



# Obstacle Detection for Vehicles

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## Short Distance Obstacle Detector using Unaligned and Distorted Stereo Cameras



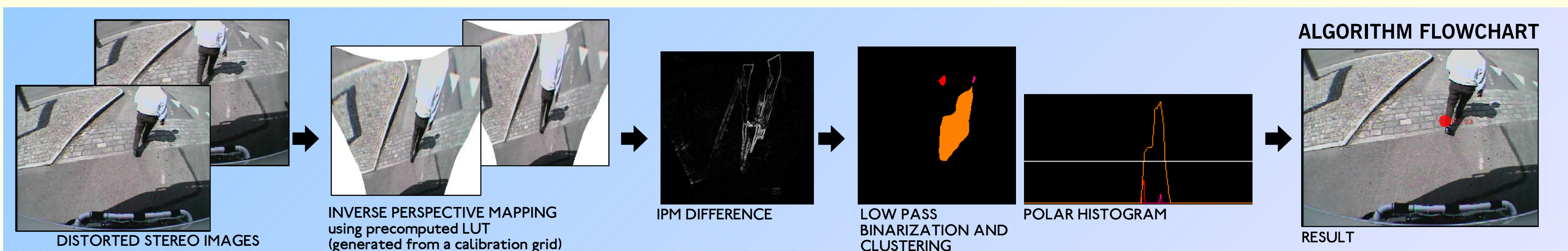
Detail of the DSP Version of this application

### MOTIVATION

An important application for artificial vision is detecting obstacles in blind spot area of Heavy Goods Vehicles to inhibit start. In those vehicles, a large area actually is not covered by direct driver visibility (neither through window nor mirror). Main goal of this system is identify unprotected road users in this blind area and warning the driver. Has been proved that this application can provide reliable obstacles information for an autonomous vehicle.

Information provided by this system can be really different:

- Visual warning on a monitor
- Acoustic warning with frequency modulated by obstacle distance
- Haptic Warning using an Electrical Seat Belt Retractor
- Obstacles coordinates sent on CAN-BUS or Ethernet



### RESULTS

Typical output of this application. Red Marker are on the bottom part of the obstacle, and its position in meters are provided

## Obstacle Detection using Fusion between Camera, Motion and Radar



### MOTIVATION

Develop an Obstacle detection (with a rough classification system) is a challenging issue. The aim of this kind of system is detect both vehicles and vulnerable road user when vehicles are in movement in complicated scenarios (both urban and highways environment).

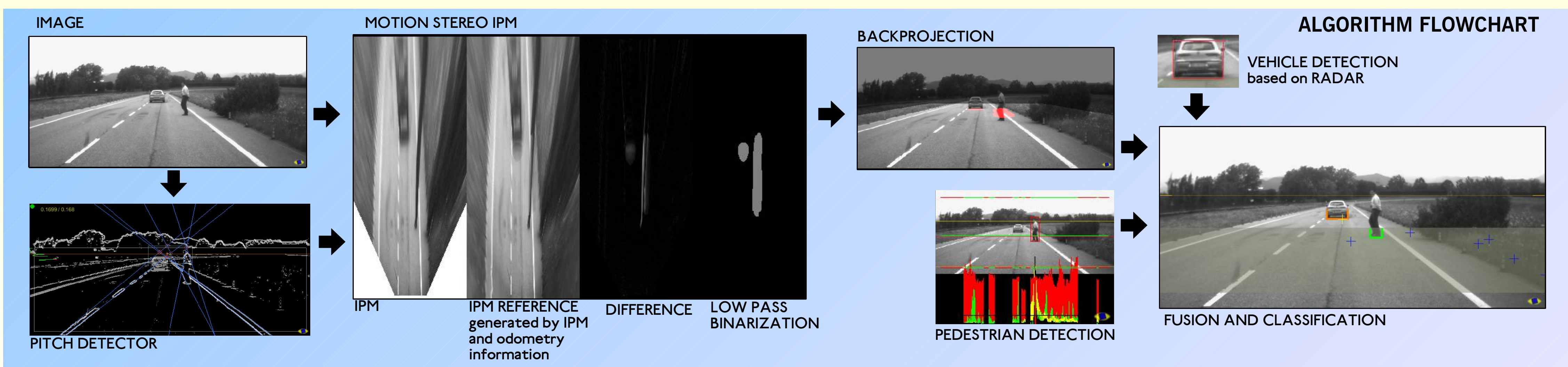
### SYSTEM

To reach the goal, a test vehicle mounting a 24Ghz Radar and a single monochromatic camera was set up.

Radar Beams are used as hints for a symmetry based algorithm able to detect vehicles.

Odometry information provided by vehicle CAN-BUS is used as offset hint for a Motion Stereo algorithm (MSIPM) based on Inverse Perspective Mapping differences between frames acquired at different time and position.

Information provided by Motion Stereo are used to filter results of a naive pedestrian detection algorithm based again on symmetry. My research activity is centered principally on this second part.



### RESULTS

Focus on Pedestrian Detection fusion with Motion Stereo