired output audio device as well as adjusting the system audio volume. Please refer to the related description under the Home Tab.

In addition to onboard voices, your robot comes with built-in support for advanced speech synthesis using the *Amazon Polly* service(s). The use of this service requires an active Amazon Polly account and subscription with the related credentials.
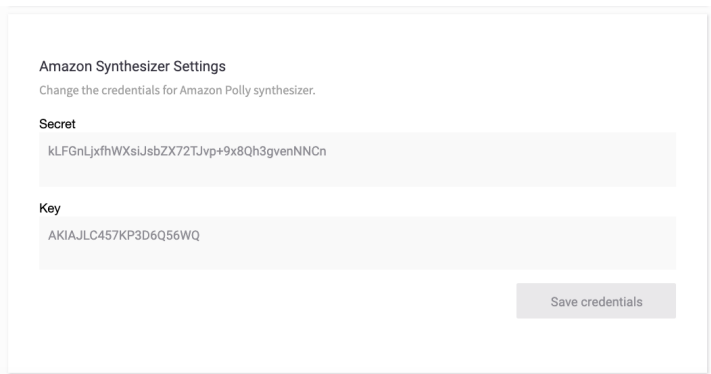
The Amazon Synthesizer Panel allows you to supply the relevant credentials (`Secret` and `Key`) required in order to access Amazon Polly speech synthesis services

You can test your settings using the `Play` function on the Home Tab

Depending on your contract, your robot may ship with a license for Acapela voices. The voice settings panel enables you to check whether you have a license installed on your system.
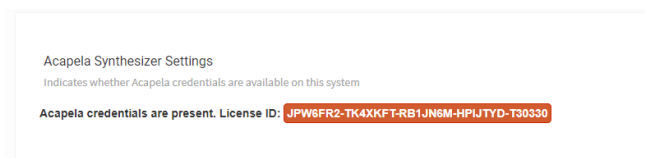
If you do not have a license installed, the settings panel enables you to request a license, using the `Request Credentials` button.

Furhat Robotics
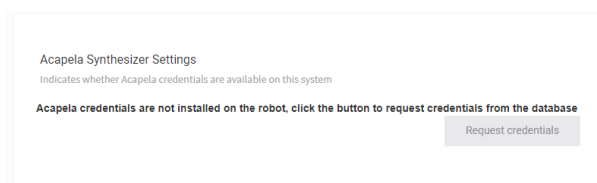
Once you have received your license, you will need to restart your robot in order for the license to take effect and the Acapela voices to be available.

Depending on your contract, your robot may ship with a predefined set of Amazon credentials. If you do not have a predefined account, or you wish to change to an alternative account, then you can acquire and configure your own account and substitute the credential into the `Secret` and `Key` field as appropriate, then use the `Save Credentials` button to confirm the changes. You can test your settings using the `Test the speech` recognizer function on the Home Tab
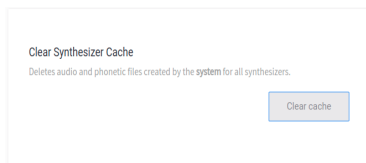
Your robot caches speech output locally as an efficiency and performance measure. Depending on your use case, you may consider the contents of the speech synthesizer cache to be sensitive and private. You can delete the contents of the speech synthesizer cache at any time using the `Clear Cache` button.

Asset Management Panel

Your robot ships with a set of preloaded Face Models and Textures that fit with the default physical mask. You can select the currently active model and mask in the Home Tab. It is also possible to upload your own custom models/textures using the Asset Management Panel.

Defining a new model and textures is a technical task that requires basic graphical modelling skills and tools. You can find information on the different parts of an asset bundle, as well as example asset bundle(s) here: https://docs.furhat.io/textures/
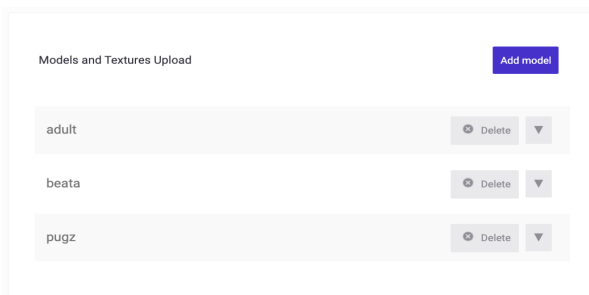

The Asset Management Panel shows a table of the currently installed face models.

Use the `Add Model` button to upload a new model to your robot.

Use the `Delete` button to delete a model from your robot.

