

**COMPUTATIONAL  
VISION  
GROUP**

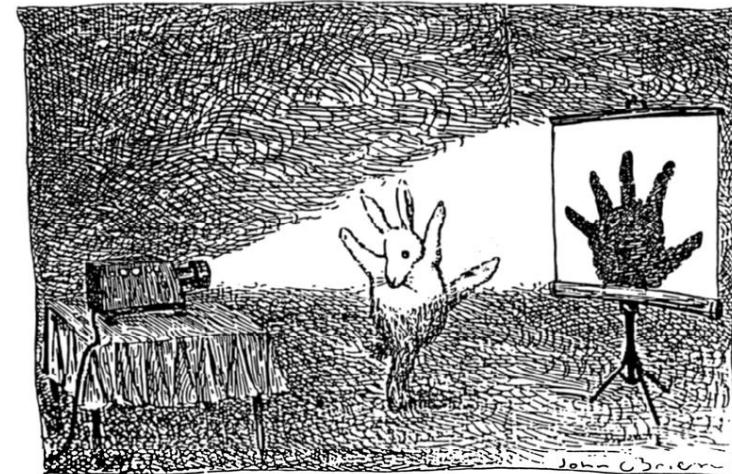
Coordinatore: prof. Carlo Colombo

**Specialità: visione basata su modelli geometrici**

- Ricostruzione 3D di oggetti e scene
- Stime di moto e autolocalizzazione

**Settori di applicazione**

- Robotica e AGV
- Interazione basata su movimenti e gesti
- Realtà aumentata, smart displays
- Ausili per disabili motori e visivi
- ...

**Corso: Visione Computazionale (II anno)**

- Ricostruzione 3D da singole viste, da collezioni di immagini e da sequenze video
- Calibrazione della camera
- Fotomosaici e Inversione della prospettiva
- SLAM - Simultaneous Localization and Mapping



# Recent CVG Research projects



## **SUONO – Safe Underwater Operations in Oceans**

2013-2017

Italian Ministry of University and Research  
(Smart Cities & Communities)



## **ARROWS – Archaeological Robot Systems for the World's Seas**

2012-2015

European Commission (FP7)



## **THESAURUS – Techniques for Underwater Exploration and Archaeology through Swarms of Autonomous Vehicles**

2011-2013

Tuscany Region (PAR FAS)



# Some technology transfer projects

- **Image-based rendering for 3D Television**

*Toshiba Research Europe, 2009-2010*

Model-based 3D conversion of single photographs

- **Computer vision algorithms for the enhancement of ophthalmological video sequences**

*HESP Technology Ltd, 2008-2010*

Super-resolution system for video-based magnification of the corneal endothelium

- **Computer vision based acquisition of the fine-grained 3D structure and chromatic texture of leather clothes for the fashion industry**

*Macip Trend Ltd, 2010-2012*

Design of a hardware/software system for 3D modeling of leather using photometric stereo

