



Elektrobit

# Quickstart Guide

EB robinos for EB Assist ADF Trial

1.0, Released



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# 1. Introduction

Welcome to the EB robinos for EB Assist ADTF Trial Quickstart Guide. This software can be used to develop Highly Automated Driving (HAD) modules with the ADTF software. It offers software modules that can be used in the field of autonomous driving.



## 2. System Requirements

The EB robinos for EB Assist ADTF Trial has these requirements:

Table 2.1. System Requirements

Minimum	Recommended
Windows 7 64bit	
ADTF 2.13.2 64bit	
7GB disk space	
4GB RAM	16GB RAM
2x1GHz CPU	4x2GHz CPU

## 3. Installation

This chapter describes the installation process. Firstly, EB robinos for EB Assist ADTF has to be installed. After that, the software has to be activated with a license file. How to request a license file is described in Section [3.2](#).

### 3.1. Environment and prerequisites

EB robinos for EB Assist ADTF is tested and runs in the following environment:

- ▶ Microsoft Windows 7 64 Bit
- ▶ Microsoft Visual Studio 2010 64 Bit (for developing own components)
- ▶ EB Assist ADTF 2.13.2 for Windows 64 Bit
- ▶ EB Assist ADTF Device Toolbox 2.6.1 for Windows 64 Bit
- ▶ EB Assist ADTF Display Toolbox 2.1.1 for Windows 64 Bit

### 3.2. Downloading the software from the Webpage

In this chapter you learn to how to request a trial license and download the Software from the webpage.

To navigate to the EB robinos webpage, open a browser and go to [www.eb-robinos.com](http://www.eb-robinos.com)

The EB robinos webpage page shall open up.

**EB robinos – DNA for automated driving**  
A comprehensive, hardware-agnostic software solution for highly-automated driving systems. Control and manage the increasing complexity of HAD systems and bring them to market quickly.

Highly automated driving (HAD) means many pieces of software and hardware need to work together seamlessly, efficiently, and safely. HAD requires creating, coordinating and combining sensors, actuators and components—with all the different parties involved (carmakers, suppliers etc.). The complexity of HAD systems is a huge challenge to the industry.

EB robinos is a comprehensive solution that helps to overcome this challenge by controlling and managing the complexity professionally. EB robinos is a functional software architecture with open interfaces and software modules. Its holistic approach provides control and management of complex HAD systems to accelerate, enhance and optimize automated driving system development.

**Get your free evaluation license and experience EB robinos with its open interfaces!**

The functional architecture and the open interfaces enable cooperation among different parties and pave the way for future mobility. EB robinos is available for development, embedded prototyping, and for series use. With EB robinos, carmakers and Tier 1 suppliers can shift their focus from architecture effort to differentiation: bringing cars to market quickly and delighting consumers with distinctive, highly-automated driving features that provide competitive advantages and strong market positions.

EB robinos includes the open robinos specification which describes its architecture and interfaces. The specification is freely available. EB encourages industry companies and professionals to join this open effort to build the future of mobility.

**Download the open robinos specification**

**Benefits**  
**Accelerates, enhances, and optimizes highly automated driving (HAD) system development**  
EB robinos' modular approach and its open interfaces make it easy to integrate customer or third-party software. With a set of various software modules for different functionalities (e.g. grid fusion, path planning), you can optimize software re-use and de-

**TECH CORNER** [View more](#)  
**Driver Assistance Software - EB Assist**  
**EB robinos infosheet**

**TRY EB ROBINOS**  
Download a free evaluation license for EB robinos for EB Assist ADTF.  
**DOWNLOAD**

**OPEN ROBINOS SPECIFICATION**  
Download the open robinos specification, including the architecture and interfaces description.  
**DOWNLOAD**

**SUPPORT**  
Contact our EB robinos service desk for technical support.  
**CONTACT US**

**CONTACT US**  
More information, technical specifications, or

Click the download button on the upper right side of the webpage for downloading the EB robinos trial version or go to [www.try-eb-robinos.com](http://www.try-eb-robinos.com).

**TRY EB ROBINOS**  
Download a free evaluation license for EB robinos for EB Assist ADTF.  
**DOWNLOAD**

The webpage for EB robinos license request and package download shall open up.

**EB** Elektrobit ENGLISH 日本語

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## Try EB robinos for EB Assist ADF - for free!

