Research Title:

Learning Pedestrian-Driver Communication and the "Almost-Accident" Phenomena

Primary Investigator:

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This research advances the vision of “zero externalities” in urban mobility through two complementary branches: psychological modeling of pedestrian road-crossing behavior and computer-vision recognition of vulnerable pedestrian groups. Together, they aim to explain individual differences in crossing decisions and support future accident-prevention strategies.

The psychological branch investigates sensation seeking, impulsivity, conscientiousness, ADHD symptoms, and executive functions as predictors of crossing behavior, emphasizing executive functions as potential protective moderators. During the reporting year, approximately 100 participants completed psychological questionnaires, laboratory cognitive tasks, and virtual-reality road-crossing simulations. The simulation was refined through reduced vehicle speeds, crossing opportunities every minute, and corrected vehicle-yielding responses. Behavioral and machine-learning analyses are underway to examine the combined contributions of psychological and cognitive factors. Additional research assistants were trained to support continued data collection.

The computer-vision branch evaluates deep-learning methods for classifying pedestrians into children, adults, and elderly individuals under facial anonymization and varying observation distances. Comparative experiments assessed convolutional and transformer-based architectures. OpenCLIP achieved 94.78% accuracy on clear images and 91.30% on facially anonymized images. Further experiments supported generalization from anonymized training images to clear test images and demonstrated the importance of distance-specific adaptation across observation

ranges of 4–16 metres. These findings inform privacy-conscious model development and the potential use of age-group information in future pedestrian-safety systems.