VisLab History and Main Milestones

1994 **The Mob-Lab vehicle**: after 4 years of research activities together with the main European car makers, the first vision system for intelligent road perception is demonstrated on board of MobLab (MOBile LABoratory) at the final meeting of the PROMETHEUS European Project.

1998 **ARGO completes the MilleMiglia in Automatico**: completely designed and implemented by VisLab, the ARGO prototype vehicle is the first autonomous passenger car exhaustively tested for more than 2000 km (94% of which in autonomous mode) on Italian highways, together with regular traffic. ARGO is considered one of the milestones of vehicular robotics worldwide.

2001 **VisLab eyes in the South Pole**: RAS (Surface Antarctic Robot) is equipped by VisLab with cameras that provide vision-based sensing of the South Pole icy environment. It demonstrates to be able to provide a leader-follower functionality in extreme off-road conditions.

2004 **IEEE Trans on ITS is edited by Alberto Broggi**: for the term 2004-2009, VisLab's director serves as the Editor-in-Chief to the major IEEE publication in the field of Intelligent Transportation Systems.

2004 **VisLab hosts the IEEE Intelligent Vehicles Symposium**: the IEEE IV 2004 Symposium is organized by VisLab in Parma, Italy; researchers, practitioners, and managers reach Parma to attend the conference and the related vehicles' demonstrations.

2005 **VisLab's vision systems drive TerraMax to the finishing line of the DARPA Grand Challenge**: in total autonomy, TerraMax completes the DARPA Grand Challenge: a 132 miles long unknown off-road course, traversing mountains and deserts. TerraMax is the only vehicle completing the race using vision as main perception technology.

2005 **VisLab at the Pentagon**: thanks to the outstanding results obtained at the DARPA Grand Challenge, in December 2005 VisLab presents the results of its activities at the Pentagon, in Washington, DC, USA.

2007 **TerraMax is qualified for the DARPA Urban Challenge**: TerraMax is one of 11 vehicles to pass the qualifications and attend the DARPA Urban Challenge; TerraMax perceives the 3D world thanks to 11 cameras, providing all-round vision in a urban environment.

2008 **VisLab spin-off company**: after 18 years of worldwide renowned activities, the research team decides to mark its presence in the industrial market: the VisLab spin-off company focuses on enhancing automotive safety.

Company Profile

After being for many years one of the key laboratories worldwide providing top-notch theoretical and applied research on Intelligent Vehicles, in 2008 the University of Parma started a spin-off company named VisLab.
VisLab is specialized in vehicular applications involving both environmental perception and intelligent control, and offers its expertise in the field of perception for vehicular robotics.
Thanks to its tight cooperation with top level companies in Europe, America, and Asia, VisLab has developed its own vision on products for the automotive market and offers a wide variety of perception and safety systems.
Thanks to the presence of Faculty members and PhDs, VisLab researchers also provide training and education.

Expertise

One of the most distinctive features that explains VisLab's continuous and proactive presence in projects with car manufacturers, automotive suppliers, and vehicle-based companies is the very specific experience developed throughout the years.
The application of vision systems on board of vehicles not only requires to fully dominate the latest vision technologies, but also to have a deep knowledge of the key issues of this environment, such as calibration, illumination, noise, temperature, power consumption, as well as cost and installation requirements.
Besides its renowned expertise, the key to VisLab's quick application prototyping is the proprietary software that has been developed in the last 10+ years and that constitutes the basis of each application developed by VisLab.
VisLab was one of the first laboratories to invest on vision technologies on board of vehicles, and its efforts are still contributing to shape the history of vehicular robotics.

Contact:

Viale G.P. Usberti 181/A, Building N° 1
43100, Parma - Italy
Phone: +39 0521 90 5722
EMail: info@vislab.it
Web: www.vislab.it

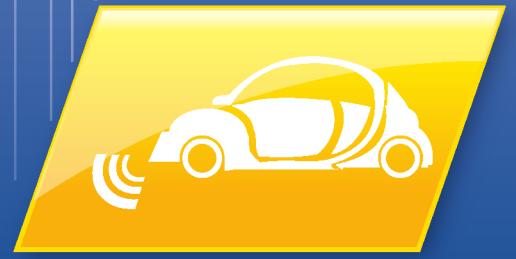
VISLAB.IT
Extend Your Vision

A Spinoff Company of the University of Parma, Italy

VOD

VISLAB OBSTACLE DETECTOR

- OBSTACLE LOCALIZATION
- START INHIBIT
- PARKING AID
- BLIND SPOT MONITOR
- CLOSE RANGE APPLICATIONS



VISLAB.IT

VOD

VISLAB OBSTACLE DETECTOR

Product

The VOD system, originally developed as a customized application for Heavy Goods Vehicles, is efficiently applicable to standard cars as well. Based on a pair of cameras working as a stereoscopic system, VOD scans the nearest surroundings of a vehicle (up to a 10m x 10m area) in order to detect the eventual presence of obstacles.
Characterized by its compact size and installation handiness, VOD provides Short-range Obstacle Detection and an Undistorted View of the monitored area.
The information provided by both functionalities are gathered and processed by different applications to increment road safety and improve the driver's comfort.
VOD's components are two arbitrarily aligned cameras with wide angle lenses that acquire images of a wide area surrounding the vehicle. VOD's other remarkable characteristic is a distinctive robustness and flexibility of installation: due to its autocalibration capability, no trained labour will be necessary to set-up and maintain the system.

