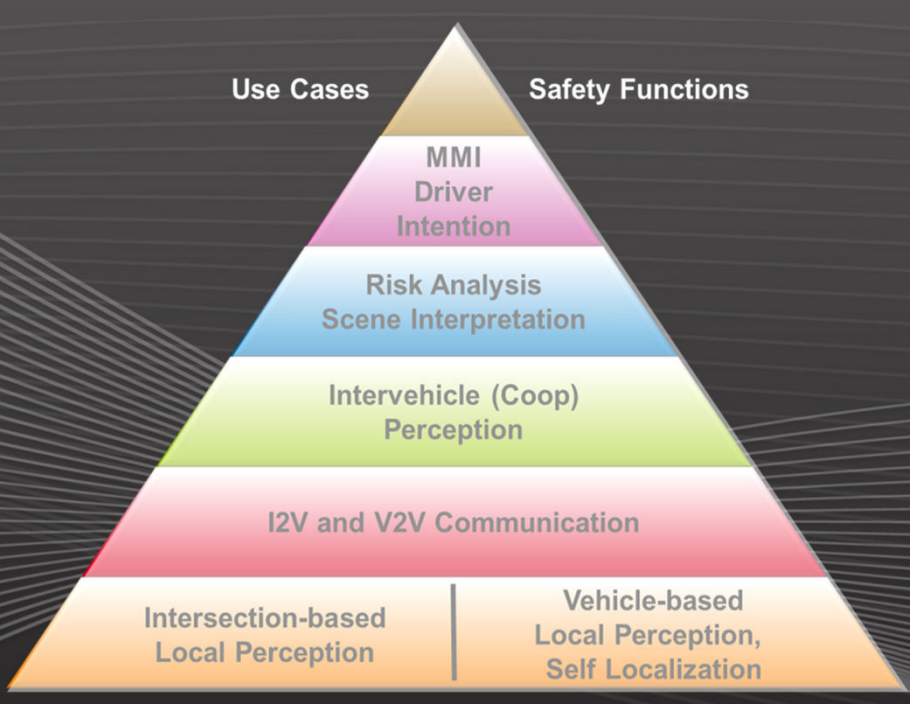