If you wish to edit a model already installed on your robot then you can do so using the `expand` button and then navigating to the asset sub-part and using the edit button on the sub-part.
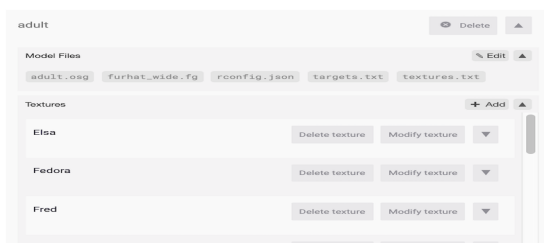
The expanded asset view lists the asset sub-parts starting with the `Model Files` and then continuing with the `Textures`

Select the desired asset sub-part from the list.

Furhat Robotics

Use the `Expand`, `Add` and `Edit` buttons to modify the selected asset sub-part.

Network Settings Panel

Your robot supports both wireless (WiFi) and wired (wired ethernet). You can configure your network connection both in the On-Face Menu accessed via the rotary controller, as well as on the Network Settings panel.
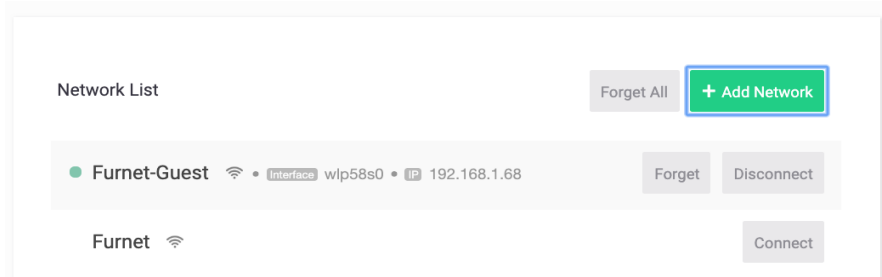
The currently connected network is denoted with a green dot. Information is provided on the (network) `interface` on your robot to which this network is attached, as well as the `IP address` that has been allocated by the network to your robot.

You can use the `Disconnect` button to disconnect from the current network and connect to an alternative network using the appropriate `Connect` button.

You can use the `Forget` button to remove the network and its specific settings from your robots network settings database. This includes any associated security settings and credentials.

You can use the `Forget all` button to remove all of the displayed networks and their respective settings, this can be useful for example if you have been travelling extensively or experimenting with different network configurations on your robot.

You can use the `Add Network` button to add a network that is not automatically discovered by your robot. This is generally only required for wireless networks that are configured to explicitly not broadcast their network name (SSID)
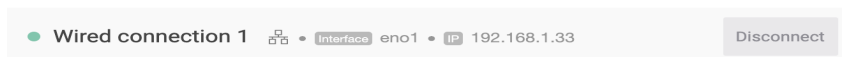
If you are connected to a network using wired ethernet, you will see a network denoted as a `Wired Connection` as shown here.

Security Settings Panel

The Security Settings Panel enables you to configure the security settings of your robot.

The Password Settings Panel gives you control over your robots password. This is the password that grants access to the robot Web-Console, with the default password `admin`. It is recommended to change the default password to a secure and appropriate password of your own choosing.
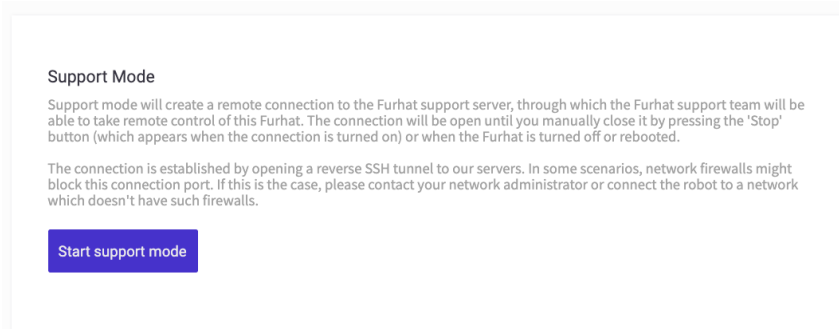
Enter your current password in the `Old Password` field, then enter your new password and repeat the new password to confirm it, before using the `Save Password` button to finalise the change of password.

Support Panel

Your robot has a remote support capability that enables you, at your command, to connect your robot in a live support session with Furhat Robotics support personnel. In advance, you should file a support ticket via https://furhat.io/ and the Support button at the top of the page.

