VERIFICATION
VALIDATION
METHODS

PROJECT of the PEGASUS FAMILY

EVASION THREAT METRICS – ETM

A Contribution to the Criticality Assessment

Michael Knoop, Bosch

Starting point for the ETM was the need for a criticality metric that incorporates the outcome of an accident.

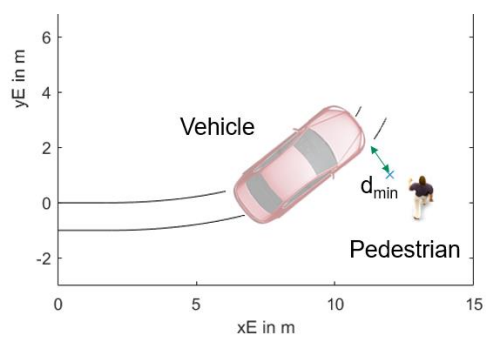
Therefore, the ETM was developed by combining two metrics:

- The **minimum distance d_{min}** between the ego vehicle and the other road user, predicted from the current state of motion, in case the accident can be avoided,
- The **injury probability**, in case the accident cannot be avoided.

The injury probability is calculated via the collision velocity, using an injury risk function, which is currently available for pedestrians.

The prediction trajectories comprise pure braking, pure steering and combinations thereof.
Braking and steering are limited by

- Realistic actuator dynamics and
- The friction coefficient.



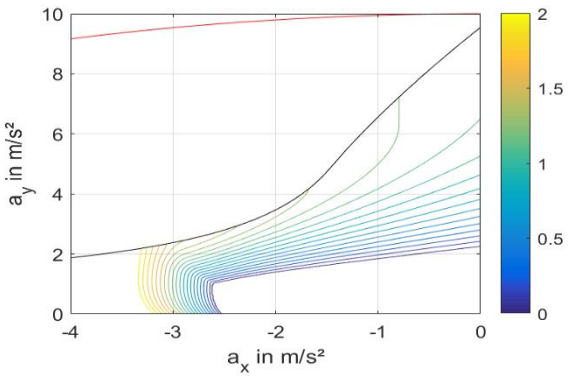
First steps towards a stochastic interpretation have been made, which is necessary, since surround sensors like radar and video yield mean values and standard deviation as output e.g. for the object position.

In a joint effort by ZF and Bosch, the ETM has been integrated into the ZF criticality evaluation tool CriSys (see separate poster).

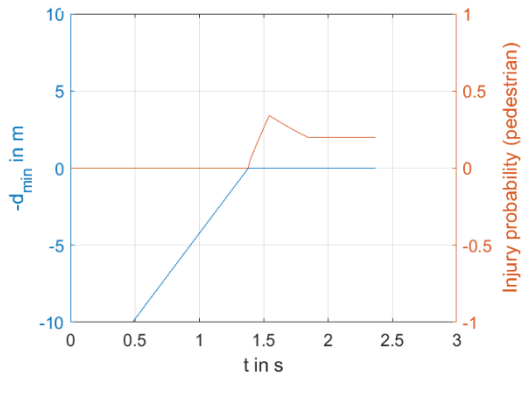
Further development work is planned:

- Motion prediction for non-stationary other road users,
- Visualisation of prediction trajectories,
- Consideration of realistic evasion trajectories instead of circle segments,
- Extension to other road users in addition to pedestrians in collaboration with the Bosch Accident Research team.

Iso-lines d_{min} in m



Metrics over time



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