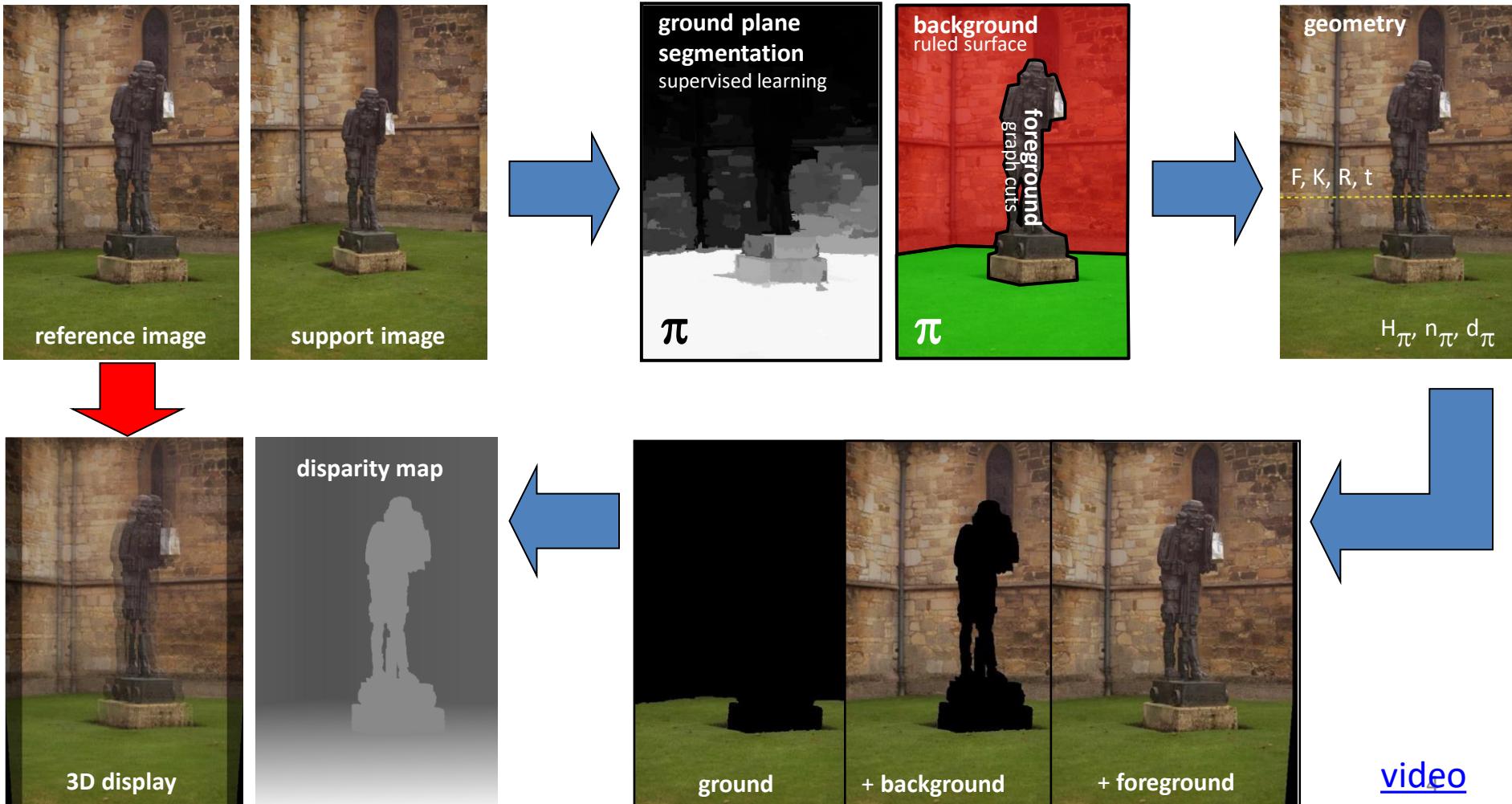
- **Fire detection in railway carriages with computer vision techniques**