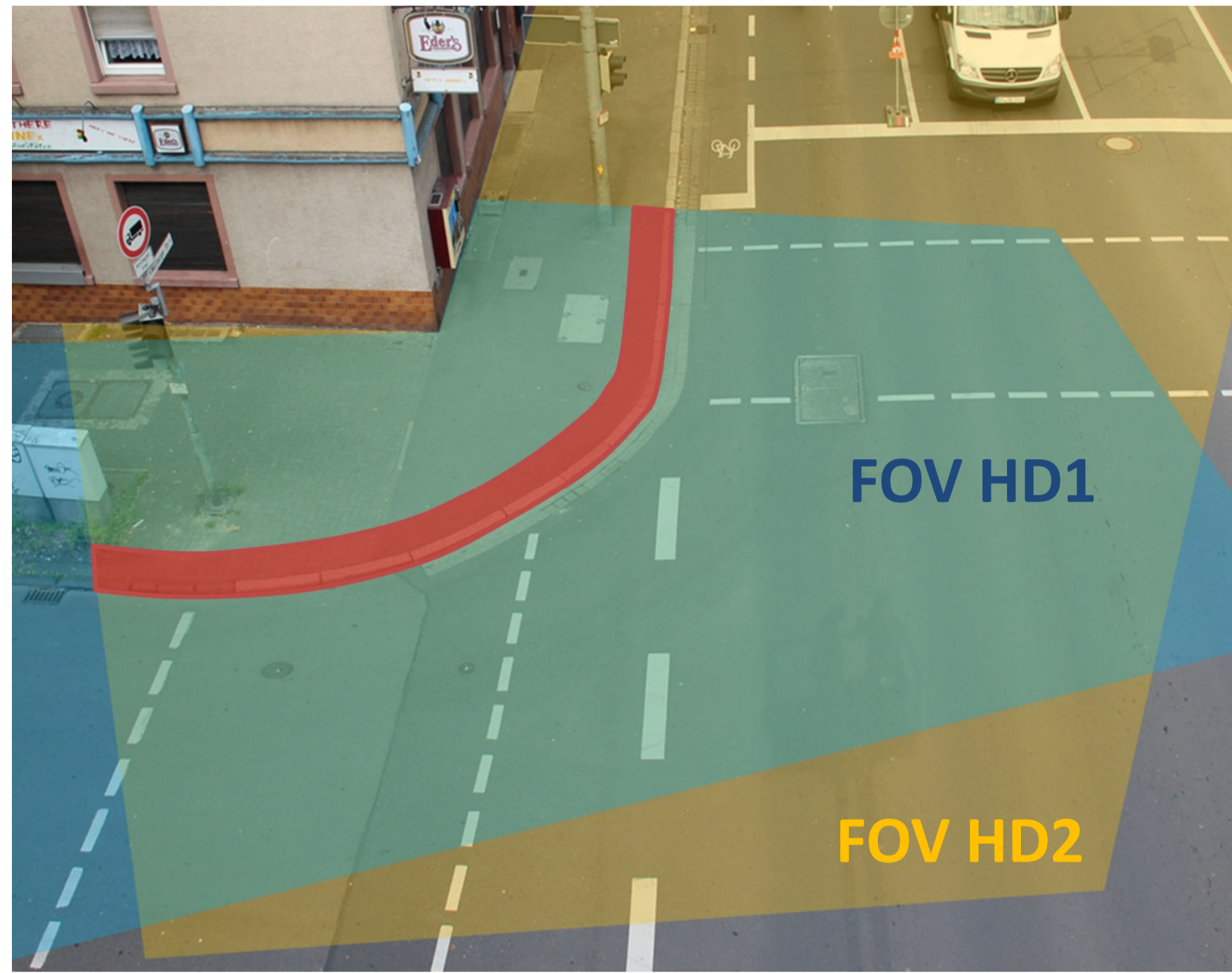