EB robinos is a functional software architecture with open interfaces and software modules for automated driving system development. EB robinos is available for development, embedded prototyping, and for volume production. This download lets you experience EB robinos in EB Assist ADF, the development and testing environment for ADAS and automated driving. This free trial version shows:

- a range of modules from the EB robinos software architecture implemented as filter for EB Assist ADF
- visualized data and detailed monitoring of the system behavior
- module interfaces in line with the open robinos specification, where applicable
- ready-to-use sample configurations
- recorded sensor information for some first interaction

EB robinos for EB Assist ADF is made for Car-PCs, enabling developers to quickly perform test runs in a real car and also for testing and developing in the lab. See also the freely available [open robinos specification](#), describing the architecture and interfaces.

**First name \***

**Last name \***

**Email \***

**Job title**

**Company name \***

**Phone**

**MAC-address \***

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**CONTACT US**  
More information, technical specifications, or support:

Fill in the required information for the license request:

- ▶ **First name**
- ▶ **Last name**
- ▶ **Email**
- ▶ **Company name**
- ▶ **Computer MAC-address**
- ▶ **Validation characters**



**NOTE**



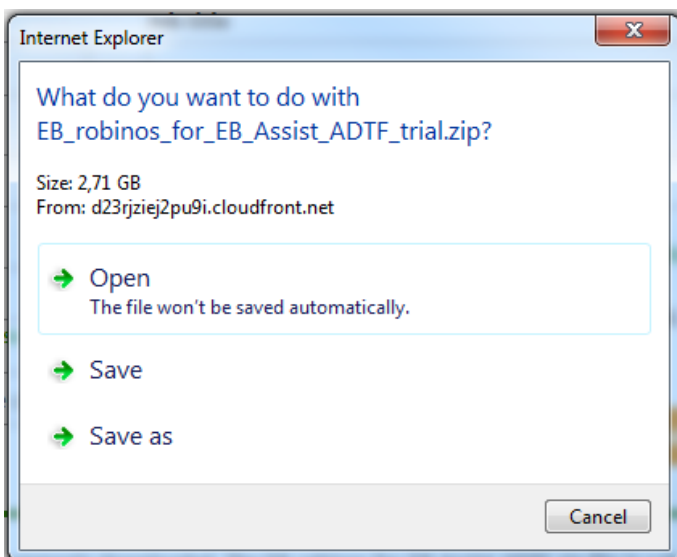
The EB robinos license is sent via Email. It is bound to the computer MAC-Address. Therefore, it cannot be used with another computer.

Agree to the terms and conditions.

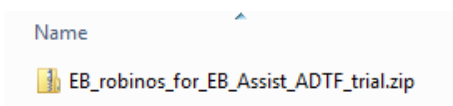
- By downloading, I agree to accept the [terms and conditions](#).
- Have an EB sales person contact me.
- Keep me updated on EB robinos and EB Assist by email.

Click the download button to load EB robinos package.

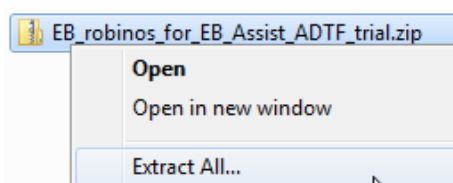
A windows to save the the EB robinos package shall show up. Select "Save as" and enter the desired location to save your package.



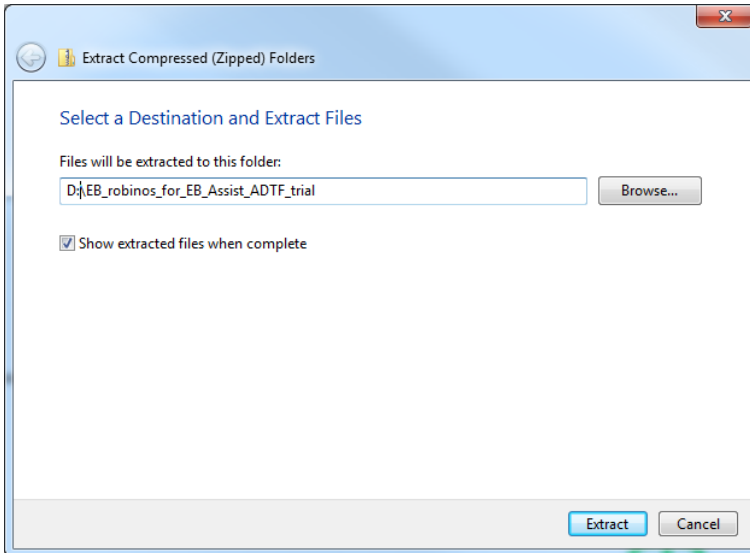
Following zip file shall appears in the chosen directory after the download.



