

# **Design and Evaluation of a Connected Work Zone Hazard Detection and Communication System for Connected and Automated Vehicles (CAVs) (03-050) Dataset**

Dataset available at: <https://doi.org/10.15787/VTTI/XUJAWN>

(This dataset supports report **Design and Evaluation of a Connected Work Zone Hazard Detection and Communication System for Connected and Automated Vehicles (CAVs)**)

This U.S. Department of Transportation-funded dataset is preserved by the Virginia Tech Transportation Institute (VTTI) in their data repository (<https://dataverse.vtti.vt.edu/>), and is available at <https://doi.org/10.15787/VTTI/XUJAWN>

The related final report **Design and Evaluation of a Connected Work Zone Hazard Detection and Communication System for Connected and Automated Vehicles (CAVs)**, is available from the National Transportation Library's Digital Repository at <https://rosap.ntl.bts.gov/view/dot/61491>.

## **Metadata from the VTTI Repository record:**

Dataset Persistent ID: doi:10.15787/VTTI/XUJAWN

Publication Date: 2019-07-02

Title: Design and Evaluation of a Connected Work Zone Hazard Detection and Communication System for Connected and Automated Vehicles (CAVs) (03-050)

Author:

- Mollenhauer, Michael (VTTI) - ORCID: 0000-0002-7595-8489
- White, Elizabeth (VTTI) - ORCID: 0000-0003-2854-4301
- Roofigari-Esfahan, Nazila (VT) 0000-0003-0466-0893

Description:

- Project Description:
  - Roadside work zones present imminent safety hazards for roadway workers as well as passing motorists. The advent of connected and automated vehicles (CAVs) are driving work zone safety practitioners and vehicle designers towards implementing solutions that will more accurately describe activity in work zones to help identify and communicate imminent safety hazards that elevate crash risks. The aim of this project is to deliver a real-time threat detection and warning algorithm that is able to accurately localize, monitor, and predict work zone actors' collision threat based on their movements and activities. This information along with CAV's trajectories was used to detect potential proximity conflicts and provide advanced warnings to workers, passing drivers, and automated vehicle control systems. To this end, data regarding various roadway construction activities and movements were collected through four data collection sessions. The worker and construction equipment data was collected using handheld Ultra-WideBand (UWB) sensors, and the respective CAV data was received from On Board Units(OBU). The data includes location information such as latitude,

longitude for workers and latitude, longitude, heading, speed and vehicle dimensions. The data was used to train the machine learning algorithm developed to recognize worker activities. As a result, this research provides a key element required to significantly improve the safety conditions of roadside work zones through prompt detection and communication of hazardous situations to workers and CAVs alike.

- **Data Scope:**
  - A total of 82626 datapoints was collected from UWB tags and 129428 was collected from CAVs during four data collection sessions at Virginia Smart Roads. The data was collected in the Highway section in two settings: straight road and curve road. This “ConnectedWorkzone” dataset includes the 58 different variables.
- **Data Specification:**
  - The ConnectedWorkzone dataset contains the collected data and the annotation regarding each data type. The UWB data includes tag IDs, time stamp, latitude and longitude of anchors (stationary) and , latitude and longitude of 4-6 tags(moving) as well as converted Cartesian coordinates. The CAV data includes RSEID, time stamp, latitude, longitude, speed, heading, dimensions, ABS, steering angle and acceleration.

Subject: Engineering; Others

Keyword: Connected Vehicles, Roadway Projects, Connected Work zone, Sensing, work zone safety, ultra-wide band, connected vehicle-to-infrastructure, V2I

Related Publication: @book{doi:10.1061/9780784482445, author = {Yong K. Cho and Fernanda Leite and Amir Behzadan and Chao Wang }, title = {Computing in Civil Engineering 2019}, publisher = {American Society of Civil Engineers}, year = {2019}, doi = {10.1061/9780784482445}, edition = {}, URL = {https://ascelibrary.org/doi/abs/10.1061/9780784482445}, eprint = {https://ascelibrary.org/doi/pdf/10.1061/9780784482445} } doi: https://doi.org/10.1061/9780784482445

Deposit Date: 2019-07-02

### **Recommended citation:**

Mollenhauer, Michael; White, Elizabeth; Roofigari-Esfahan, Nazila, 2019, "Design and Evaluation of a Connected Work Zone Hazard Detection and Communication System for Connected and Automated Vehicles (CAVs) (03-050)", <https://doi.org/10.15787/VTTI/XUJAWN>, VTTI, V1

### **Dataset description:**

This dataset contains 1 file collection, described below.

### **Design and Evaluation of a Connected Work Zone Hazard Detection\_Data.zip**

- workzoneData20181004-105056.csv
- workzoneData20181001-085731.csv
- workzoneData20180920-095338.csv

- workzoneData20180828-183409.csv

- jp\_bsm\_41\_20181004.csv
- jp\_bsm\_41.csv

The .csv, Comma Separated Value, file is a simple format that is designed for a database table and supported by many applications. The .csv file is often used for moving tabular data between two different computer programs, due to its open format. The most common software used to open .csv files are Microsoft Excel and RecordEditor, (for more information on .csv files and software, please visit <https://www.file-extensions.org/csv-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://doi.org/10.21949/1503647>) 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/10.15787/VTT1/XUJAWN> on 2022-04-28. If, in the future, you have trouble accessing this dataset at the host repository, please email [NTLDataCurator@dot.gov](mailto:NTLDataCurator@dot.gov) describing your problem. NTL staff will do its best to assist you at that time.