*CPA Elettronica Ltd, 2014-2016*

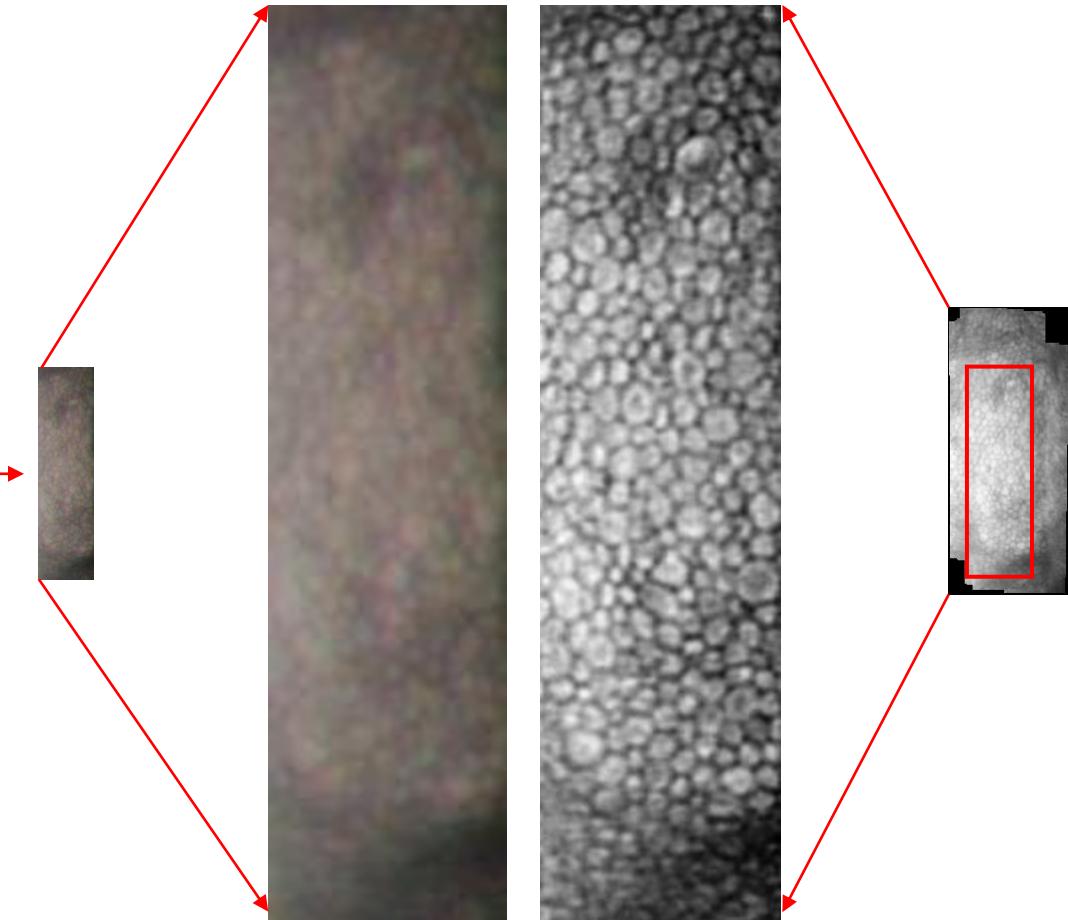
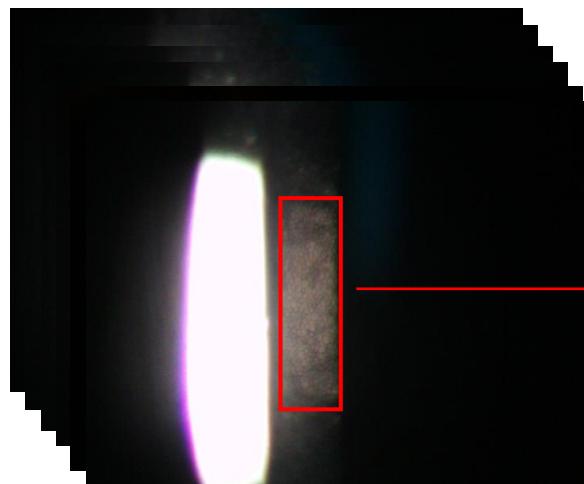
Hybrid (visible/infrared) camera system designed to achieve very low false alarm rate performance



## 2D-to-3D – Photo rendering for 3D displays. Automatic segmentation of scene elements. Automatic estimation of camera and scene geometry

