Developing an Open-Source Multi-Agent Simulation Environment for Connected Autonomous Vehicles Dataset

Dataset available at: https://doi.org/10.7910/DVN/WF4ZO5

(This dataset supports report **Developing an Open-Source Multi-Agent Simulation Environment for Connected Autonomous Vehicles,** http://safersim.nads-sc.uiowa.edu/final_reports/UW%201%20Y2%20Final%20Report.pdf)

This U.S. Department of Transportation-funded dataset is preserved by the SAFER-SIM University Transportation Center in the Harvard Dataverse Repository (https://dataverse.harvard.edu/), and is available at https://doi.org/10.7910/DVN/WF4ZO5

The related final report **Developing an Open-Source Multi-Agent Simulation Environment for Connected Autonomous Vehicles**, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/42268

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Description: This document contains an overview of the software infrastructure developed under the SAFER-SIM project "Developing an Open Source Multi-Agent Simulation Environment for Connected Autonomous Vehicles". We provide a description of the four foundational simulation elements – agent dynamics, sensing, communication, and virtual worlds – that anchor Synchrono, a simulation platform for connected and autonomous agents. Synchrono is built around a "server-paradigm", where two specialized servers are in charge of maintaining time, space, and communication coherence. The first server, called the Synchrono Dynamics Server, maintains coherence in space and time for all agents participating in a scenario. This would enable the dynamics of a collection of Synchrono clients to advance their evolution in time in a coherent fashion. Moreover, for sensing purposes, the clients will be in a position to sense each other, owing to the space coherence attribute of a scenario enabled by the dynamics server. The Synchrono Communication Server establishes a virtualization layer that provides a "communication space" in which messages are sent and received in a time coherent fashion. Synchrono is demonstrated in conjunction with a 30-vehicle simulation that builds off a busy Madison intersection between University Avenue and Park Street. The simulated scenario

touches on several aspects of Synchrono, such as vehicle dynamics simulation, agent communication, sensor simulation, and synthetic virtual worlds (2019-05-01)
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Dataset description:
This dataset contains 1 .zip file, SimulationEnvironment_CVVehicles.zip, containing 26 files in 3 formats (.txt, .cpp, .h) further described below.

- 2 files in .txt: The two .txt files found in this collection are LICENSE and README files that provide additional documentation on the dataset. The .txt file type is a common text file, which can be opened with a basic text editor. The most common software used to open .txt files are Microsoft Windows Notepad, Sublime Text, Atom, and TextEdit (for more information on .txt files and software, please visit https://www.file-extensions.org/txt-file-extension).
- 12 files in .cpp: The 12 .cpp files found in this collection are titled Sedan followed by the specific car related term that the software is addressing (eg. Sedan_BrakeSimple.cpp). The cpp file extension is associated with C++ programming language, and are used for main source code files written in the C++ programming language. These files can be viewed with any basic text editor, but most software development programs will display the text with helpful syntax highlighting. The most common software used to open .cpp files are Eclipse IDE for C/C++ Developers, C++ Builder, Xcode, and Microsoft Visual Studio (for more information on .cpp files and software, please visit https://www.file-extensions.org/cpp-file-extension).
- 12 files in .h: The 12 .h files found in this collection are titled the same as their corresponding .cpp files (eg. Sedan_BrakeSimple.h). The h file extension is related to C/C++ header files, referenced by a C++ (eg. CPP file) or Java source code document. As a result, .h files can be viewed using the same software as .cpp files (for more information on .h files, please visit https://www.file-extensions.org/h-file-extension).

National Transportation Library (NTL) Curation Note:
As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (https://ntl.bts.gov/public-access) Section 7.4.2 Data, the NTL staff has performed *NO* additional curation actions on this dataset. NTL staff last accessed this dataset at https://doi.org/10.7910/DVN/WF4ZO5 on 2019-08-20. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.