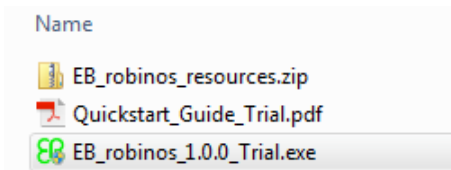
Unzip the downloaded file.



Enter a desired location to store the unzipped files.

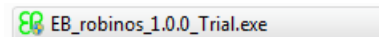


Check if following new files are available in your unzip directory.

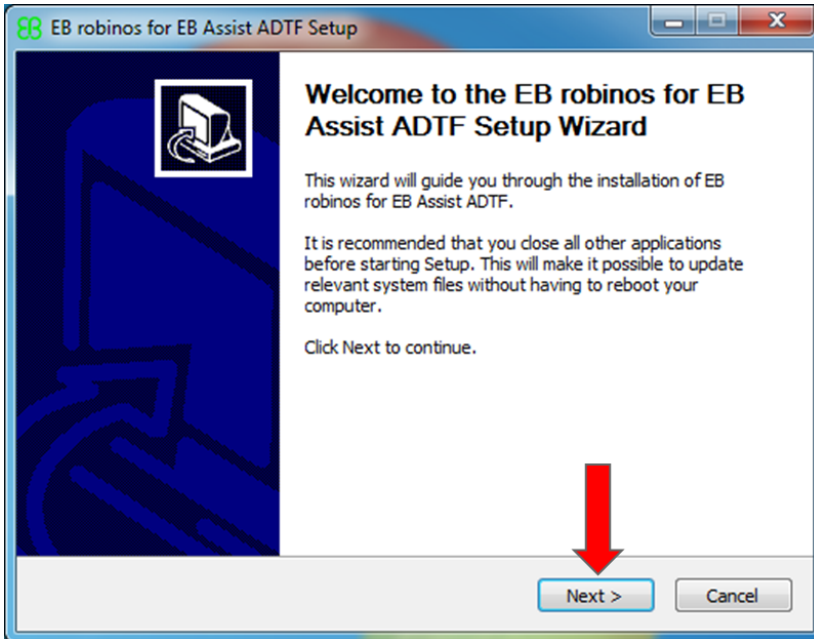


## 3.3. Installation

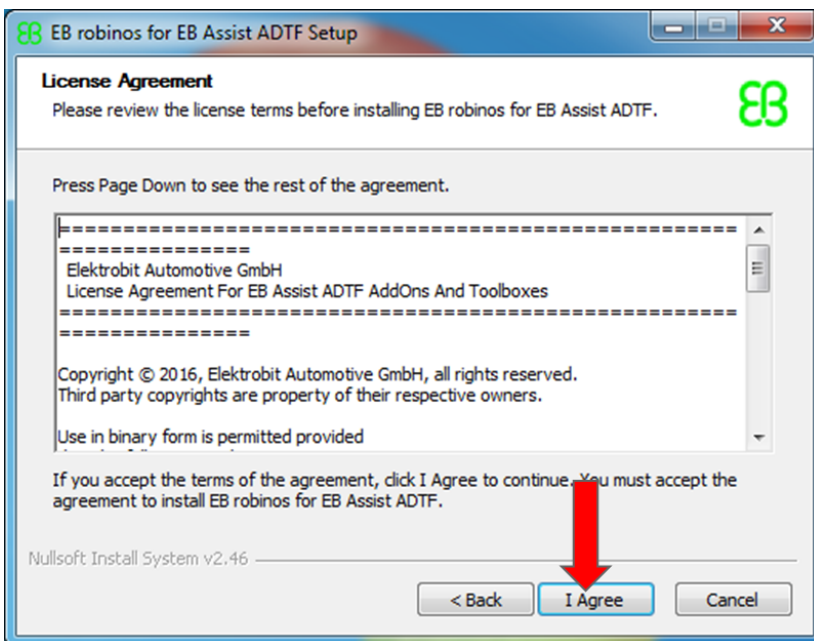
Start the downloaded installation executable of EB robinos for EB Assist ADTF.