To start support mode, select the `Start Support Mode` button on the Support Panel. To end support mode select the `Stop Support Mode` button.

Support mode uses an authenticated reverse secure shell (SSH) connection between your robot and Furhat Robotics support. Some office network environments may have network rules or

policies preventing this, please check with your local administrators if you encounter problems with this.

Update Panel

Furhat Robotics releases updates to FurhatOS on a regular basis. We recommend you run our latest software and your robot supports remote upgrade using the Update feature.

The Update Panel shows you which version of FurhatOS your robot is running. It also indicates if you are already on the latest version of the system

> **Update Furhat**
>
> You are already on the latest version.
>
> Current version: **1.15.0**

If you wish to upgrade your robot, please select the `Update` button and observe the instructions on screen.

The update feature should be used only when connected to a network with good performance as the process may require downloading a significant amount of data. Similarly, avoid triggering the update feature when connected to a network with data caps or similar restrictions.

The duration of the update process is highly dependent on your network performance with the actual update on the robot taking less than 5 minutes once the software packages have been downloaded to the robot.

Note also that your robot will restart as part of the upgrade procedure and that you may lose contact with your Web-Console browser session as a consequence of the restart procedure.

Camera Panel

If your robot is of type Research, then you will have an additional settings panel for the Camera. Currently, this panel provides access to the Camera Feed feature.

The camera feed feature enables the streaming of live video from your robot to off-robot systems via the network. The default setting for this feature is Disabled.

Camera Feed

The Camera Feed feature streams live video from your robot's camera via the network. When enabling the camera feed, you should give due consideration to applicable ethical, security, and privacy requirements. For more information please visit our docs.

DISABLED
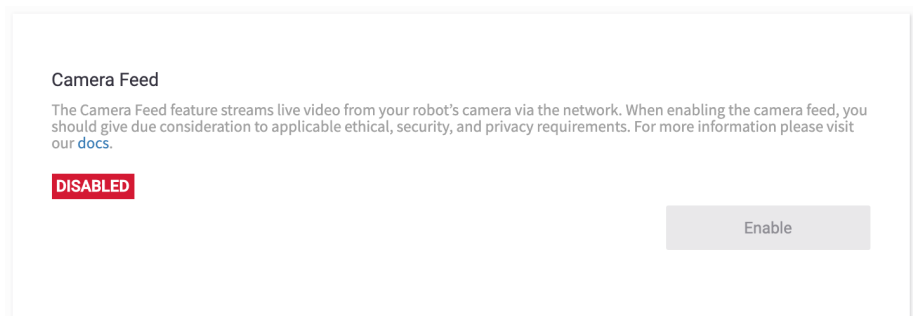
Enable

In order to enable the camera feed, simply select the `Enable` button. The system will display the network address, port number, and applicable protocol by which the video feed is made available.

Camera Feed

The Camera Feed feature streams live video from your robot's camera via the network. When enabling the camera feed, you should give due consideration to applicable ethical, security, and privacy requirements. For more information please visit our docs.

ENABLED Camera Feed available at 10.10.8.94:3000 with a ZMQ.SUB socket

Disable
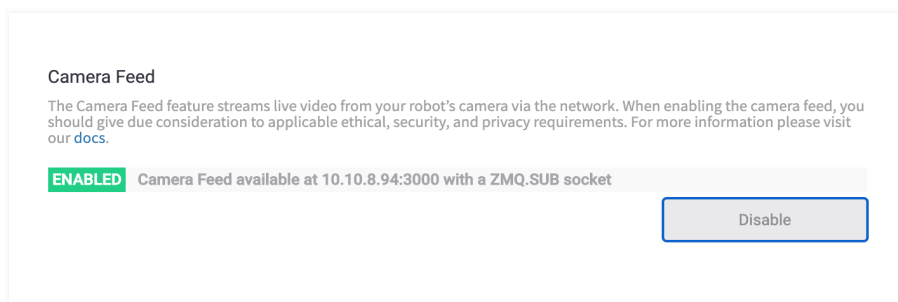
When enabling the camera feed, please give due consideration to applicable ethical, security and privacy requirements.

Information on how to receive and programmatically process the camera feed video stream can be found on docs.furhat.io

Robot Deployment Guidelines

There are a number of steps you can take in order to ensure the best possible performance of your robot when running skills and catering to end-users. Note also that the skill developer may provide additional specific guidelines for optimal performance of their skill on your robot.

General Environment Design Considerations

The physical environment in which your robot is deployed interplays with the type of skill[10], and the user's situation. Controlling and designing the environment around your robot is key to both fundamental and advanced aspects of the interaction delivered by the skill.