Will He Run into Danger? (Prediction of Pedestrian Behaviour)



Motivation and Sensor Setup



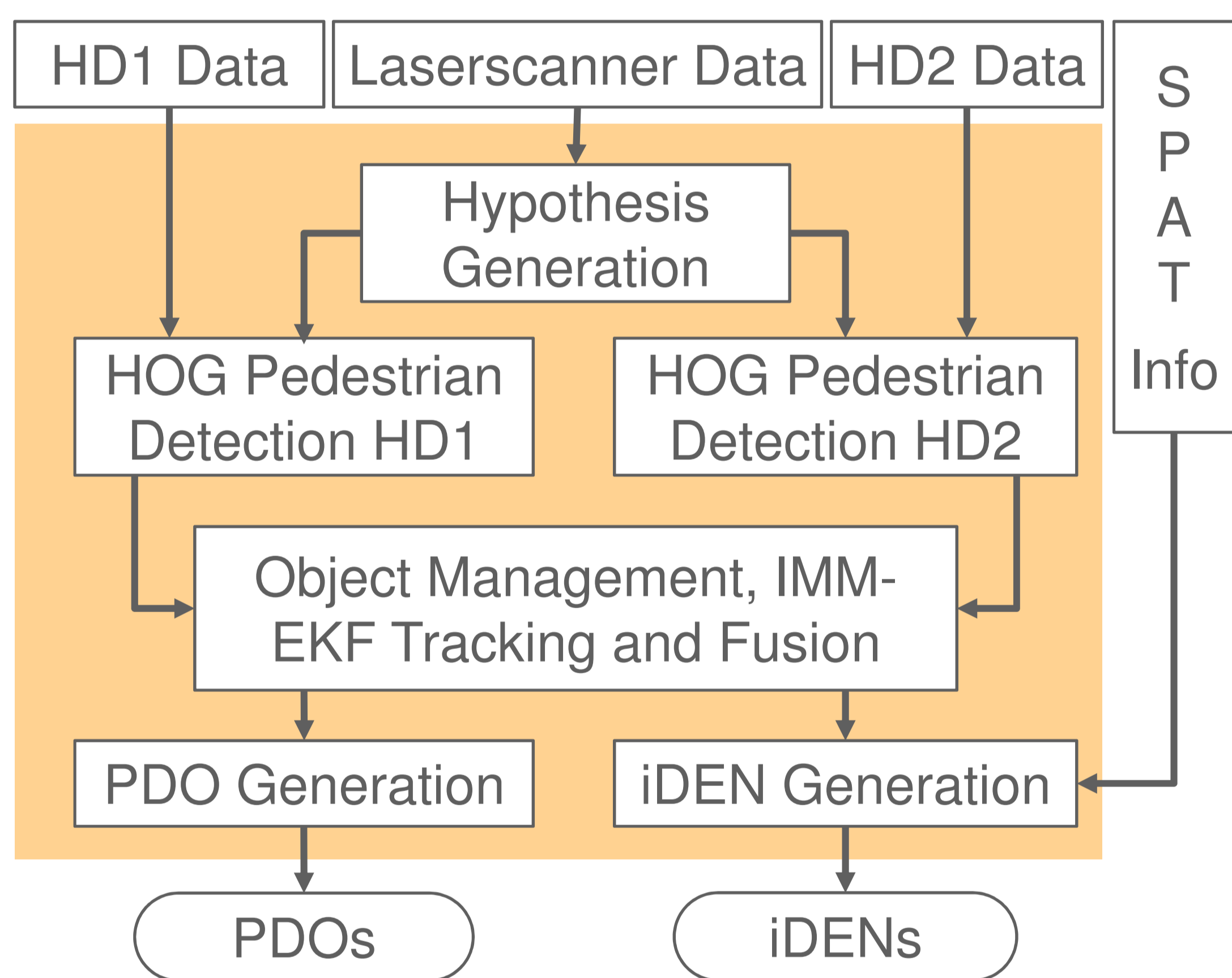
Avoid collisions with crossing pedestrians (PEDs):

- Detection of gait initiation and prediction of the PED's trajectory
- Issue an *intersection Decentralized Environmental Notification* (iDEN)

Perception at crosswalks:

- 2 stationary mounted High-Definition video-sensors HD1, HD2, operating @ 50 Hz
- 4 eight-layer laser scanners operating @ 12.5 Hz

Method



iDEN triggered by motion pattern classification using Interacting Multiple Model Extended Kalman Filter (IMM-EKF), constant velocity (CV) model probability and MCHOG starting probability to detect initiation of gait:

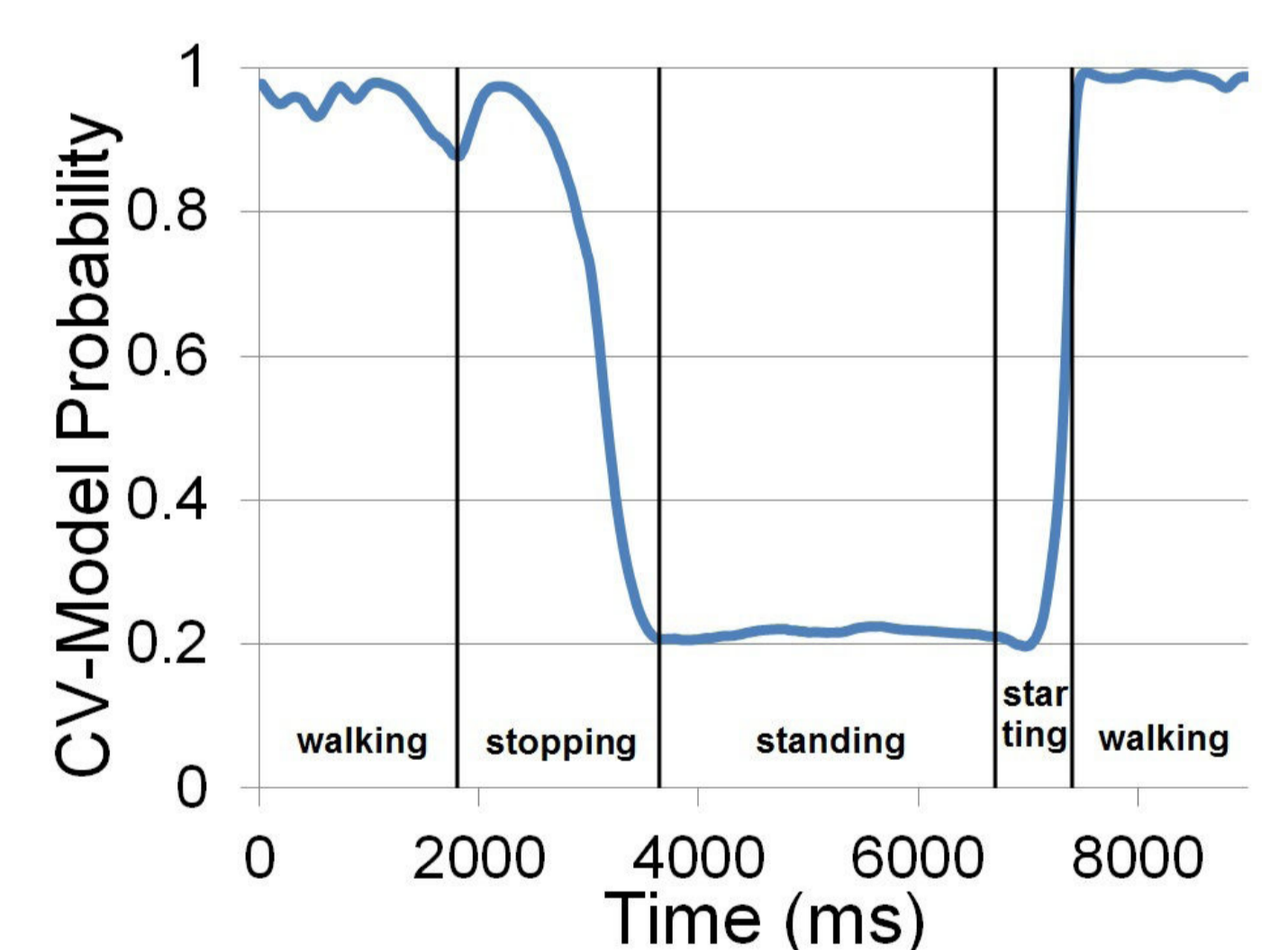
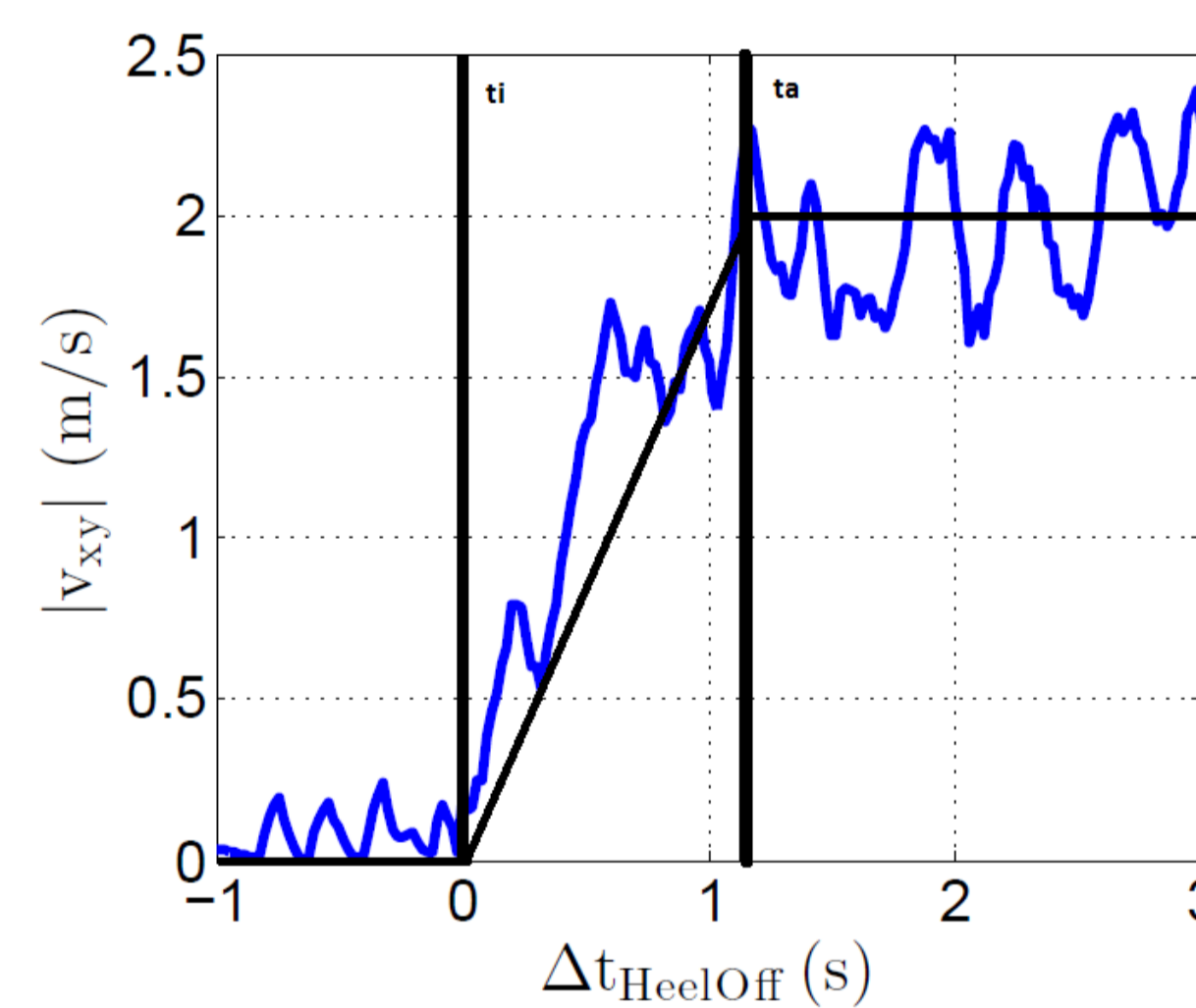
- Edge-Based Motion History Image
- Motion Contour HOG-like descriptor (MCHOG)