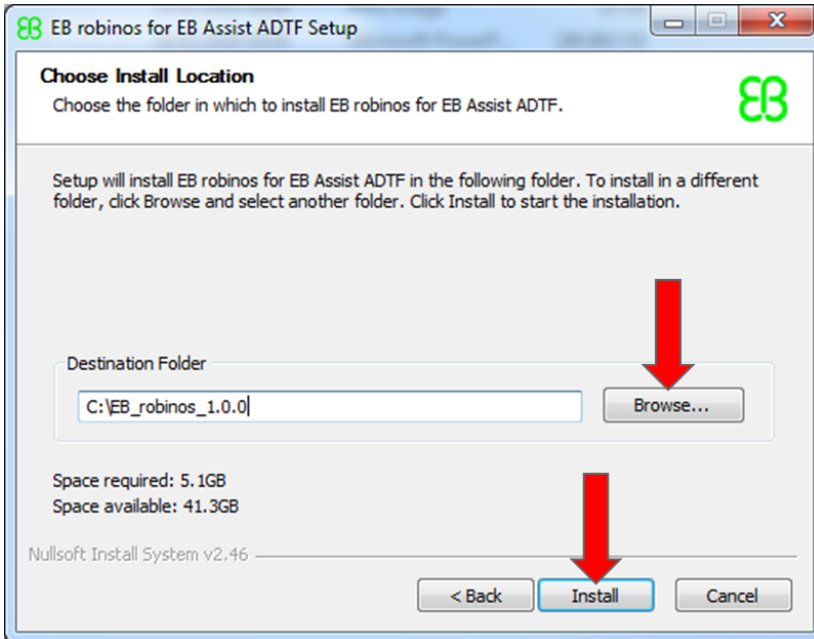
Read the start dialog and click "Next".



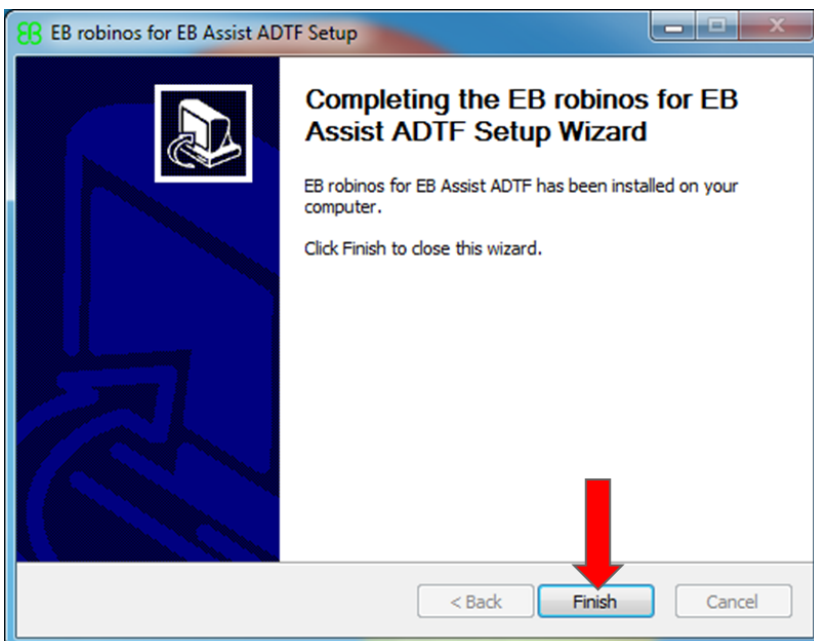
Read the license agreement and click on "I Agree".



Click on "Browse" and choose the EB Assist ADF directory. Then click on "Next". Make sure that enough disk space is available.