For example, a user needs to be able to see and hear the robot as well as intuitively knowing how to interact with it. Placement of the robot will dictate some fundamental principles of the interaction. Different spaces have different conversational affordances and will elicit different user behaviours. The technical requirements for providing a good environment for the interaction goes hand in hand with the design of the conversational interaction. Generally, a more controlled environment around your robot will make it easier to design and implement the interaction. The robots physical environment should be designed so that is clear to the user:

● How to approach the robot
● What the robot is capable of doing
● In what space you can interact with the robot

The physical environment should also support the skills need for:

● Emotional connection
● Control of the interaction space

Finally there are technical requirements around the spatial, visual, and audio environment, as well security and maintenance of the robot.

Additional Spatial Design Considerations

The optimal height of the robot is where it is at eye level or or just below eye level with users and the placement of the robot should be at the appropriate height taking into consideration what users it will be interacting with (e.g. a seated or a standing interaction).
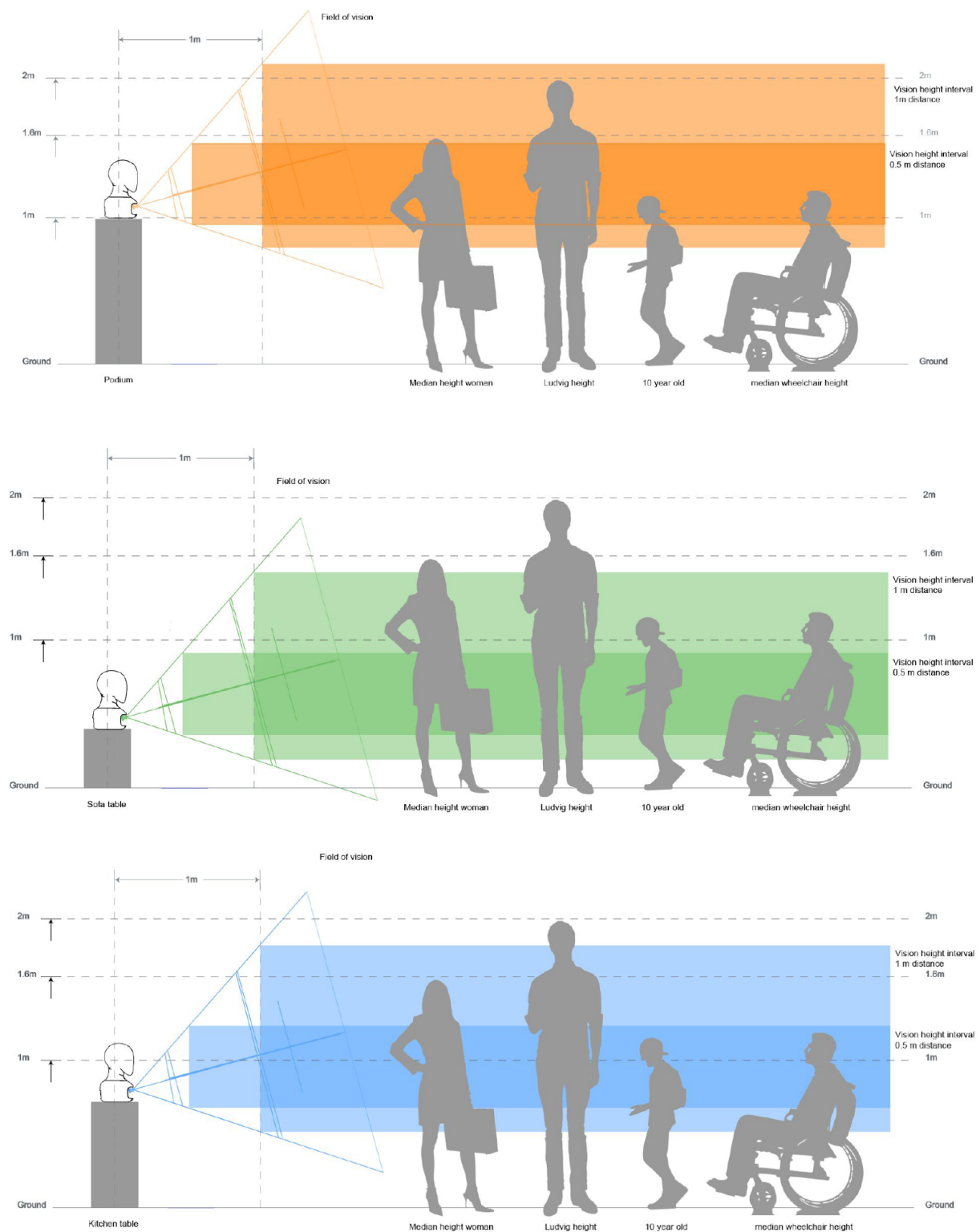
● A mounting surface height of 100-115 cm is recommended for standing interaction
● A mounting service height of 80-95 cm is recommended for seated interactions

