Vehicle acceleration, which in the present analysis is not considered constant, was associated to the available net engine horsepower; however such reduction (more than 10% in total) was disregarded and the safety margin was set to the constant value of 100m, which actually can be interpreted as a safety margin for predicting PSDs are developed.

Field Measurements

The field measurements were carried out on two mild graded (1.00% and 2.00%) 2-lane rural road sections located at Spata area (near Athens) for both directions of travel. The recording device used for the speed-distance data was the Vericom V4000 accelerometer. The peak friction supply for the examined road section was measured under dry road surface conditions $f_{max}=0.82$.

The key concept of the approach was the flexibility and the measure of the processing keeping it as cost effective as possible. Therefore, a HD machine vision camera was utilized, mounted on the passing vehicle and recording continuously the passing vehicle during the maneuver. By that means, the distance among the two vehicles may be estimated for every successive frame, utilizing a typical image-based camera localization method that exploits tracked feature images. The overall robustness of this single camera approach was ensured by an accurate camera pre-calibration step, along with an a priori 3D photogrammetric reconstruction of several signalized targets (cobbled targets) mounted on the passing vehicle surface. The achieved localization accuracy is directly related to the distance (dist) from the camera towards the target-vehicle and ranges from some millimeters at close distances (dist < 5m), to several centimeters at longer distances. The authors deliver passing distance outcomes as a function of critical vehicle and road parameters by statistical models for predicting PSDs are developed.

The technological advancements provided by connected vehicles (CVs) and autonomous vehicles (AVs) are on the verge of realizing the interaction between vehicle dynamics and road geometry, where decision passing distance was incorporated. The process, assuming free flow conditions, involves the contribution of three vehicles; namely the passing vehicle, the passed vehicle and the opposing vehicle. The technological advancements provided by connected vehicles (CVs) and autonomous vehicles (AVs) are on the verge of realizing the interaction between vehicle dynamics and road geometry, where decision passing distance was incorporated. The process, assuming free flow conditions, involves the contribution of three vehicles; namely the passing vehicle, the passed vehicle and the opposing vehicle. Therefore, the assessment of the vehicles' passing process was investigated solely through ADAS incorporated. The process, assuming free flow conditions, involves the contribution of three vehicles; namely the passing vehicle, the passed vehicle and the opposing vehicle.

Figure 1 Distance criteria utilized for PSD determination

Aiming to utilize a uniform approach for assessing PSDs, the current analysis was performed in line with the German rural road design guidelines (RiAL), and more specifically for ERL2 and EKL2 design conditions, the design – posted speed values are set to 100km/h and 90km/h respectively. In RiAL, 2012 design guidelines, PSD is dependent on the homogeneity of the proposed road design and it no longer is set to a fixed value (PSD=0.30m).

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Certain cases by design class were examined by arranging the combinations of 4 independent variables; namely peak vehicle horsepower rates on the wheels through the friction ($\Delta V_{peak}$), constant speed of the passed vehicle ($\Delta V_{pass}$), constant speed of the opposing vehicle ($\Delta V_{op}$), and peak vehicle acceleration under acceleration of the passing vehicle ($\Delta V_{acc}$). In every case, further research is necessary to quantify more accurately the amount of utilized horsepower rates during passing maneuvers.

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