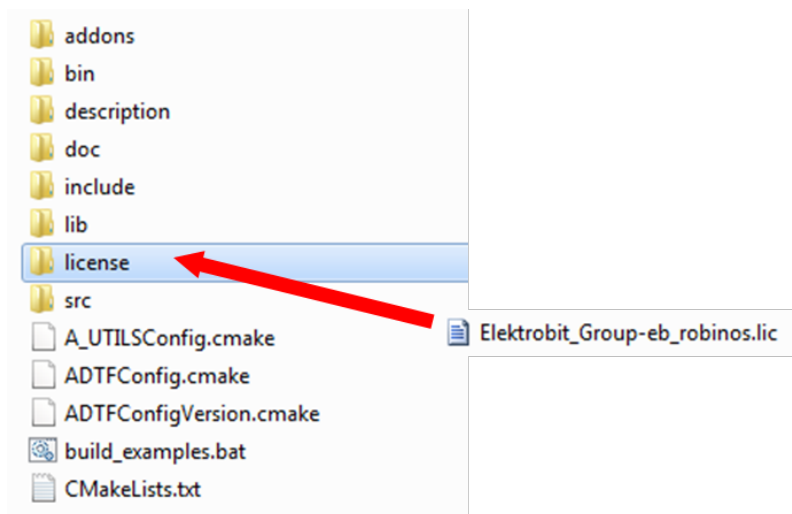
Wait for the installation to be finished. Click on "Finish" after the installation is done.



## 3.4. License File

### 3.4.1. Installing the local license on local machines

For running the EB robinos for EB Assist ADTF Trial, a license file is needed. Copy the file from your disk to the license folder located in EB Assist ADTF.



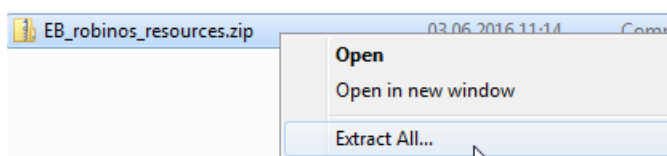
### 3.4.2. Requesting an evaluation license

Evaluation licenses can be requested via our webpage [www.try-eb-robinos.com](http://www.try-eb-robinos.com) (see Section 3.2).

## 3.5. Install the Example Resources

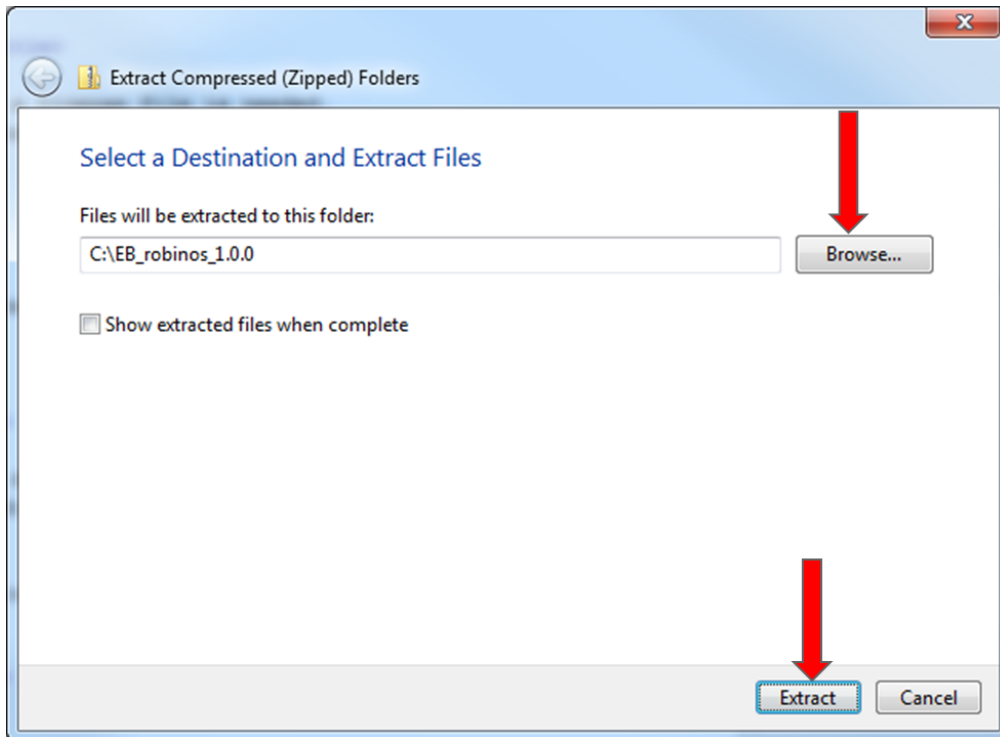
To run the examples, the "EB\_robinos\_resources.zip" archive must be extracted. This zip file shall be contained in your EB robinos download directory (see Page 10).

After the download has completed right click on the archive file and select "Extract All...".