---

[10] https://docs.furhat.io/introduction/#different-types-of-applications

● A distance of 1 meter between the robot and users is considered optimal for interactions

The virtual interaction space of the skill should ideally be reinforced or encoded in the physical environment, so that interacting with the robot becomes intuitive from a physical perspective:

- Can the physical setup be used to constrain the number of users to optimal levels ?
- Can the physical design help separate active users from bystanders ?
- Is the camera facing users in the best manner, e.g. enabling their detection as they enter ?

Lighting Considerations

Your robot's face projection is most vivid in medium and darker indoor lighting conditions and less vivid in bright direct sunshine. Your robot's camera and perception features require users interacting with the robot to be reasonably well lit in order to detect, track and identify the users.

Ideal lighting conditions are those where there is less direct light on the robot, but direct light on the users in the interaction space.

Ambient Noise Considerations

The ambient noise of the environment has a significant effect on the speech recognition performance of your robot. Noisier environments will cause increases in speech recognition errors. Environments containing a lot of background human speech "noise" are the most negative for speech recognition performance. For best performance, we recommend you reduce ambient noise levels as much as possible

Microphone Placement Considerations

Your robot includes a USB connected external microphone. For optimal performance, the microphone should be placed on a level surface where it is directly in between the users and the robot. If placed closer than 10-15 cm to the robot, there is a risk the microphone will pick up fan noise from the robot. To be able to detect the direction of the user speaking, the microphone is best placed on a level surface, however, it can also be placed on a sloping surface of no more than 45 degrees incline.

External Monitor Placement Considerations

If you choose to use an external monitor with your robot, it should normally be placed within the robot's actual field of interaction, so that the robot can reference the screen, by looking at it.

The monitor should also be placed such that the brightness of the screen will not interfere with the face projection of the robot. The placement of the monitor needs to be in line with the use of the monitor in the skill. E.g. if the user is supposed to cooperate with the robot on the content displayed on the monitor, the monitor should be placed at an equal distance from the user and

the robot. Whereas if the robot is using the monitor to display information, the screen is best placed closer to the robot.

Physical Security Considerations

The physical deployment of the robot should pay attention to securing access to the rear I/O panel of the robot where multiple physical I/O ports are present. The robot's rotary controller is also accessible at the rear of the robot and this controller can be used to effect changes to the robot's configuration and settings.

Your robot can be physically secured to any appropriate mounting surface using the hole in the bottom side of the robot.

Caring For Your Robot

Your robot is designed in order to give you years of reliable service if cared for appropriately.

Environmental

The robot is designed for deployment in indoor office/business premises environments.

- Ambient temperature range 5-25° C / 41-77° F

- Low humidity, vibration, and dust levels.

- Ventilation clearance of 200mm behind the robot unit

Operations & Handling

The robot is designed to be operated like any other commercial electronics product.

- Exercise care when using the electrical, audio, and data ports on the robot

- Use controls such as the rotary controller and on/off switch with care in order to maximise their service lifetime

- Avoid mechanical shocks and vibrations in the robot's environment. The robot contains sensitive and finely calibrated optics which may be damaged or misaligned by shocks

- Avoid manual adjustments and *playing with the neck* as this can damage or cause misalignment of the robot motion platform and mechanics.

- Avoid removing power from your robot while it is running. Shut down your robot using the on/off switch and only then remove power from the robot.

- We recommend that you keep your robot up to date with the latest releases of *FurhatOS* using the software update function within the Web-Console

Your robot is designed to operate reliably in a continuous, sustained manner, however:

- In order to maximise the lifetime and performance of the robot, in particular it's projection and optics systems, we recommend that you switch off the robot when it is not in use.

Cleaning & Periodic Maintenance

The following cleaning and care tasks should be performed on a periodic basis

- Rub down / dust the robot using using a clean lint free cloth

- Check that there is adequate ventilation clearance behind and around the robot unit

- Inspect the rear ventilation grill and ensure it is free of obstruction and/or dust/lint

- Check that power, audio and data cables are in good condition and securely connected

Transportation

Your robot contains sensitive finely calibrated optics, projection, and mechanical components which can be damaged due to shocks and or incorrect handling during transportation.

