Research on Software and Augmented Reality Tools for the Automotive Industry

Augmented Reality Tools
Augmented Reality techniques in various applications to bring together the physical and the virtual work

Scenarios: AR-visualization of airflow characteristics
- Superimposition of real images and virtual elements
- Streamlines, particles and cutting surfaces to visualize temperature, pressure and velocity
- CAD geometry for display or occlusion through VRML97 or JT-Open

Future Work:
- Setup of AR-applications at Daimler AG

Collaboration with Daimler AG
- AR-applications support visual evaluations during review meetings
- Managers and designers can profit from the ease of use of AR-tools

Future Work:
- Evaluation of prototypical AR-applications for the examination of thermal comfort and thermal validation

Development of prototypical hybrid AR-Tools
- Infrared tracking to obtain the position of the HMD
- Mechanical tracking to obtain the position of certain points in the car
- Pattern tracking for camera calibration

Future Work:
Markerless Tracking
- Aim: replace the current tracking system based on fiducial markers
- Advantages: position determination is no more dependent on physical markers
- Realization: implementation and optimization of feature and line detection algorithms

Open MPI for Windows
A fast and extensible MPI-2 implementation combining the expertise, technologies, and resources from all across the HPC community

Adaptation to Windows
- Support for large scale Microsoft Windows Clusters
- Achieve better performance
- New architecture of Open MPI

Multi-node startup
- Resource allocation and discovery system
- Remote process launch system
- Integration with job scheduler and monitor on Windows HPC Server