

Multi-scale multi-modal perception of dynamic 3D environments based on the fusion of dense stereo, dense optical flow and visual odometry information



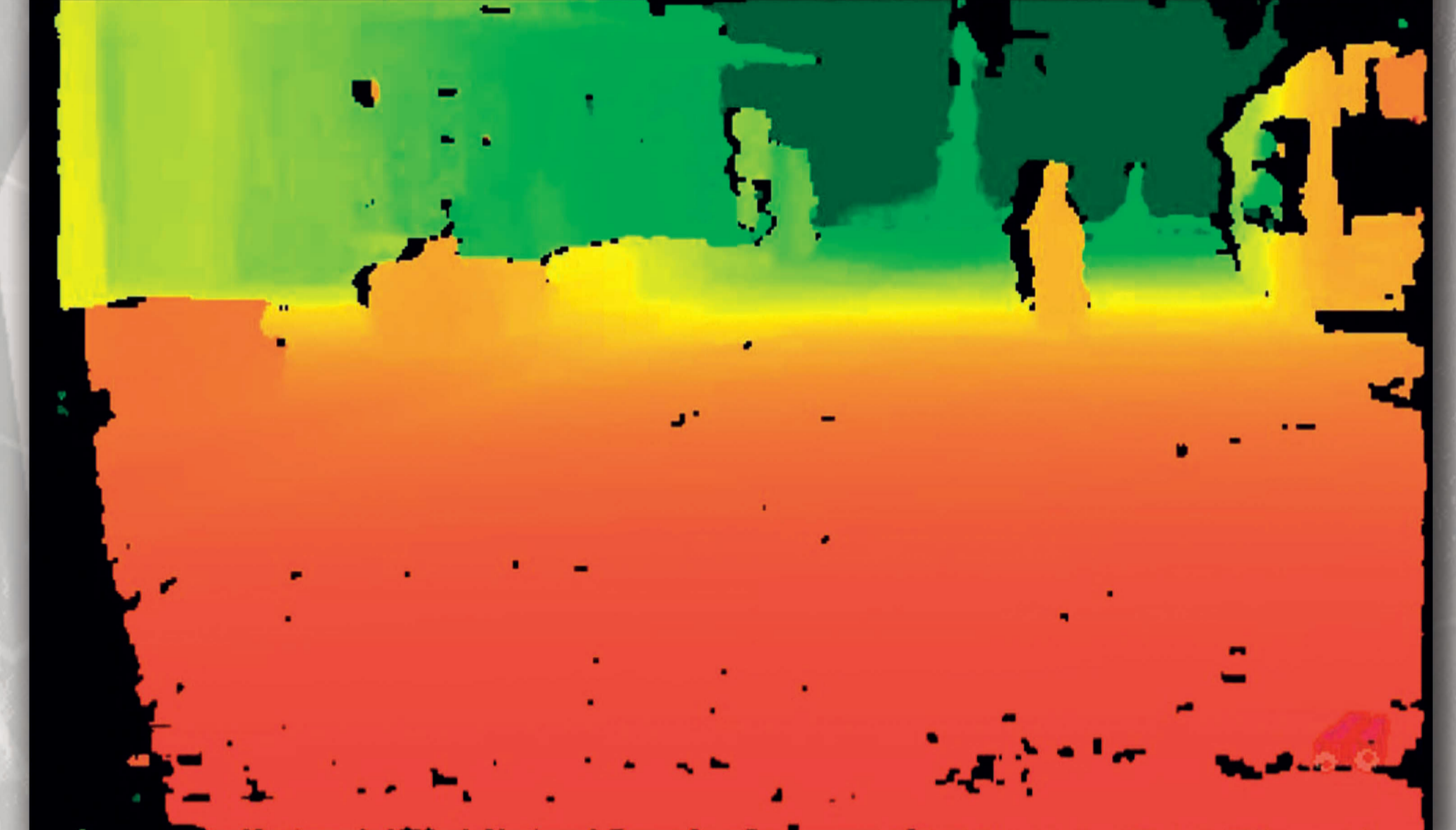
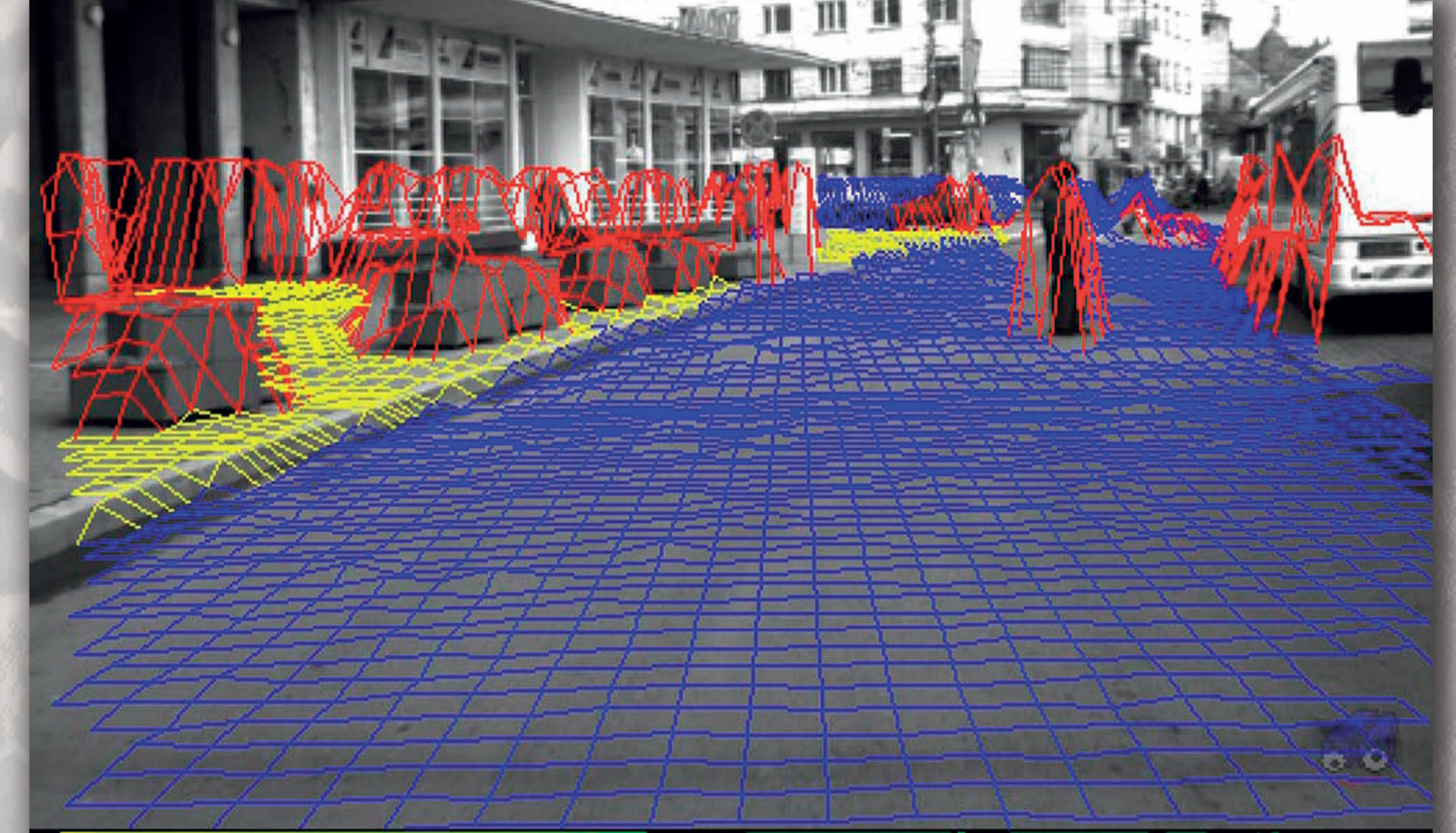
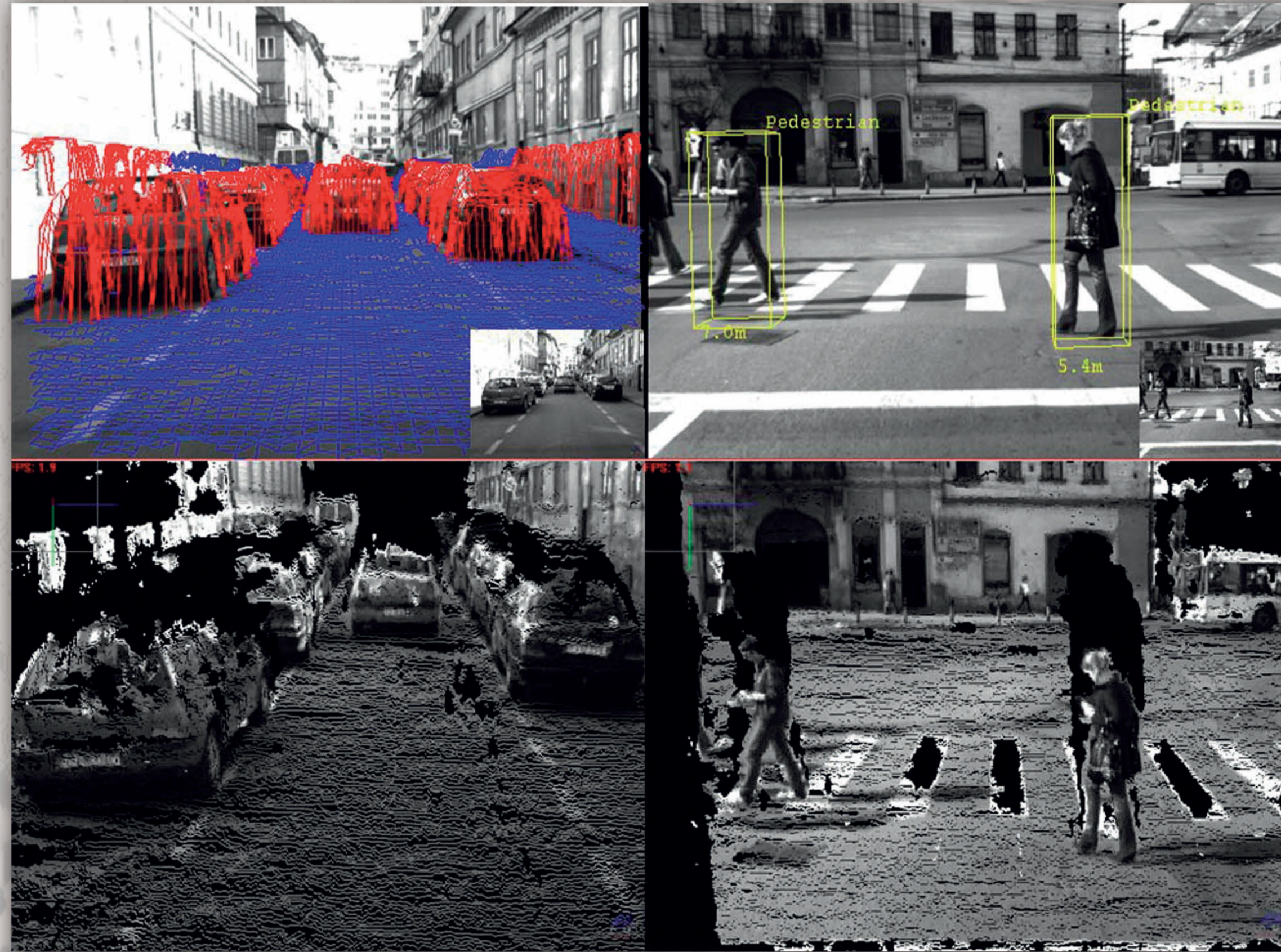
Project code: PN-II-ID-PCE-2011-3-1086