- The protective case in which your robot came is the ideal transportation device for your robot. It is designed and built to offer maximum protection to your robot while it is being transported.

- When flying with your robot it is recommended to check-in your robot as special baggage and add fragile labels (where available) to the casing. Your robot does not contain batteries or other components requiring special handling by airlines or airports.

Furhat Skills

Furhat Robotics has a number of skills, including a demonstrator skill, that can be used to explore and showcase our products. Please contact sales@furhatrobotics.com for further information on Furhat Skills.

Support

We are happy to support you in getting the best use and value out of your Furhat Robotics products. Should you require support, or wish to report an issue with your Furhat Robotics product, please use our online service desk by visiting www.furhat.io and following the Support link at the top of that page.
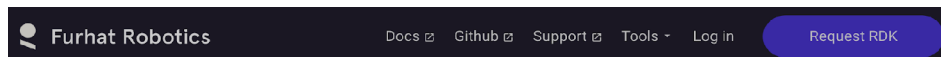
By selecting the Support link you will be routed to our service desk page. From this page you can request help via Technical Support, Report a bug you have discovered, Share a feature idea or improvement you have in mine.
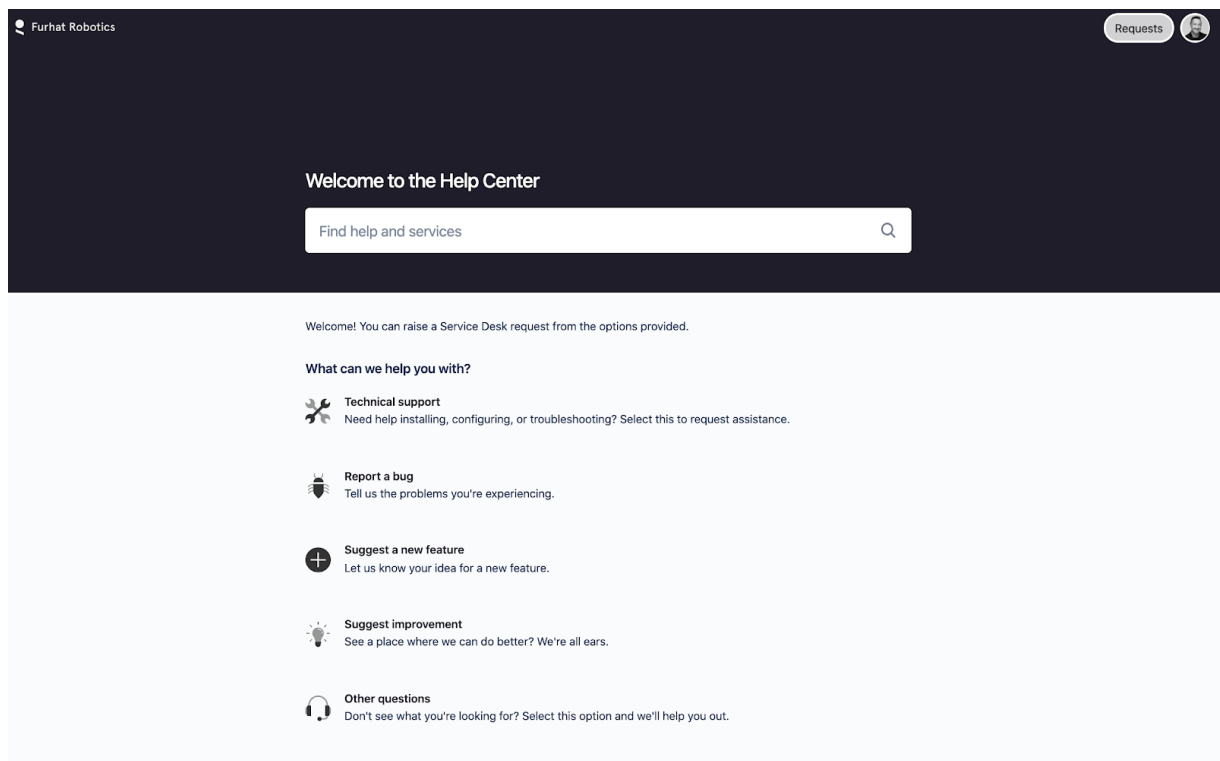
Furhat Robotics is also actively building a community where help, recommendations and knowledge sharing are on tap. We welcome you to join the community by sending a mail to community@furhatrobotics.com