In the following window use "Browse" to select the directory where EB robinos for EB Assist ADTF has been installed (e.g. C:\EB\_robinos\_1.0.0).

After that click on "Extract" and wait until the extraction has finished.



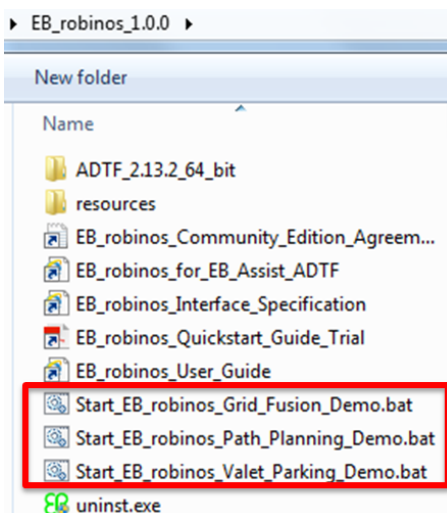
## 4. Usage

For using the EB robinos for EB Assist ADF Trial, EB Assist ADF knowledge is a prerequisite. Nevertheless some short-cut and batch files have been created to ease the running of EB robinos examples.

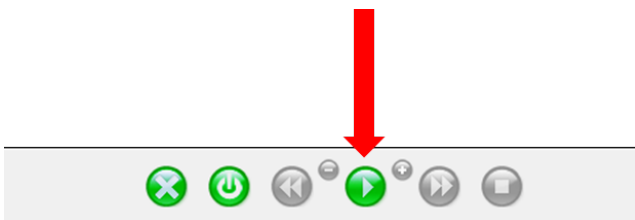
### 4.1. EB robinos example

To load an example, go to the EB robinos installation directory (e.g.: "C:\EB\_robinos\_1.0.0") and start the corresponding batch file to the desired demo:

- ▶ start\_eb\_robinos\_grid\_fusion\_demo.bat
- ▶ start\_eb\_robinos\_path\_planning\_demo.bat
- ▶ start\_eb\_robinos\_valet\_parking\_demo.bat



After the project is loaded, it can be started with the sidebar buttons. Press the "Play" button and the EB Assist ADF configuration is executed.



### 4.1.1. EB robinos Grid Fusion example

In this example, an EB Assist ADTF demo configuration for EB robinos Grid Fusion is implemented. It uses an aerial image representing an inner city map area. In this area, an earth fixed grid with the size 80x80 [m] is selected (all properties are already set). There is an ego car that is driving inner city (its icon is already placed in the configuration). The ego car is equipped with two IBEO LIDAR sensors, one sensor on the front, one on the rear. In this example, measurements from the IBEO LIDAR sensor have been recorded in real conditions. Using the *Harddisk\_Player* from ADTF device toolbox, the recorded raw data is processed offline with the Grid Fusion.

The raw data provided by sensors are processed with two LIDAR sensor models. For each sensor model a maximum distance range of 50 meters is set. The measurements are processed only if they are placed inside of the earth fixed grid. The software always shifts the grid in such a way, that it includes the moving car.

After the sensors' measurements are processed, the results are stored in the grid layer. An application specific view of the grid data is used in order to visualize the occupied and free areas (see Figure 4.1). All drivable areas are marked with green. The display shows all valid LIDAR measurements, which are interpreted as relevant obstacle objects, in red. The grid layer stores the actual data. The content of the grid layer is degrading over time, but it is updated over and over again by sensors' measurements.



Figure 4.1. Snapshot from the running configuration



A helper window that displays information coming from the front video camera as seen in Figure 4.2.



Figure 4.2. Front camera snapshot

The common controls are used to play/pause the loaded configuration (see Figure 4.3) or to set the speed of the playback with a time factor (see Figure 4.4).