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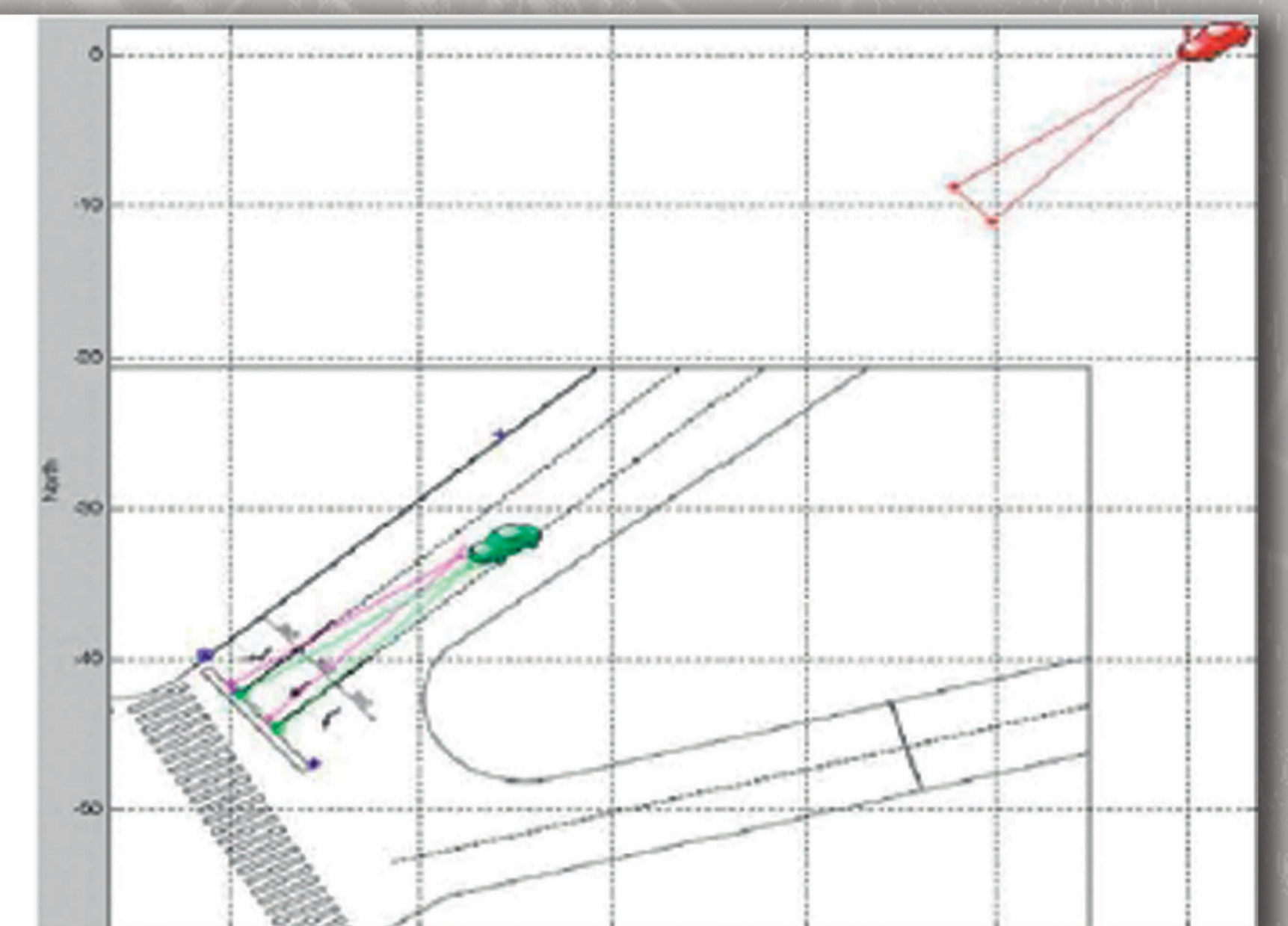
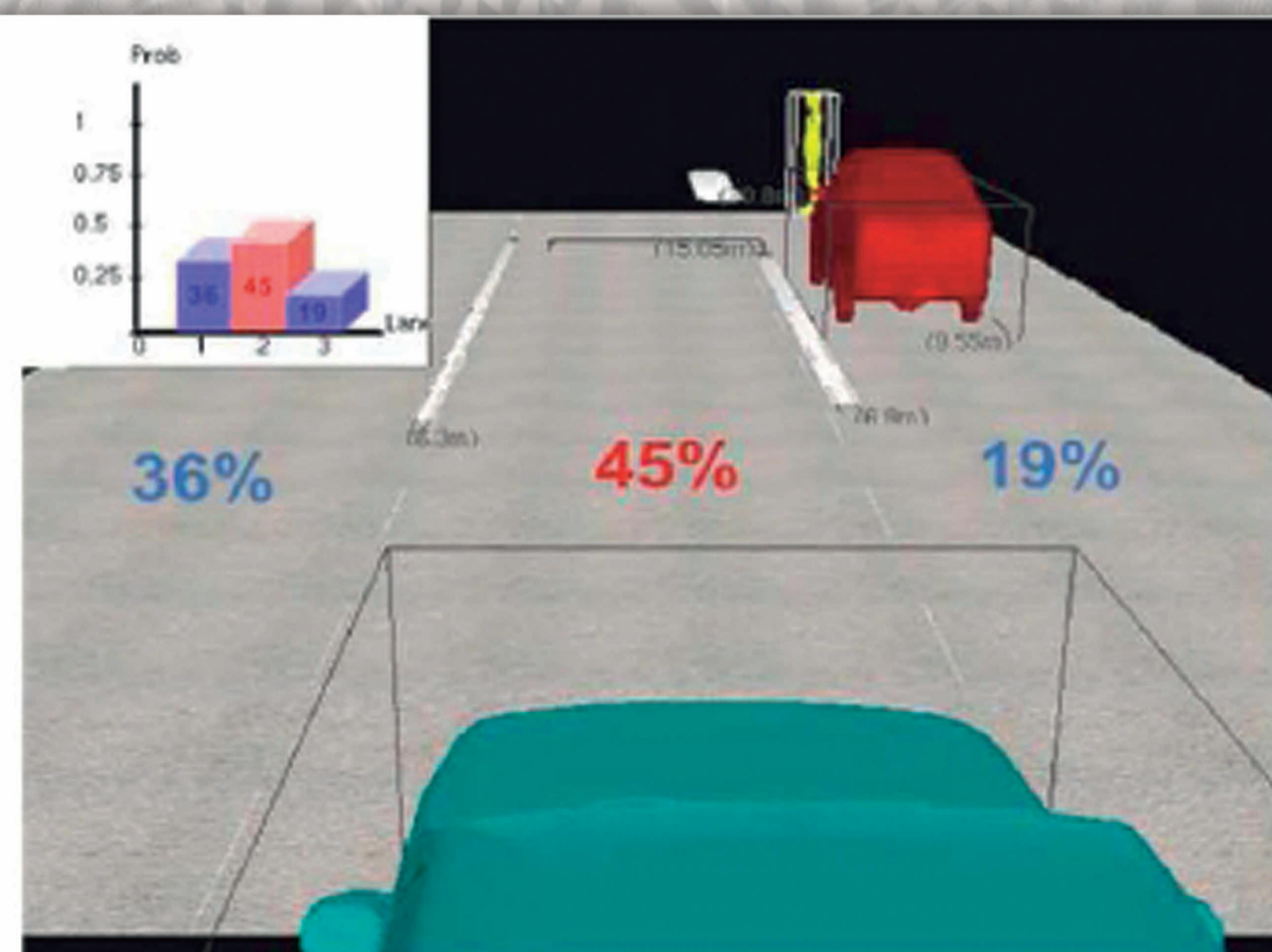
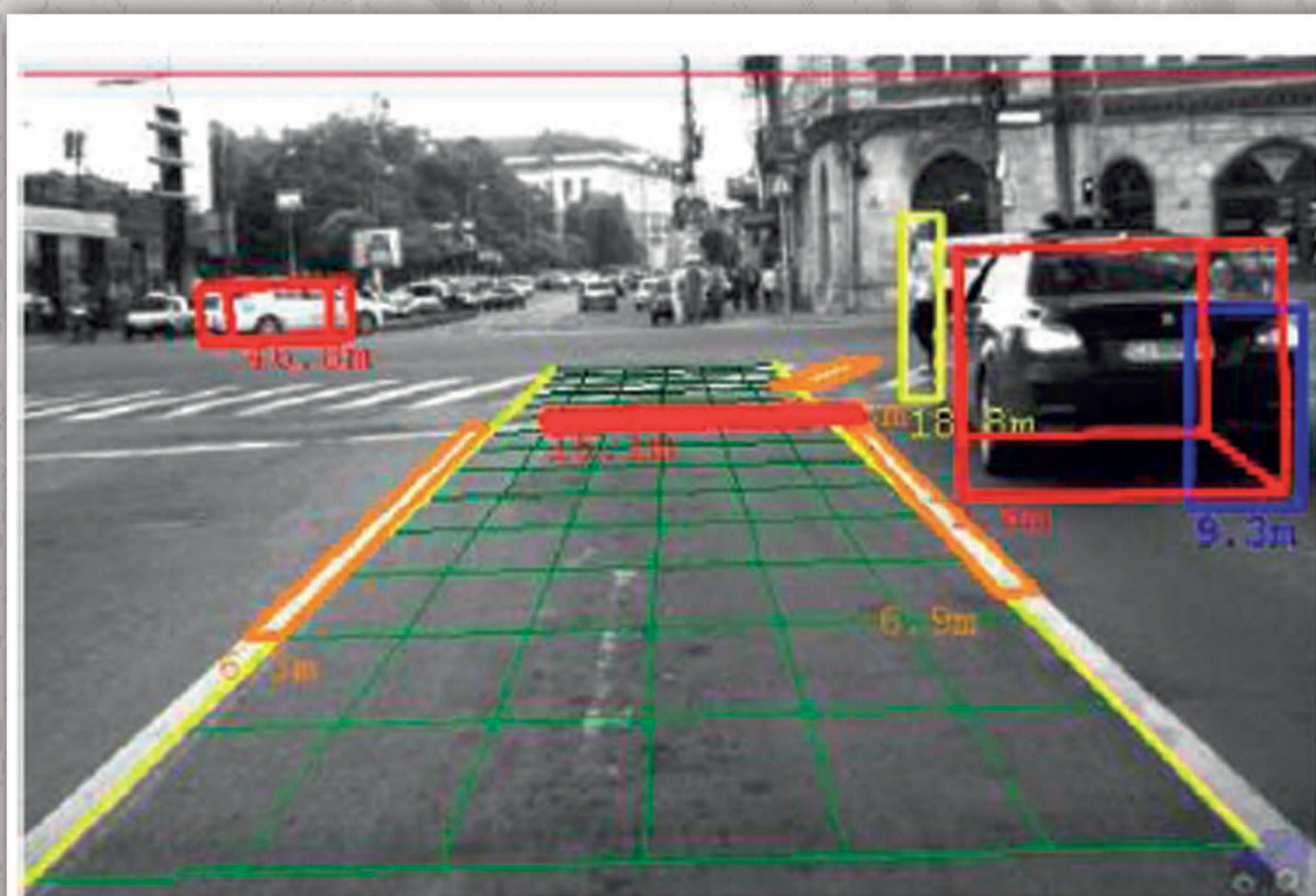
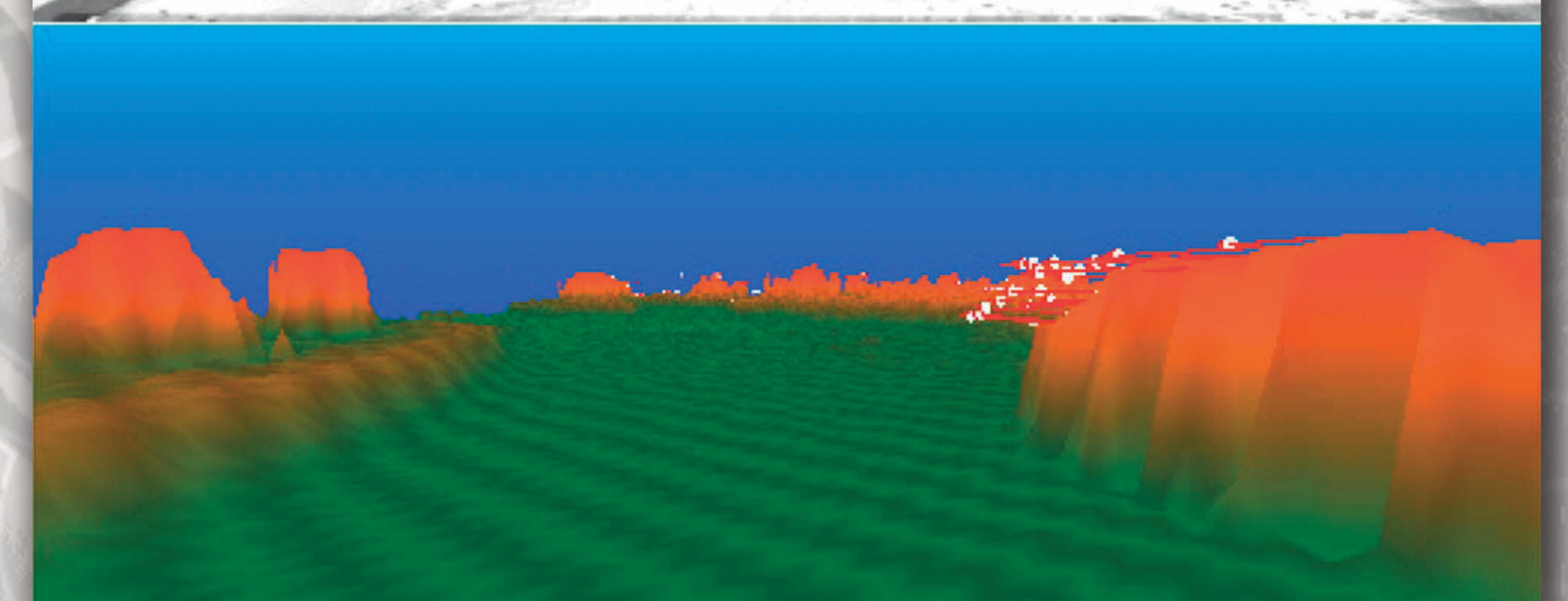
Objectives:

- Design of new methods for extraction of high density and high accuracy low level dynamic 3D features from stereo image sequences