Troubleshooting

Issue	Troubleshooting Instructions
I can't connect to the web interface.	To use the robot's Web Interface on an external computing device, make sure both devices are connected to the same local network. If you are connected to a wifi network with internet access, check the internet access is working by accessing other webpages from your laptop.
I can't connect to the web interface from an external screen plugged into the robot via the USB-C port. The monitor registers touch, but the virtual keyboard does not come up when trying to enter password.	The virtual keyboard Chromium extension is loading/updating. ● Wait a few seconds ● Refresh the page using refresh icon to the left of the address bar. ● Click on the password field to bring up the virtual keyboard.
The robot won't connect to a Wifi network	Make sure you have input the correct network password. In the menu to enter password you can select the option to show the password. If you have connected an external USB keyboard to your robot note that the keyboard layout is US/English, so if your password contains any special characters you need to enter them as if using a keyboard with US/English layout. Try to connect to the same WiFi network with your laptop or smartphone in order to verify that the network and password is correct.
The WiFi network is not displayed in the list of available wifi networks on the on-face menu.	Is the WiFi network broadcasting its SSID? (the name of the wifi). Verify that the network is broadcasting its SSID by connecting to it with your phone or laptop. There is a limit of the number of wifi connections that can be displayed in the robot menu. The full list of reachable WiFi networks can also be seen on the Web-Console which can be accessed in multiple ways (over the network on any device, via an external screen, via the robot hosted WiFi hotspot)
The robot automatically connects to a WiFi network I don't want to use.	The robot will connect automatically to known networks. You can set your robot to forget a network from the on-face menu or via the Web-Console

I have an issue with a device that is connected to the USB or USB-C jacks.	Connect all cables before booting the robot or restart the robot. Certain device/robot combinations require the device to be plugged into the robot at start up time in order for the device to be recognized and function correctly.
The head is not moving around as expected.	Test if the problem is in the skill. Stop the skill. From the web interface, click at different locations in the video feed to have the robot look at different locations. If the neck moves, like it should, then the problem is likely in the skill.
The head is not moving at all.	Turn the robot off. You should be able to move the head around manually using only light force. Turn the robot on, the neck should stiffen and attempting to move it will be difficult (do not force it). Open the web interface and click on different locations in the gaze control panel on the home tab, the robot should turn it's gaze to that location.
The face goes dark after I updated the robot.	Wait until the robot reboots. On a fast connection, the update should complete within 10 minutes. On slower connections it can take up to 40 minutes. If the robot has not rebooted after 40 minutes, contact support.
The face is dark when I start the robot.	Verify that the robot has power and is turned on - there is no LED indicator, but you should be able to hear the fan. Verify that the projector is working by removing the mask and checking the lense, there should always be some light coming from the projector.
The face is slightly misaligned.	Verify that the mask is properly attached to the head. Go to the web interface and the main tab. Check that the correct face model is selected. For the regular adult mask, the mask model should be adult. Go to the settings tab and adjust the face sliders to calibrate the face.
I'm using an external microphone and it's not working.	Most probably you have rebooted the robot. Furhat currently only selects the included USB microphone as the default microphone when connected. Other microphones need to be selected again at every boot. • Go to microphone settings in the web interface. • Click on the small blue refresh button. • Select the microphone you are using. • Test the sound input using the test button in the home tab.
I've connected the robot to external speakers, but there is no sound.	Make sure that the 3.5mm audio cable you plug into the robot is either a TRS (tip-ring-sleeve) or TRRS type (tip-ring-ring-sleeve). Make sure it's firmly inserted into the 3.5mm audio point.

