OpenDS (Open-source Driving Simulator)

Release: **SOURCE CODE** - version 4.9 - 1st October 2019

OpenDS is an open source driving simulator for research. The software is entirely written in Java and is based on the jMonkeyEngine framework, a scene graph based game engine which is mainly used for rendering and physics computation. OpenDS is distributed under the terms of GNU General Public License (GPL) version 3.

What is contained in this folder

This folder contains the source code of OpenDS including all the features developed in the Dreams4Cars project. In addition, you will also find the JavaDoc files, the license text, the multi-driver server and a client to receive data from the running simulator (settings controller server).

In order to save disk space, libraries and assets (containing scenes, models and tasks) are not included – however necessary to run OpenDS. They can be found in the pre-built release at the following location: ../SimulationEnvironment_v1.5/tools/OpenDS_4.9/

Building OpenDS

The source code of OpenDS is contained in the "src" folder. The following steps show how to build the binaries under Windows, Mac OS or Linux.

1. Make sure you have installed the Java Development Kit (JDK) 8 or higher. If not, you can download it from: http://www.oracle.com/technetwork/java/javase/downloads/index.html.
2. Make sure you have installed Apache Ant version 1.7 or higher. If not, you can download it from: https://ant.apache.org.
3. Copy the "lib" and "assets" folders from ../SimulationEnvironment_v1.5/tools/OpenDS_4.9/ to the folder containing this README file.
4. Run Ant from the command line by changing to the current directory and typing: `$ ant`
5. After the build process has terminated, you will find executable *.jar files and the subfolder "bin" in the main folder.

Running OpenDS

In order to create the required OpenDS.jar file, you need to build OpenDS first (c.f. "Building OpenDS").

1. Run OpenDS by right-clicking "OpenDS.jar" in the main folder.
   Alternatively, execute `$ java -jar OpenDS.jar` from the command line.
2. Select resolution and proceed with clicking "OK".
3. Specify driver's name (optional).
4. Select which driving task to load and click "Start".

Steps 2-4 might be pre-defined in file "startProperties.properties" and thus not be available. In this case, OpenDS will start immediately after step 1.

To stop the application, press the ESC key or close the window. Press F1 during simulation to show default key assignment.

Modification of the Source Code

The source code can be found in the "src" subfolder. Any text editor can be used to modify the *.java files. Make sure to repeat step 4 of paragraph "Building OpenDS" every time you want a change to take effect.

As the work with text editors is rather inconvenient, the following steps demonstrate how to import the source code into an integrated development environment (IDE), considering the example of Eclipse. For this purpose, the main folder contains a project file (".project") and classpath file (".classpath") for Eclipse.

First of all, make sure:

1. 1. You have installed the Java Development Kit (JDK) version 8 or higher. If not, you can download it from: http://www.oracle.com/technetwork/java/javase/downloads/index.html.
2. The "lib" and "assets" folders have been added to the main folder (c.f. step 3 of paragraph "Building OpenDS").

If you like to use the import functionality of Eclipse:

3. Start Eclipse and import an existing Project (File → Import...). Select "General" → "Existing Projects into Workspace" and click "Next".
4. Select this folder as root directory and click "Finish".
5. In order to run OpenDS from the IDE, right-click "eu.opends.main.Simulator" in the Package Explorer of Eclipse and select "Run As" → "Java Application". Go ahead with paragraph "Running OpenDS" step 2.

If you like to use a different IDE or if the import functionality of Eclipse does not work:

3. Start the IDE and create a new project.
4. Add the content of this folder to your project. Folder "scr" contains the source code, "lib" the libraries used for the build path, and "assets" some vehicle models, driving environments, etc.
5. Make sure that all *.jar files that can be found in the "lib" folder or in any of its sub-folders have been added to the Build Path.
6. Add the following folders to the build path:
   - assets/Textures/Logo
   - assets/JasperReports/log4j

   For Eclipse users: Right-click the project and select "Build Path" → "Configure Build Path..." to open the "Properties" dialog. Go to tab "Libraries" and click "Add Class Folder". Select the check box of folder "Logo" which can be found at "assets/Textures" as well as the check box of folder "log4j" which can be found at "assets/JasperReports". Click "OK" to close both dialog windows.
7. In order to run OpenDS from the IDE, right-click "eu.opends.main.Simulator" in the Package Explorer of Eclipse and select "Run As" → "Java Application". Go ahead with paragraph "Running OpenDS" step 2.

Credits

Digital media assets have been taken from jMonkeyEngine (http://www.jmonkeyengine.org) if no other reference can be found in the corresponding folder.

The Oculus Rift Extension has been provided by Malvin Danhof, Tarek Schneider, Michael Walz, and Eric Audehm from Hochschule Konstanz (University of Applied Sciences), Constance, Germany.