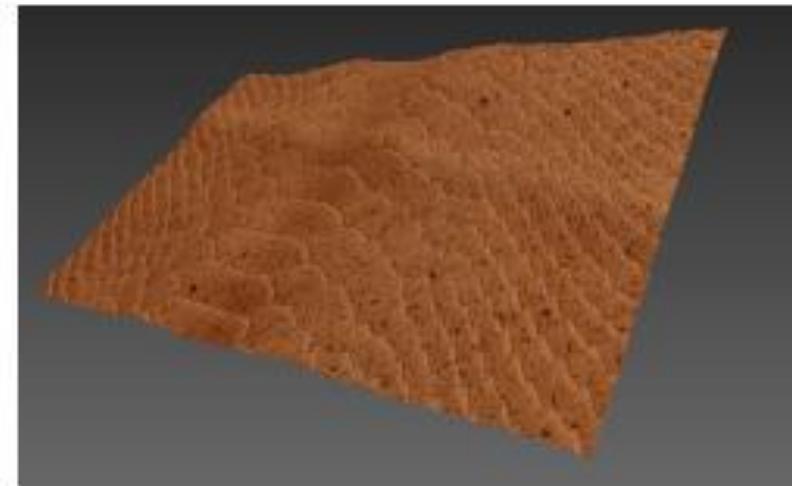
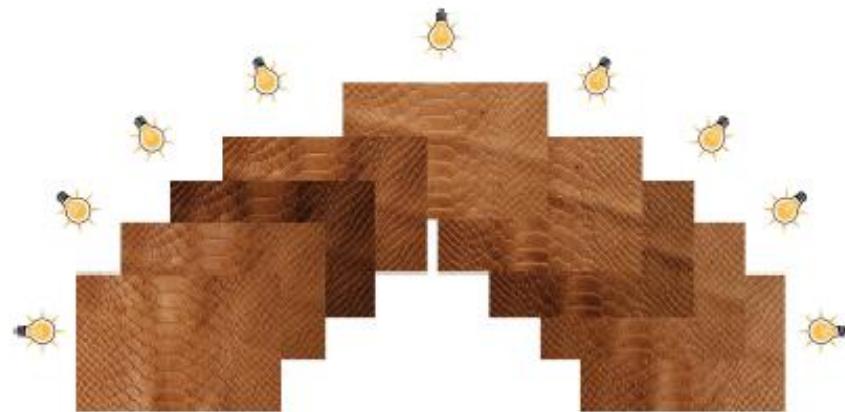
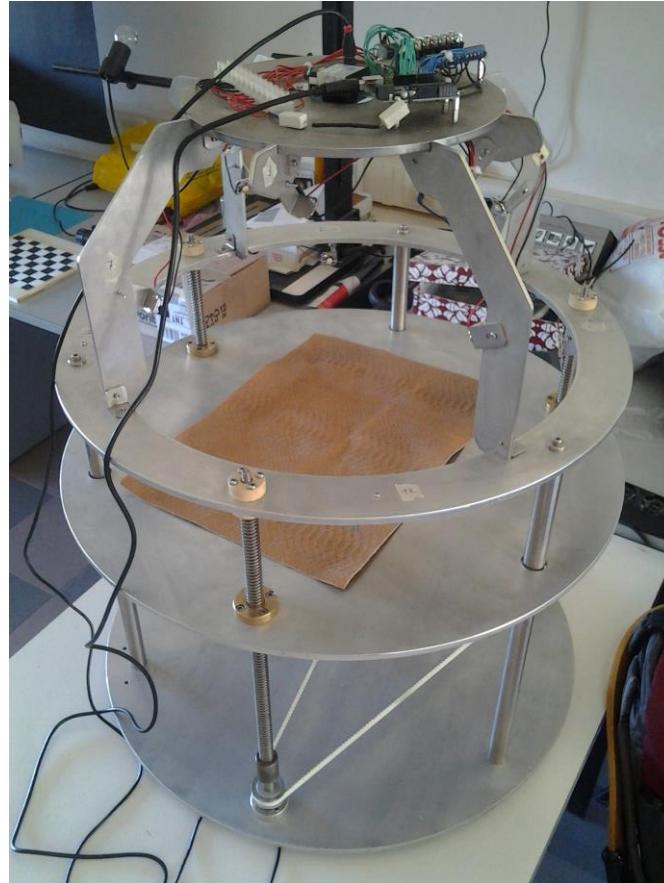


