

# Computer vision in Transport and Traffic

Faculty of Transport and Traffic Sciences, (FTTS) Zagreb, Croatia



# FTTS CV Group members



- **Three departments involved**

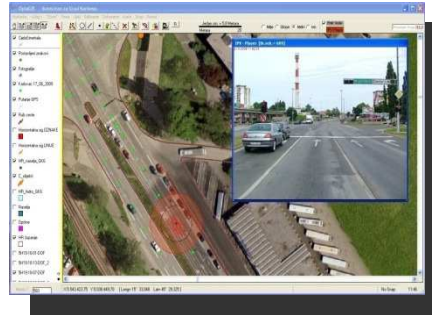
- Department of transport planning
- Intelligent transport systems department
- Department of general program content

- **High inter-disciplinarity**

- **Technical areas**

- Traffic science
- Traffic and transportation technology
- Computer Science & Engineering
- Control & Robotics

# Computer vision in Transport and Traffic



- Video georeferencing for road infrastructure management and road safety inspection and assessment
- Traffic sign detection including geo-referencing
- Traffic flow parameters measurement and estimation of O/D matrices from video-footage obtained using elevated cameras
- Automatic traffic incident detection

## FTSS Role - Collecting the data – Video Georeferencing



- Multisensor device integrates information from different sources of navigation and video(foto) sensors on a movable platform
- On-board computer collects and integrates data from all sensors
- Integration is completely automatic

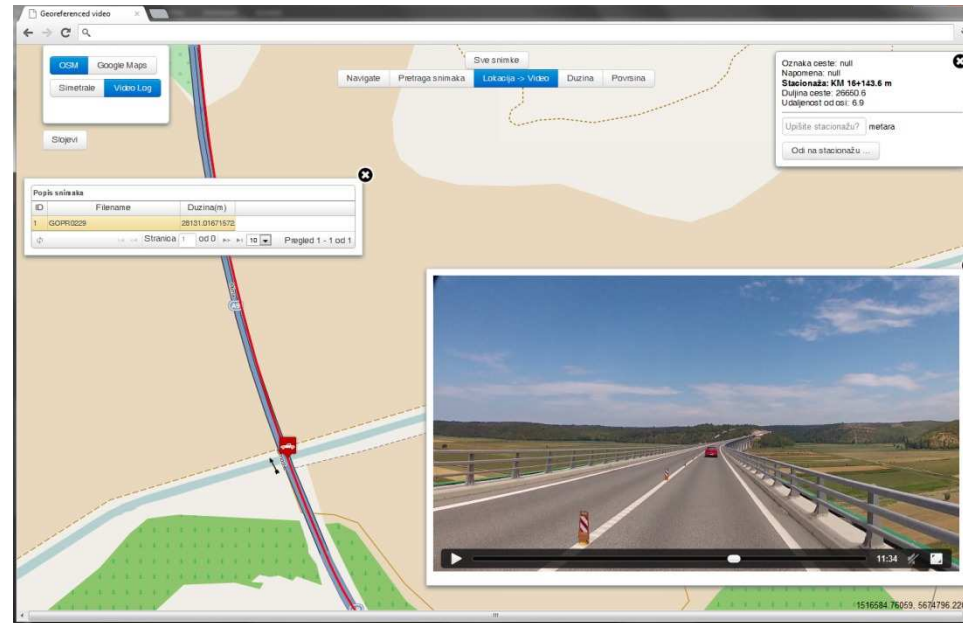




# Special equipment is installed in measurement vehicles



# Traffic safety, Georeferenced video recording and GIS



- Visualization and improvements of dangerous road sections
  - Building of geo-information video databases
    - GIS object mapping
    - Reversible road project engineering
- Road sign database data collecting and maintenance

# Special software –Georeferenced video GIS viewer



## CV Research potential

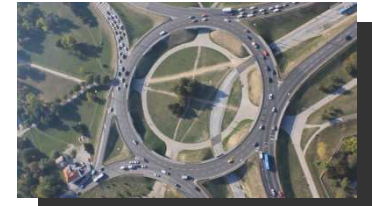
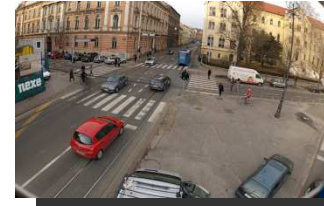
- Automatic traffic sign detection
- Automatic centerline identification
- Dimension measurements
- Visual odometry
- Tunnels – path reconstruction
- Curvature characteristics





## Simulation and modeling

- Requires input traffic data as accurate as possible
- Existing traffic counting procedures do not provide sufficient data
- All counting methods have disadvantages
- High quality data leads to high quality results - saving time and money





# Traffic flow parameters estimation – Potential Approaches



## CV Research potential

- Every pixel is a sensor meaning that everything visible can be measured
- Accurate time measurements
  - Traffic flow time gaps
  - Vehicle headway
- High camera elevation
  - Urban areas
  - Rural areas
- Incident detection







Intelligent Cooperative Sensing for  
improved traffic Efficiency

**FP7-317671 ICSI**

HR Leading person : prof. dr. sc. Sadko Mandžuka

# Intelligent Cooperative Sensing for improved traffic Efficiency



Small or medium-scale focused research project (**STREP**)

## Work programme topics addressed:

ICT-2011.6.7 Cooperative Systems for energy efficient and sustainable mobility

## Target outcomes:

- a) Cooperative Systems for low-carbon multi-modal mobility
- b) European Wide Service Platform (EWSP) for cooperative system enabled services

## Facts:

Duration: **30 months**

Total effort: **560 PM**

Project cost / EC contribution: **4,682 k€ / 3,120 k€**



# Intelligent Cooperative Sensing for improved traffic Efficiency



Participant No.	Participant organisation name	Part. Short name	Country
1 (Co-ordinator)	INTECS INFORMATICA E TECNOLOGIA DEL SOFTWARE S.P.A.	INCS	Italy
2	BRISA INOVACAO E TECNOLOGIA	BRISA	Portugal
3	CONSORZIO NAZIONALE INTERUNIVERSITARIO PER LE TELECOMUNICAZIONI	CNIT	Italy
4	CONSIGLIO NAZIONALE DELLE RICERCHE	CNR	Italy
5	UNIVERSIDAD DE DEUSTO	DEUSTO	Spain
6	FORTHNET S.A.	FNET	Greece
7	UNIVERSITY OF ZAGREB, FACULTY OF TRANSPORT AND TRAFFIC SCIENCES	FPZ	Croatia
8	ANGEL IGLESIAS S.A. – IKUSI	IKUSI	Spain
9	INSTITUTO DE TELECOMUNICACOES	IT	Portugal
10	OBJECTSECURITY LIMITED	OS	United Kingdom



# Objectives



- New architecture to enable cooperative sensing in Intelligent transportation systems
  - Advanced traffic and travel management strategies
1. Design of a new architecture for M2M communication and local intelligence implementation in ITS
  2. Development of a reference implementation of the data distribution layer
  3. Development of a new class of road sensors with pervasive communication capabilities (The operation of the data distribution architecture will enable the integration of a new class of road-sensors able to measure traffic-related parameters with advanced techniques (e.g., **computer vision techniques**) not fully exploited by existing sensors. The new sensors will be organized as a pervasive Wireless Sensor Network (WSN), based on the IEEE802.15.4 standard.)
  4. Adaption of V2X and backhauling communication technologies to the proposed architecture
  5. Definition of novel traffic and travel management strategies leveraging the proposed solution (FPZ-DEUSTO)
  6. Validation of the proposed solutions via field trials

# Any questions?

✓ Thank You for your attention!