

Radar based detection and classification of vulnerable road users

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Safe and sustainable mobility in urban and rural regions can be fostered by developing intelligent road infrastructure to avoid accidents by warning drivers about approaching vulnerable traffic participants. Radar sensors accurately detect different objects, however the reliable classification still remains challenging. In this paper, a new approach to extract and interpret unique spectral signatures of pedestrians and cyclists is proposed. Moreover, this approach can be also extended to any moving object including wild animals. This method uses Doppler-Range measurements in real time which result from the local dynamic of the moving parts in order to extract statistical parameters of the movement pattern. The movement pattern is represented by a time dependent velocity distribution which can be further analyzed by conventional signal processing techniques. In this work, the intensity-normalized average velocity calculations are based on a probabilistic approach of the detection. Such a velocity series can be further analyzed by applying Fast-Fourier-Transform in order to extract spectral information of the movement. In case of more than one detected object, a spectrogram can be built, therewith it is possible to determine average velocities as well as periodicities of the measured movement patterns. Machine learning algorithms can be also applied to the discussed time series in order to automate the classification.