WheelSim Manual

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1. Getting started

1.1.   Input device

You can use WheelSim with different input devices, e.g. with the keyboard. For optimal use, we recommend alternative mouse input devices or gaming joysticks that allow control comparable to real power wheelchairs, e.g. the Optima joystick from Pretorian Technologies.

A good handling of the input device is very important, the selection of the appropriate device and an optimal position are crucial. Consultation centres on assistive technologies will be happy to help you here.

1.2.   User Management (WheelSim Pro only)

While in WheelSim Home you only have one default user, in WheelSim Pro you can create and manage multiple users.

Click on the current user in the top right corner of the main menu. You can

- ➢ view the profile.
- ➢ change the user.

If you select *Change User*, you can remove existing users or add a new user. All settings you make later for the selected user and all log files are saved under this user.

2. Drive

2.1.   Controlling the power wheelchair

Use your input device to move the power wheelchair in the virtual world.

Press the *left mouse button* or *joystick button 0* (left, red button on Optima joystick) to call up the power wheelchair menu.

Note: You can change the assignment of the button(s) in the settings, e.g. to *right mouse button/joystick button 1*.

Move the mouse cursor to change the current speed level in the power wheelchair menu.

- ➢ change the current speed level
- ➢ activate the horn or
- ➢ switch the power wheelchair on/off.

You can end, continue or restart a ride.
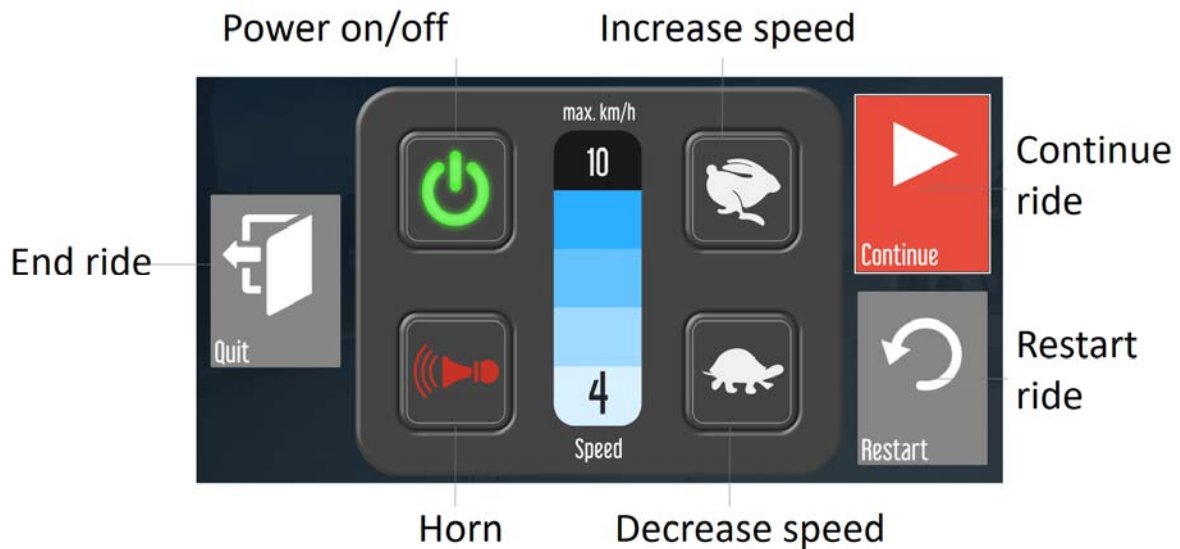
2.2.   The different driving ranges

Practice park

In the practice park, you can move freely and try out different situations such as ramps, inclines and edges. There are no other road users here, such as pedestrians or cars.

Time trials

There are a total of 4 different courses to choose from, which are to be completed as accurately as possible. The courses are defined by lines on the ground. The circuits must be completed three times and the time is measured. The focus is less on speed and more on accuracy. Touching or crossing the lines is assessed with additional "penalty time".

Tasks

In total, there are four assignments that train real-life situations and proper behavior on the road:

- ➢ Driving in a confined space in an apartment
- ➢ Crossing the street at a crosswalk with pedestrian lights
- ➢ Crossing the street at a crosswalk without pedestrian lights
- ➢ Crossing the street without a crosswalk

Free exploration

In free exploration, the city can be explored without orders.

Note: Serious driving errors, such as driving on the road in unintended places, collisions with other road users such as cars or pedestrians will result in an immediate stop and the ride must be restarted.

2.3.   Protocols (WheelSim Pro only)

In the WheelSim Pro version, extensive logging functions are available. To access the logs, click on the *Log files* button in the bottom left corner of the Drive menu page.

Track	Speed	Total Time	Collisions	Completed	
Return		Log files			
26 May 2021					
⬜ Pizza	10 km/h	2 min, 10 sec	0	Yes	View
⬜ Apartment	10 km/h	1 min, 46 sec	32	No (A) ⓘ	View
⬜ Practise Park	10 km/h	5 min, 59 sec	2	-	View
25 May 2021				Collision with car or person	
⬜ Exploration	10 km/h	27 sec	1	No (C) ⓘ	View
⬜ Exploration	10 km/h	8 min, 51 sec	1	No (R) ⓘ	View
					Delete

Each ride will be entered into this list. You can read the following information:

> ➢ Date of the ride
> ➢ Driving range/course
> ➢ The set maximum speed of the e-wheelchair
> ➢ Total time
> ➢ Number of collisions
> ➢ Successfully completed: Yes/No with abort information (To get abort information, please move the mouse pointer over the entry).