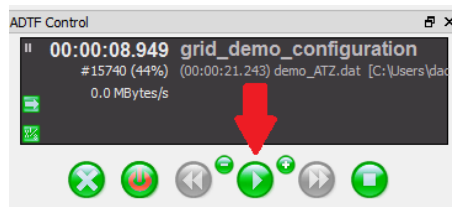


Figure 4.3. Play/pause button

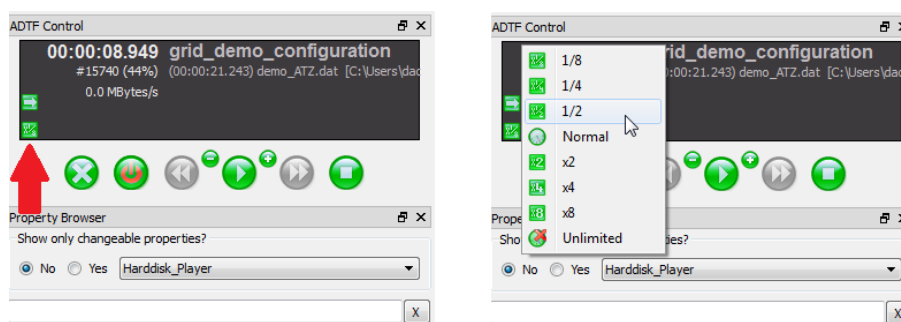


Figure 4.4. Setting the playback speed

## 4.1.2. EB robinos Path Planning Example

This example demonstrates EB robinos Path Planning in the inner city. The real life recording contains ego data, front and rear LIDAR sensors and a camera. It was recorded with a real driver and no EB robinos Path Planning was used at recording time. Thus the EB robinos Path Planning will not match the driven path but plan a more efficient way. Furthermore, no infrastructure information like lane markings are used but EB robinos Path Planning in this example fully relies on the LIDAR sensors. The camera in this example is just for documentation purpose. The two LIDAR sensors are merged in a grid layer from the EB robinos grid fusion. Based on this grid information the EB robinos Path Planning searches the best path to a regularly updated target position.

Main parts of the EB robinos Path Planning configuration are four PP Data Source Filters, four algorithm filter and a scheduler. The PP Data Source Filter EB robinos PP Configuration Space Filter and EB robinos PP Node Based Data are used to provide the grid data to the EB robinos Path Planning algorithms. The EB robinos PP Cost Parameter filter provides a list of properties to individual costs for specific tasks like a gear change. The EB robinos PP Precomputed Costs Filter ensures that at any position with respect to the target position the minimal costs for reaching the target position without considering obstacles is known.

The algorithm filter use the information from the PP Data Source Filter. A detailed description of EB robinos Path Planning algorithm filters can be found in the user manual:

- ▶ EB robinos PP Hybrid A Star Filter
- ▶ EB robinos PP Rapidly Exploring Random Tree
- ▶ EB robinos PP Last Path Adapter
- ▶ EB robinos PP Target Position Shifter

The EB robinos PP Scheduler Filter takes the output of the algorithm filter and assembles them in order to generate a single path description. Here we are using two different algorithm assemblies. The first assembly only updates the last calculated path to the current vehicle position. The other assembly complete recalculates the path. This is done after a fix cycle time or when the distance between the vehicle and the path exceeds a defined threshold. Finally, the path description is modified by the EB robinos PP Velocity Planning Filter to plan the velocity for each control point in the path.

With the EB robinos PP Path View Subfilter the path description can be visualized in a 2D Display. This is illustrated in Figure [4.5](#).

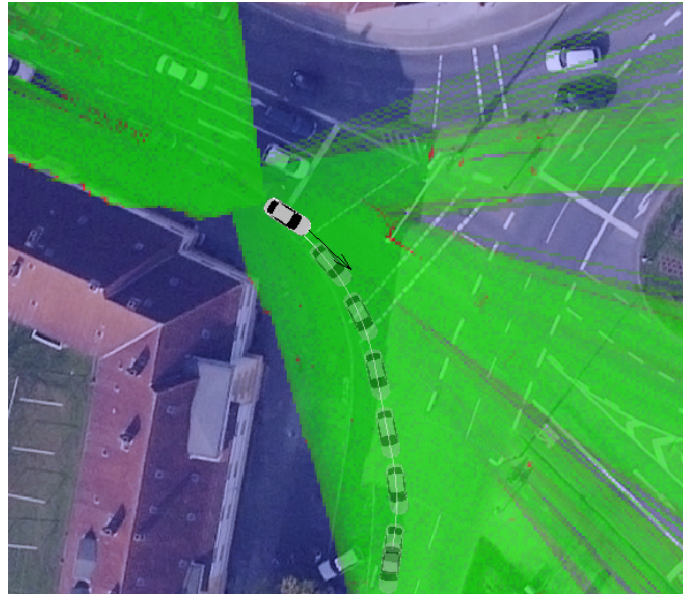


Figure 4.5. Screenshot of the EB robinos Path Planning visualization

### 4.1.3. Valet Parking Example

In this example the valet parking scenario is demonstrated. Triggered by a remote input signal, in this case a mobile application; the vehicle autonomously drives from its current position to a defined target position.