**SuperResolution** – Slit lamp biomicroscope  
images are magnified to achieve confocal  
biomicroscope quality

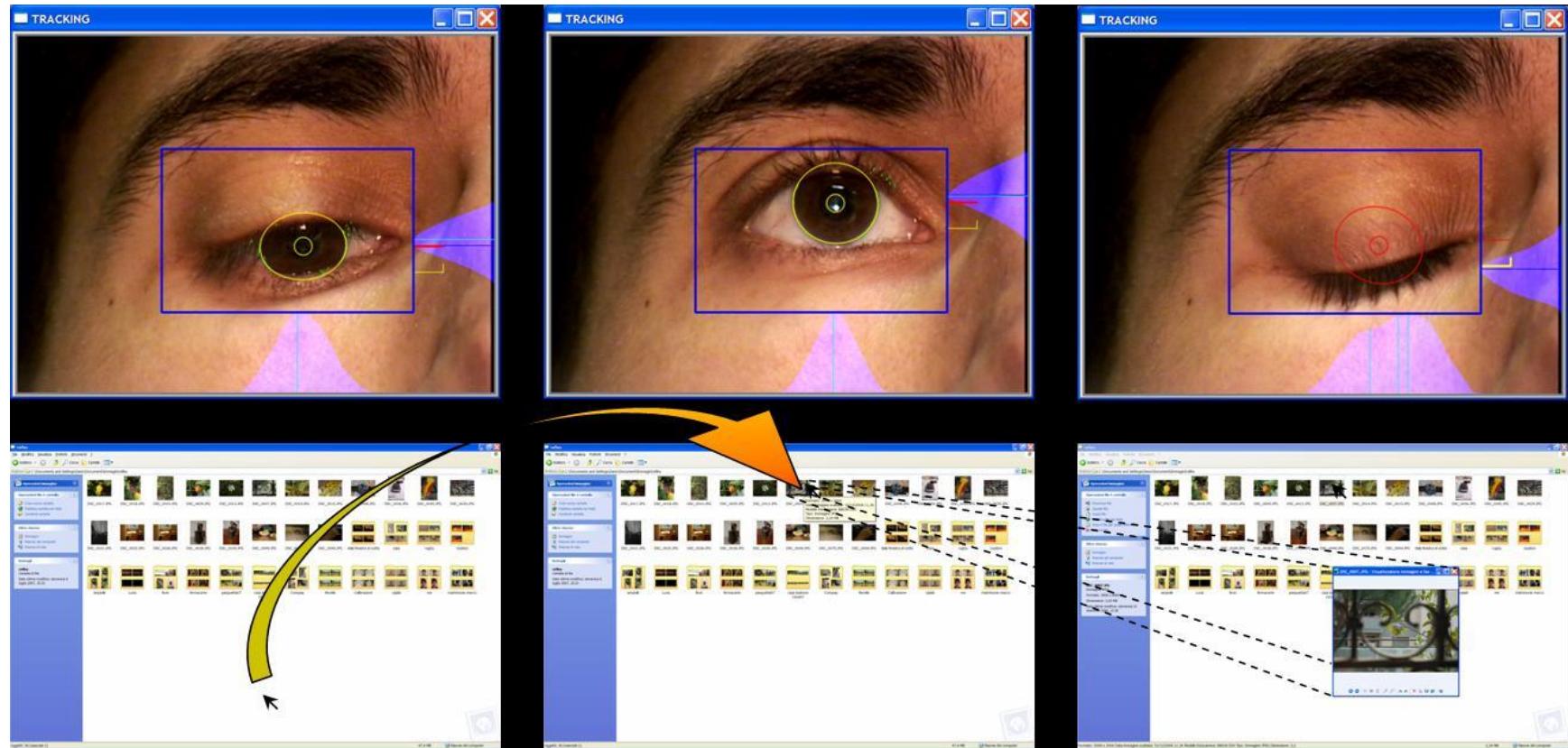


[video](#)

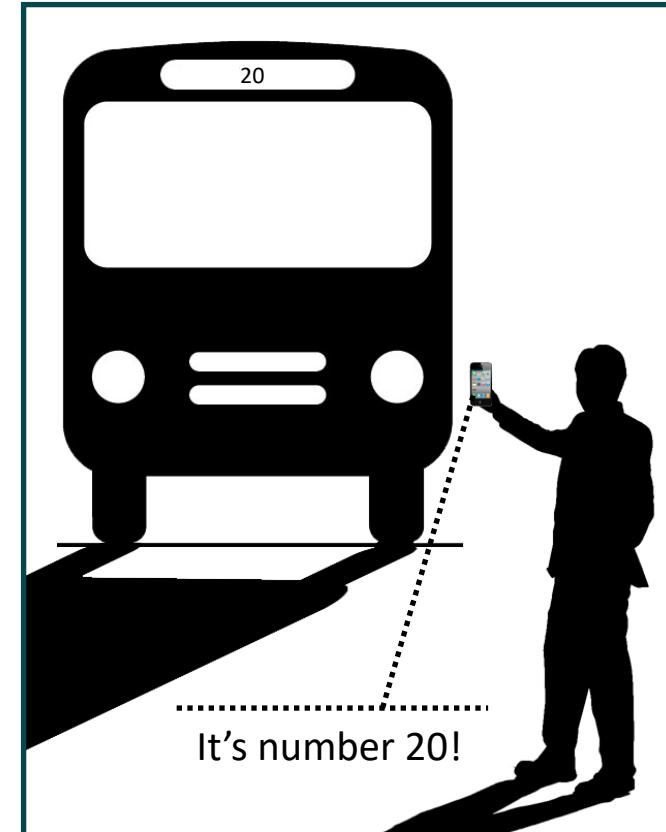
## Magic Box – 3D reconstruction of fine shape details for the fashion industry from multiple images obtained under controlled illumination