- Design of new methods for high level modeling and perception of dynamic 3D environments based on high density and high accuracy low level dynamic 3D features



Achievements:

- Design of original solutions for real time extraction of dense and accurate 3D information from stereo image pairs, using the semi global matching concept and the parallel processing capabilities of graphic processors (GPU).
- Design of original solutions for real time, dense and accurate optical flow computation from image sequences, based on variational methods and GPU processing
- Design of original solutions for accurate real-time visual odometry using real-time pose estimation from stereo image sequences
- Design of original probabilistic 3D dynamic world models based on the occupancy grid, elevation map concepts
- Design of original tracking techniques for real-time estimation of the proposed world models
- Implementation of the original solutions on demonstrator platforms, testing, comparison with existing methods
- Dissemination in top tier scientific publications



Application fields: mobile robotics, advanced driving assistance systems, mobile surveillance.

Dissemination:

- 8 articles published in ISI ranked journals, with a cumulated Impact Factor higher than 20.
- Numerous papers published in the proceedings of prestigious international conferences.

Derived projects:

1. "Plug and Navigate robots for smart factories - PANROBOTS", FP7 project funded by the European Commission.
2. "Measurement of road surface using stereo", project funded by the Robert Bosch GmbH, Germany.
3. "Identification of 3D lane boundaries based on road limiting infrastructure and surface discontinuities using stereo measurement", project funded by the Robert Bosch GmbH, Germany.