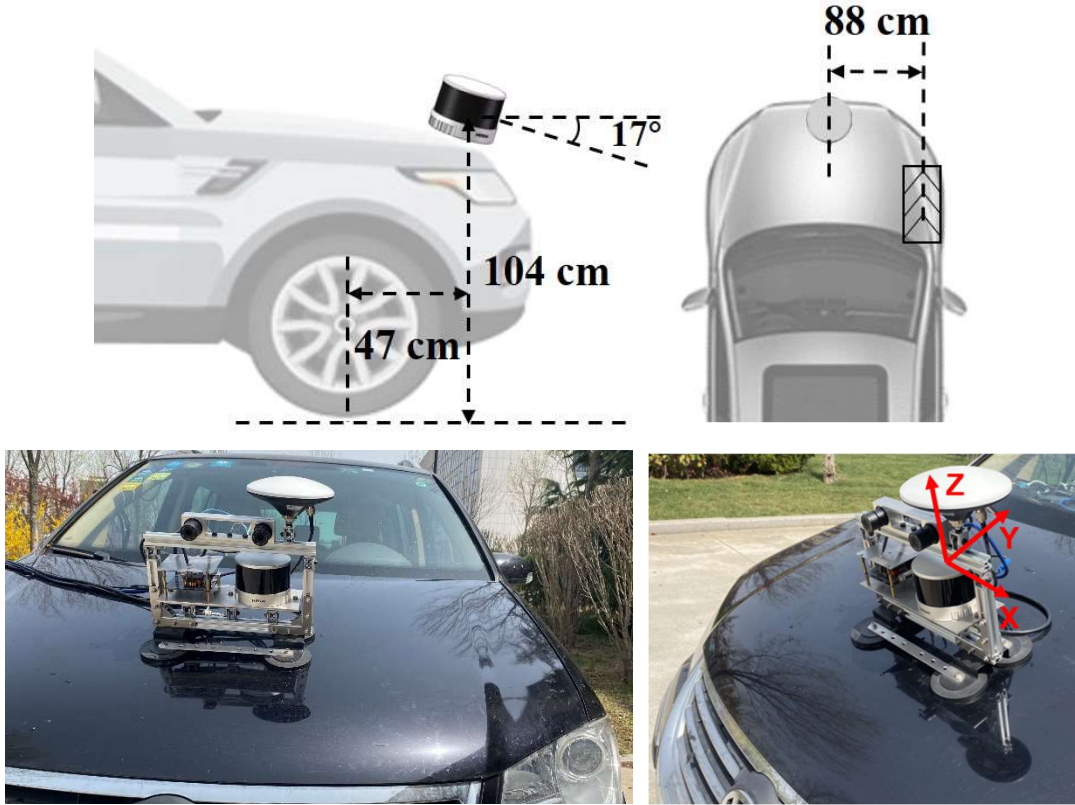


# RSRD Dataset Description

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## Coordinate and Installation



## Position-Pose-Velocity Data

We provide several continuous sequences each of 8 seconds long in both RSRD-dense and RSRD-sparse. These sequences are in independent folders with `conti` in folder name. The corresponding pose, location, and velocity measurements are included in a *loc\_pose\_vel.pkl* file, which can be read by the provided development kit.

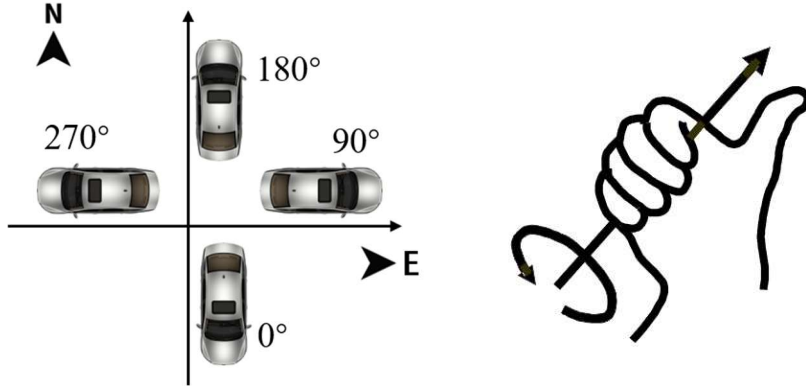
### Position

The position information includes longitude, latitude, and altitude in WGS84 coordinate. The altitude is the height over mean sea level in mm unit. For SfM and localization applications, the position can be converted into the relative coordinate in the local ENU frame.

### Pose

The provided Euler angles are in the LiDAR's coordinate. The status of heading (yaw, the rotation angle w.r.t Z axis of LiDAR) is shown below. The pitch and roll are the rotation angles w.r.t the X and Y axes respectively, obeying the right-hand rule. The

rotation sequence is yaw-pitch-roll in intrinsic rotations (rotated axis). We also provide scripts to get the corresponding orientation and extrinsic parameter of the camera.



### Velocity

The velocity values are in the local ENU frame: `vel_e`, `vel_n`. The unit is mm/s.

## Dataset Directory

### RSRD-Dense

The data samples are divided into trainset (2500) and testset (300). All the folders and files are named with the time stamp. The trainset consists of 27 subfolders each contains *'left'*, *'right'*, *'pcd'*, *'depth'*, *'disparity'*. The depth and disparity maps are with respect to the left camera (the one above LiDAR). The true depth (in meter) or disparity values can be obtained by dividing 256.

### RSRD-Sparse

This sub-set contains about 13K samples with sparse ground truth. The point cloud label is derived from only the current frame with motion compensation. This subset includes 176 continuous sequences each of 8 seconds long. The IMU and RTK measurements are also provided. We do not divide it into train or test sets. This subset can be utilized for weakly supervised or unsupervised learning.

The full-resolution(1920\*1080) images above are challenging for deep learning models. So we further provide the half-resolution images and maps along with the dataset, which are placed in folders with *'half'* in names.

## Calibration Parameters

The data in the same day shares the same calibration file. The calibration parameters for every data sample can be indexed by the date in file name. The parameters are saved in *.pkl* file, which can be read by the development kit.

The *'K'* is camera intrinsic after stereo rectification. *'B'* is the stereo baseline in mm. *'R'* and *'T'* are the left camera – LiDAR extrinsic parameters after rectification. *'Width'* and *'Height'* are the image width and height, respectively.