Furhat Robotics

I've connected the robot to external speakers, but there is still sound coming out of the robot.	Using the 3.5 mm audio jack will not silence the robot's speakers. If you want/need to use external speakers and silence the robots speakers, then use a USB speaker and select it as the output in the Web-Console home tab.
The robot's voice is fragmented and delayed (when a cloud based voice such as those from *Amazon Polly* is selected)	Verify your internet connection speed. If the problem persists, you may need to clear the speech synthesizer cache. Contact support for assistance.
The robot's voice is completely silent and I can't select a voice. (when a cloud based voice such as those from *Amazon Polly* is selected)	Start by rebooting the robot. Verify that you have not lost Amazon Polly credentials by going to the Web-Console and selecting settings - voice. Verify that there is a secret and a key. Open the command console (top right corner) check for any message about "Could not start Amazon synthesizer, verify credentials". If there is an issue with the credentials, contact support.
The TTS voices are missing Amazon Polly voices even though the internet is connected.	The robot might have booted without internet, or the internet was slow to connect at boot and Amazon Polly engine started without a network connection. ● Wait 60 seconds (the system retries Amazon Polly authentication every minute). ● Refresh the web interface and check the voice list. ● If not solved in a few minutes, reboot the robot.
The robots says that it's speech recognizer isn't working.	Verify that you have a stable internet connection. Reboot the robot to re-establish connection with Google or Microsoft Azure speech API. Stop any skill that is running and test the speech recognizer by pressing the Listen button on the home tab in the web interface. Go to settings - recognizer. Verify that recognizer service keys are entered and correct. Open the command console (top right corner) and check for any error messages related to GoogleRecognizerProcessor, AzureRecognizerProcessor or RecognizerModule.
The robot is not picking up speech.	Verify that the correct microphone is being used. Go to the web interface and the tab settings - microphone. The "ReSpeaker 4 mic array" should be selected. If it's not available to select, verify it's plugged in correctly and click refresh. If it's still not visible, turn the robot off, reconnect the microphone, start the robot and try again. When the correct microphone has been selected, the microphone levels bar should be moving to, that will indicate the microphone is picking up sound. For speech recognition please also ensure that your internet connection is working properly.

Furhat Robotics

The robot does not track me by following me with it's head movements.	Note that the robot will only track the user if a skill is running and the skill is designed to attend to the user. Check the camera is not blocked and the video feed is working by accessing the Dashboard Tab in the Web-Console. If the video feed is not working, try adding a virtual user by double clicking in the interaction space, and see if your robot will attend the virtual user.
The robot is not using the correct face (texture)	Go to the Web-Console Home Tab. Check that the correct face *model* is selected. For the regular adult physical mask, the mask model should be `Adult`. Then verify that the texture is available by choosing it in the drop down menu. If the texture is missing, reboot the robot and try again. Otherwise contact support.
Rebooting Furhat does nothing, it still won't speak or listen	A skill installed on the robot, and set to autostart might be starting when the robot starts and due to a defect in the skill blocking the robot. Check the installed skills and deactivate `autostart` on any skill where it is set, then try rebooting the robot again.
The robot does not turn off completely, the face remains lit in a blue color.	A lit face after shutdown, means the robot computer system is powered down, but the projector is still powered on. To power off everything, remove the power supply.

Revision History

For system release changelog, please visit: https://docs.furhat.io/changelog/

Revision	Date	Related SW & HW Versions	Description
1.0	20200116	FurhatOS Versions 1.15.0 & later Furhat Robot Generation 2, Rev A & later	Initial release of this document
1.1	20200204	FurhatOS Versions 1.16.0 & later Furhat Robot Generation 2, Rev A & later	Revised for FurhatOS 1.16.0 Clear synthesizer cache
1.2	20200304	FurhatOS Versions 1.17.0 & later Furhat Robot Generation 2, Rev A & later	Revised for FurhatOS 1.17.0 Support for *MS Azure Cognitive Services Speech-to-Text cloud* service
1.3	20200403	FurhatOS Versions 1.18.0 & later Furhat Robot Generation 2, Rev A & later	Added Robot deployment guidelines chapter Updated the Voice Settings panel description to include details on the Acapela license feature.
1.4	20200924	FurhatOS Versions 1.22.0 & later Furhat Robot Generation 2, Rev A & later	Added robot type Research /Production description Reflected Camera Feed Feature Reflected FPS SW Focus Control.
1.5	20201202	FurhatOS Versions 1.23.0 & later Furhat Robot Generation 2, Rev A & later	Reflected new and changed features such as Volume Control and Speech Test

Glossary

AC	Alternating Current
API	Application Programming Interface
ASR	Automatic Speech Recognition
DC	Direct Current
DHCP	Dynamic Host Configuration Protocol
EOL	End Of Life
EOS	End Of Support
GUI	Graphical User Interface
I/O	Input Output
JSON	JavaScript Object Notation
IP	Internet Protocol
LED	Light Emitting Diode
OS	Operating System
RFID	Radio Frequency Identification
RDK	Robot Development Kit
SDK	Software Development Kit
SSH	Secure Shell
SSID	Service Set Identifier
TTS	Text To Speech
USB	Universal Serial Bus

Furhat Robotics