Functionalities

Short-range Obstacle Detection and the Undistorted View of the monitored area around the vehicle, are the basic functionalities on which VOD's applications are based.
While other technologies already provide obstacle localization (e.g. radars, laserscanners, sonars), VOD offers a comprehensive visualization of all monitored areas through an on-board display, offering to the driver a clear understanding of what caused the system intervention.

Applications

The **Start Inhibit** application is automatically enabled when the vehicle engine is turned on and disabled once the driving speed has reached 5km/h. Once an obstacle has been detected, VOD provides acoustic and optical warnings, and generates CAN messages that can be used to activate other signals, such as electric seat-belt retractor systems. The obstacles detected by the system can be visualized on an on-board display, and graphically enhanced to provide immediate evidence to the driver.
The **Low-speed Obstacle Detection** application is activated in case of low-speed driving (below 15km/h). It localizes obstacles in the close neighborhood of the vehicle, providing acoustic and optical warnings to the driver.
As for the Start Inhibit application, the detected obstacles can be visualized on an on-board display.
The **Free Space** application is specifically useful for parking automation and can be enhanced by road markings detection to ease the interpretation of the scene.

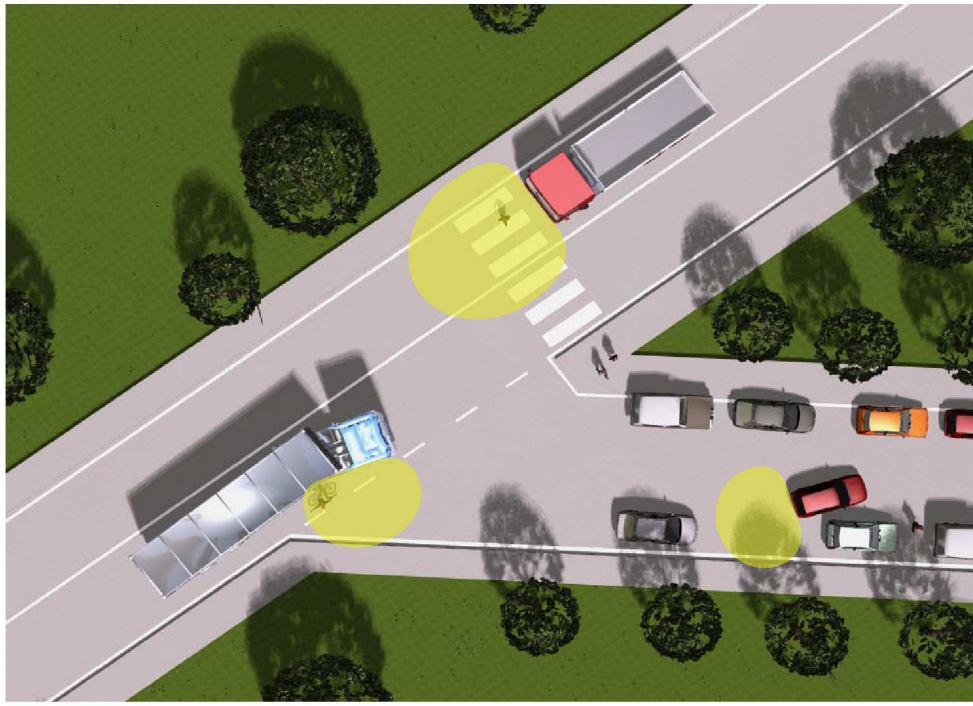
Hardware and Integration

VOD acquires information from the environment surrounding the vehicle thanks to two low-cost cameras, whereas the processing algorithm runs on a low-cost and low-power DSP. Results of the processing can be visualized on an on-board display.
In order to read vehicle data (e.g. speed and steering angle) and provide feedback to the vehicle itself or to other safety devices on board, VOD features an interface to the vehicle's CAN bus.
The stereo cameras can be mounted at an height ranging from 1m to 3m over the ground depending on vehicle style and physical constraints.

Additional customized functionalities can be provided as separate plug-ins to the standard system.

A special plugin to provide detection of curbs and lane markings, including sharp curves, was successfully fielded on the TerraMax vehicle at the 2007 DARPA Urban Challenge.

Info on availability and development timeline: ***info@vislab.it***



Frontal Applications	Lateral Applications	Rear Applications
Start Inhibit	Blind Spot Monitoring	Parking Aid
Bird's eye view of the vehicle frontal area	Bird's eye view of the vehicle lateral area	Bird's eye view of the vehicle rear area
Low-Speed Obstacle Detection	Low-Speed Obstacle Detection	Low-Speed Obstacle Detection