iDEN trajectory prediction:

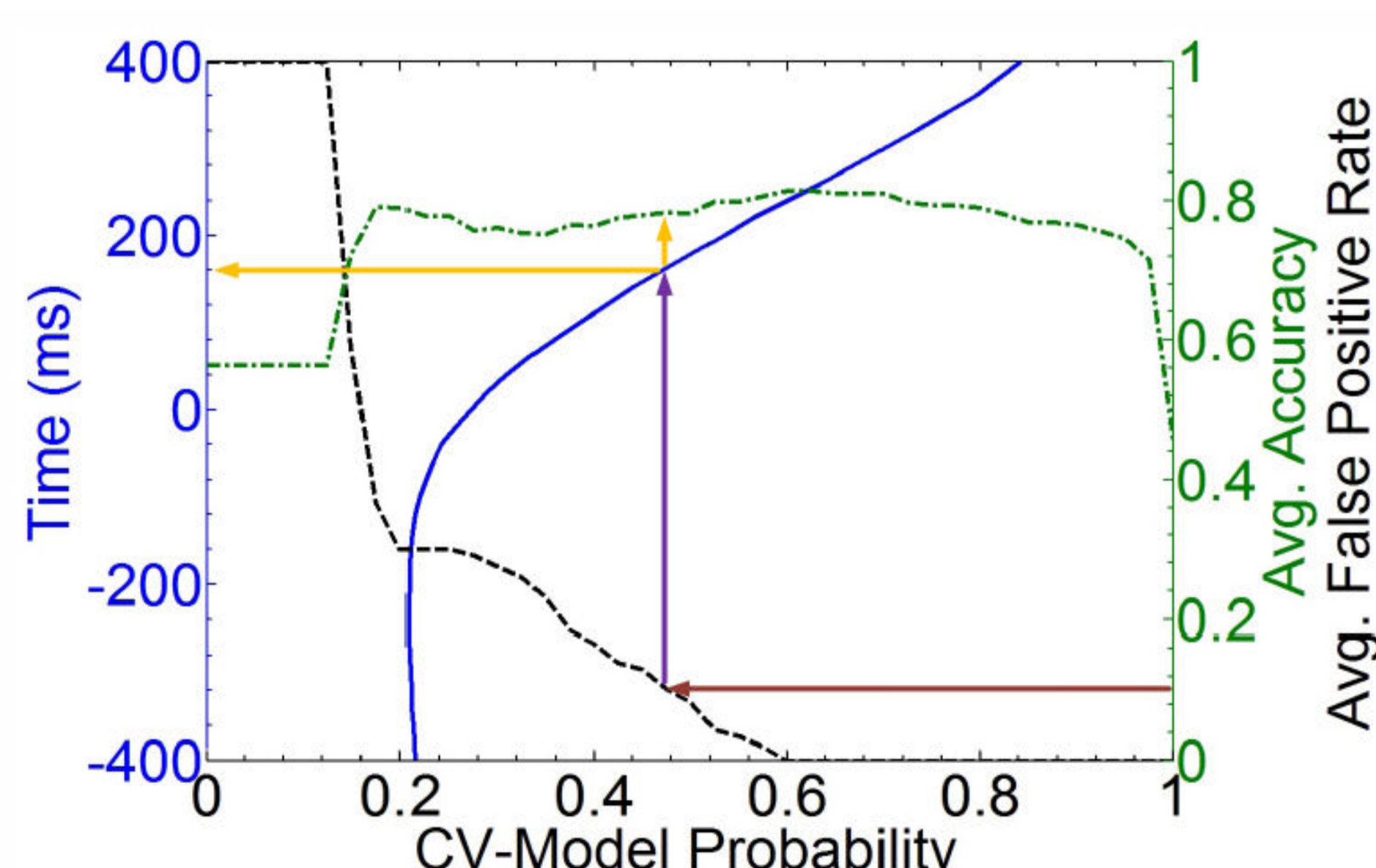
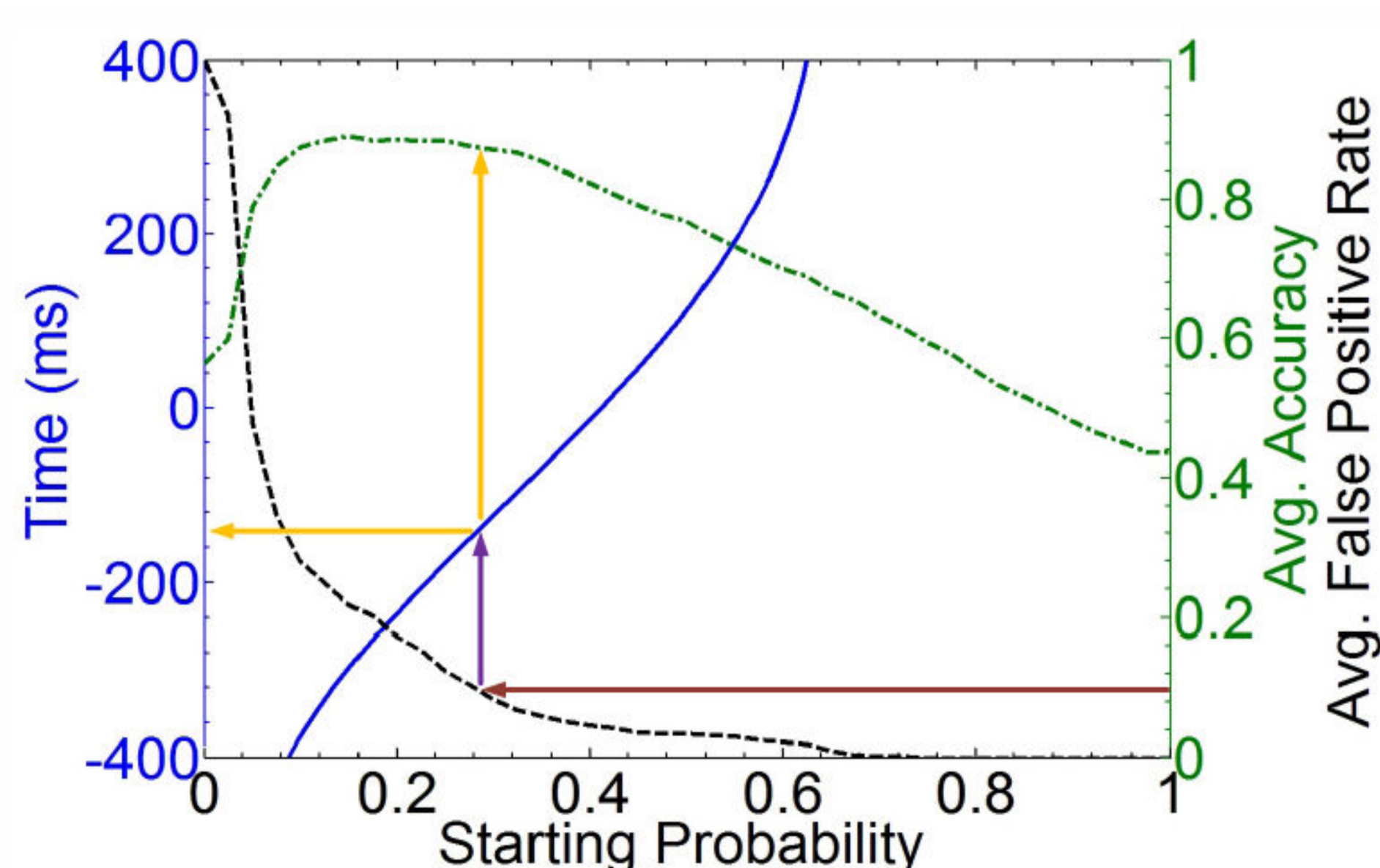
- Piecewise linear velocity model
- Gait parameters derived from video data captured at the Ko-PER intersection

Reference: S. Köhler, M. Goldhammer, S. Bauer, S. Zecha, K. Doll, U. Brunsmann, K. Dietmayer: "Stationary Detection of the Pedestrian's Intention at Intersections," accepted for publication in: *IEEE Intelligent Transportation Systems Magazine*, *ITSC 2012 Special Issue*, invited Paper.



Results

Intention Detection



Trajectory Prediction

| Time | lin. mean | lin. min | lin. max |
|-------|-----------|----------|----------|
| 0.6 s | 0.12m | 0.03m | 0.28m |
| 1.2 s | 0.17m | 0.04m | 0.29m |
| 1.8 s | 0.23m | 0.07m | 0.41m |
| 2.4 s | 0.26m | 0.04m | 0.52m |
| 1.2 s | 0.09m | 0.04m | 0.14m |
| 1.8 s | 0.16m | 0.07m | 0.29m |
| 2.4 s | 0.19m | 0.04m | 0.39m |
| 1.8 s | 0.15m | 0.07m | 0.22m |
| 2.4 s | 0.24m | 0.11m | 0.33m |