**EyeMouse** – Human-computer interaction for motor disabled people based on eye tracking with a single webcam. The system implements a vision-based single-button mouse (click=eye blink)

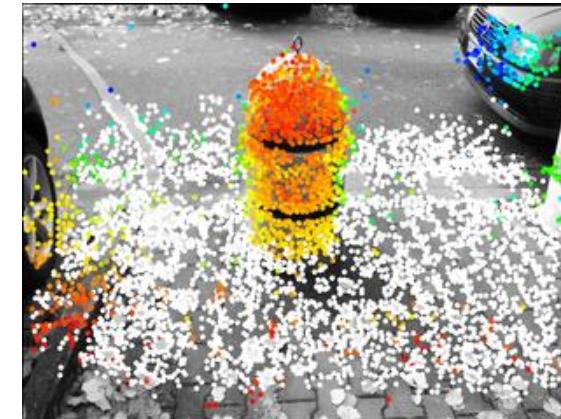
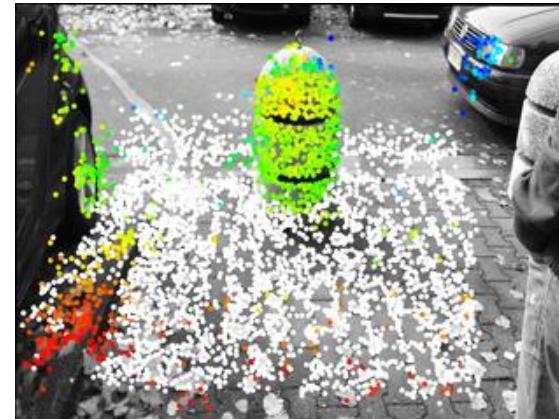
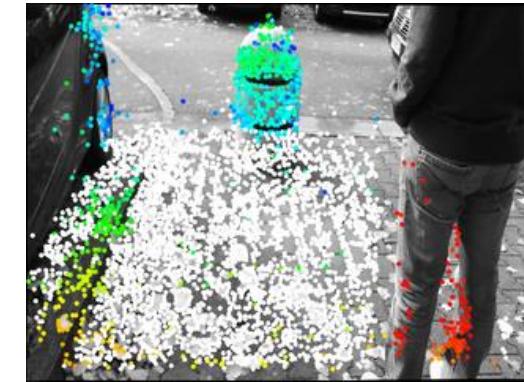
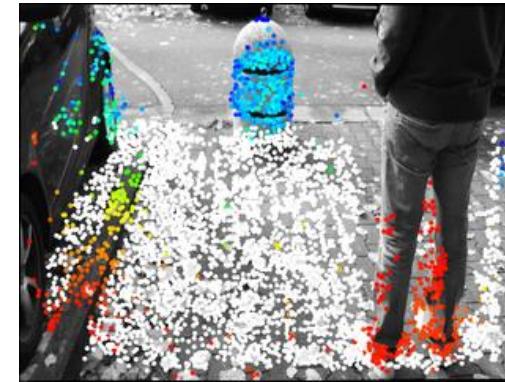
[video](#)

**BusAlarm** – mobile application for helping visually impaired people.  
The app is able to automatically read for the user the incoming bus line number  
*(Invited talk at the Andrea Bocelli Foundation, 2012)*



[video](#)

**Smart PathFinder** – mobile application for helping visually impaired people.  
The app is able to detect nearby obstacles and provide audio feedback to the user





# (WO)MEN WANTED

**TESI DI LAUREA IN VISIONE COMPUTAZIONALE presso il CVG**

- ***Machine Learning for Computer Vision***
  - ***Computer Vision for Information Forensics***
  - ***Visual Servoing of Underwater Robots***  
(progetto finanziato dal MIUR)
  - ***Sviluppo di sistemi di visione per disabili visivi***
  - ***Ricostruzione 3D da foto d'epoca e dipinti***
- ...