All rides can be viewed repeatedly using the replay function. To do this, click on the *View* button.

While replaying a recorded ride, you can switch the view between first person perspective and third person view. This can be helpful to determine what the driver has seen or how close, for example, objects were passed or whether sufficient distances were kept.

In the time trial section, you are also offered a high score list.

3. Learn

The learning area is aimed primarily at younger users and teaches basic behavior in the form of short videos. The 4 videos in total are aligned with the requirements in the driving assignments and are suitable for preparing for them.

4. Achievements

Badges are unlocked by power wheelchair driving and watching the videos. These badges serve as long-term motivation.

5. Settings

5.1.   Important power wheelchair settings

Open wheelchair menu by looking at the speed display (only with VR headset).

By fixing the speed display in the centre of the field of view, a closing circular ring appears. By continuing to fix the display, the ring closes and the power wheelchair menu is called up. Activate this function if it is not possible to use a key to open the menu.

Maximum speed

Select the maximum speed of the power wheelchair here. During ride, the speed of the power wheelchair can be adjusted up to this maximum speed in 5 steps.

5.2.   Control

These settings affect the navigation/mouse control in the game menus and do not affect the behaviour of the power wheelchair control.

Dwelling and dwell time

If it is not possible to confirm inputs by pressing a key, a selection can be made by dwelling the mouse cursor over a selection field for a sufficiently long time. The dwell time determines how long the mouse cursor has to touch a selection field.

Note: If you have problems with pressing a key, you can also try to connect external keys and position them in such a way that actuation is possible. Consultation centres for assistive technologies can help you here.

5.3.   Graphics

Change the graphics settings if you have problems with the display/performance.

5.4.   Key assignments

Important key assignments and wheelchair functions can be freely assigned here.

6. Using WheelSim with VR Headset

WheelSim is suitable for use with Oculus brand VR headset. The following VR headsets are supported when connected to the computer with a cable:

- Oculus Rift S
- Oculus Quest 1 & 2

Note: Please note that the use of WheelSim with VR has higher hardware requirements for the computer compared to pure 2D use on the screen. Your computer should be *VR Ready* for use with VR. A computer dealer will be happy to help you here.

The WheelSim app automatically detects when a suitable VR headset is connected and indicates this by a small VR headset icon in the lower left corner of the main menu home page.

All settings can still be made on the monitor. Only after selecting one of the 4 driving areas (practice park, time trial, tasks, free exploration), the virtual environment is displayed in the VR headset. In addition to moving the power wheelchair, it is now also possible to change the viewing direction by moving the head, which enables better orientation and deeper immersion in the virtual world. The action can be followed by supporting persons on the monitor.

6.1.   Setting up the VR headset

Step 1: Connect the VR headset to the computer with a cable.

In order to use one of the VR headsets mentioned above, it must be connected to the computer via a cable. For Oculus Quest 1 and 2, please use a designated Oculus Link cable and plug it into a USB 3.0 port on your computer.

Note: You can usually recognise USB 3.0 ports by the fact that they are coloured blue inside. In case of problems when using VR headsets, please always also check whether the Link cable is actually connected via a USB 3.0 port.

Step 2: Allow content from unknown sources

Open the Oculus app on the computer and allow in *Settings->General* the use of unknown sources.

Step 3: Activate Oculus Link (Oculus Quest 1 and 2 only)

In order to transfer image content from the computer to the VR headset (Quest 1 and 2), you must first activate the Oculus Link: To do this, open the quick settings in the VR headset and activate Oculus Link.

When you now start WheelSim, you should see a VR headset icon in the bottom left corner of the main menu. When you start a ride, you will be prompted to put on the headset. The ride should now also be displayed in the VR headset.

6.2.   Important notes

➢ Make sure that the VR headset is calibrated correctly. With a good calibration, your position is exactly in the power wheelchair and the head is at the right height, so that the impression is created that you are really sitting in the power wheelchair.
➢ If necessary, you may need to perform a calibration using the Oculus controllers in the headset.
➢ Perform this calibration before you start the actual training.

To perform a calibration during a ride, follow these steps.

1. Press the Oculus button on the right Oculus controller.
2. A window appears in the VR headset. Select *Reset View* here.
3. After the user has assumed a good position facing forward, press any button on the Oculus controller.

Note: It may be necessary for the first two steps to have the support person put on the VR headset. However, before step 3, the person doing the training rides should be wearing the VR headset again. Once the position fits, the support person can press any button on the Oculus controller to complete the calibration.

6.3.   General notes on use with VR headset

➢ Please follow the general instructions for using the VR headset.
➢ Avoid too long, continuous use and take regular breaks.
➢ Watch out for dizziness and discomfort during use and stop if you do not feel comfortable.
➢ Use WheelSim in a seated position only. Make sure that your upper body is well stabilized and that you cannot fall.