

# Cooperative Sensing of Vulnerable Road Users and Real-time Response to Potential Collisions via Connected Vehicle and Infrastructure Communication

## Introduction

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**Many DMPs include an introduction. If your DMP includes an introduction, add it here.**

The data management plan elaborated below is intended to support CMU Safety21 UTC Project 511: Cooperative Sensing of Vulnerable Road Users and Real-time Response to Potential Collisions via Connected Vehicle and Infrastructure Communication.

## Types of data produced

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**Types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project. Click on box size (small | medium | full) for detailed guidance.**

This project aims to develop and experimentally evaluate new techniques for (1) cooperative perception from multiple sensors with disparate fields of view, and (2) real-time collision mitigation by connected autonomous vehicles (CAVs). As such, data collection is not an explicit goal of the project. However, to evaluate the efficacy of the techniques to be developed, we expect to perform experiments using publicly available data sets, and to record performance results that enable comparison to previously developed techniques.

For the cooperative perception side of the project we will use publicly available data sets such as V2VReal [1], as well as internally generated data sets, in conjunction with the CARLA simulator, and record the resulting performance results relating to object detection, tracking and trajectory prediction performance of the cooperative perception algorithms we develop. As in our previous work, we will make any internally generated data sets, all performance results, and the respective algorithm(s) used to produce them publicly available to the research community to promote future research in this area.

For the collision mitigation side of the project, DRL will be used to train an agent across various intersection scenarios with human-like reactive agents to learn to decode social maneuvers from the past observed trajectories of the surrounding road users and execute a safe strategy for crossing the intersection. The set of interaction scenarios used as training and test data will be generated using the Common Roads platform and will be made publicly available for future research.

## Data and metadata standards

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**Standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies). Click on box size (small | medium | full) for detailed guidance.**

For all internally generated data sets and algorithm results, a data dictionary will be provided with the file containing the data in comma separated form and header information, to explain the semantics of the values in each field (column).

## **Policies for access and sharing**

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**Policies for access and sharing; Provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements. Click on box size (small | medium | full) for detailed guidance.**

Any internally generated data sets, and associated performance results will be made publicly available and shared with the research community as soon as the results have been published, and will remain accessible thereafter. For replication purposes, the developed algorithm(s) that generated the performance results will also be made accessible.

All of the above mentioned data will be made available via KiltHub, the comprehensive institutional repository and research collaboration platform for research data and scholarly outputs produced by members of Carnegie Mellon University and their collaborators. KiltHub complies with funder mandates around making data openly accessible and stored in perpetuity. Built upon the figshare platform, KiltHub collects, preserves, and provides stable, long-term global open access to a wide range of research data formats. All datasets and scholarly outputs published on KiltHub receive their own DOI, recommended citation, a machine-readable copyright license, are indexed in Google, and are tracked to measure downloads and citations. Carnegie Mellon University Libraries faculty and staff facilitate the deposit and publishing of research data in KiltHub repository, as well as provide support in metadata, data organization, and ensuring that all research products (i.e. datasets, code, stimuli, publications) are linked and discoverable.

## **Policies for re-use, redistribution**

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**Policies and provisions for re-use, re-distribution, and the production of derivatives. Click on box size (small | medium | full) for detailed guidance.**

We are not opposed to re-use, re-distribution and the production of derivatives, as long as this

project and CMU are given proper credit for the genesis of relevant data sets, performance results and the algorithms used to generate the results.

## **Plans for archiving & preservation**

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**Plans for archiving data, samples, and other research products, and for preservation of access to them. Click on box size (small | medium | full) for detailed guidance.**

As mentioned previously, all data sets internally generated by the project, all performance results obtained, and the algorithms responsible for generating these performance results will be archived and preserved in KiltiHub.

## **Software Sharing Plan**

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**Some NSF solicitations require software sharing plans in the DMP. Please check with your specific solicitation for this requirement.**

The algorithms created for cooperative sensing and real-time conflict mitigation will be made available for replication and extension via KiltiHub.

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