Based on the grid, which holds environment information, the path to the target position is planned by the EB robinos Path Planning and finally executed by the vehicle controller. The real life recording provides the sensor information, the planned path description and the vehicle ego information. For a closer look on the EB robinos Path Planning and grid fusion please look at the examples (see Section [4.1.1](#) and Section [4.1.2](#)).

In this recording the vehicle stands in front of an obstacle. Thus it drives curvy backwards first before it performs a gear change and reaches the target position by curvy forward driving. This is illustrated in Figure [4.6](#).



Figure 4.6. Screenshot of valet parking scenario while executing curvy backwards driving

While performing the parking manoeuvre, control parameters such as steering and acceleration can be monitored at run time using the "Signal View" of the EB Assist ADF display Toolbox. This is illustrated in Figure 4.7. For more information about the "Signal view" please consult the documentation of the display toolbox of EB Assist ADF.

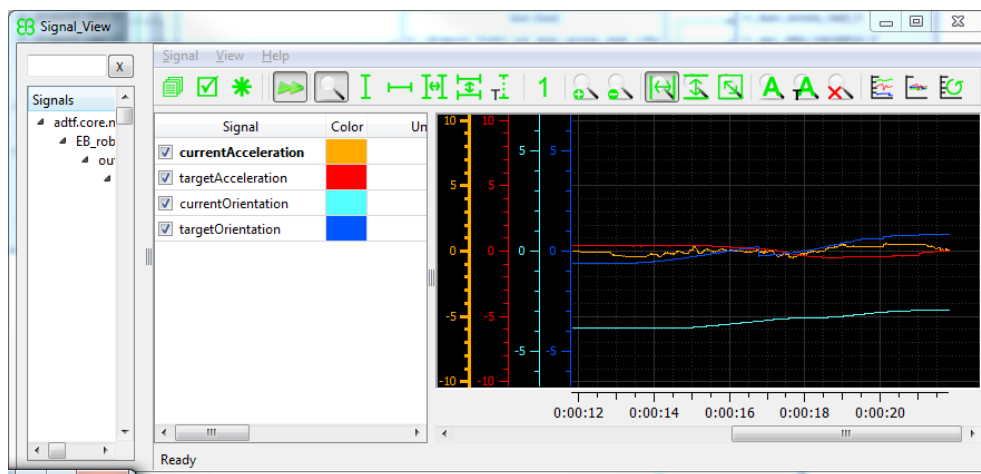


Figure 4.7. Screenshot of EB Assist ADF Signal View while monitoring vehicle control parameters. Current acceleration in orange, target acceleration in red, current orientation in light blue, target orientation in blue.



## 4.2. Control the 2D-Display

To resize the 2D-Display window press and hold the left mouse button on lower right corner of the window. In doing so the mouse cursor becomes a double sided arrow. Now move the mouse to resize the the window. Release the left mouse button when the window has the desired size.

To change the zoom of the 2D-Display either the mouse wheel or the +/- keys can be used. Therefore the 2D-Display has to be the active window. To set the 2D-Display as the acitve window simply left click inside the 2D-Display window. Now you can use + key or mouse wheel up to zoom in, or - key and mouse wheel down to zoom out respectively.

To change the view position of the 2D-Display click and hold the left mouse button inside the 2D-Display window. Now you can move the mouse cursor to change the current view position. Release the left mouse button when the window shows the desired position.

To reset the 2D-Display view right click inside the 2D-Display window. This opens a context menu. Select "Reset View" in this context menu. Now the 2D-Display view is resetted to a car-centered view with a default zoom.



## 5. Referential Information

For more information, please have a look at the EB robinos for EB Assist ADTF User Guide. Also take a look at the Elektrobit webpage ([www.eb-robinos.com](http://www.eb-robinos.com)) for latest news about the EB robinos for EB Assist ADTF product.

## Appendix A. Potential export restrictions

The product is not classified as „Dual-Use Items” in accordance with Council Regulation (EC) 428/2009 (as of June 2016). The License is responsible for compliance with any applicable export or import regulations or obligations. Elektrobit Automotive GmbH provides assistance on request.