

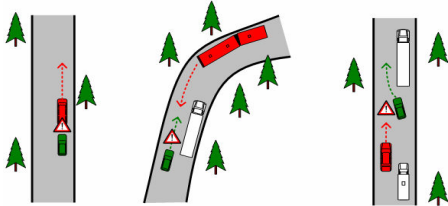


# An Ubiquitous Spatial Knowledge Framework for Car Driver Assistance

## SCORE - Spatial Context Ontology Reasoning Environment

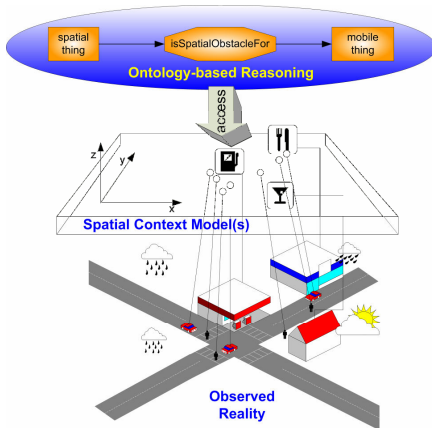
### 1. Motivation

Advanced Driver Assistance Systems (ADAS) aim at supporting drivers with their driving task. Those need to track cars and other obstacles, deduce relevant information and present it to the driver.



### 2. Approach

Stationary systems along the road gather data from passing cars and integrate it into local traffic models. For the area of ubiquitous computing, the challenges of a highly dynamic environment in conjunction with dynamic short range network connections are addressed.



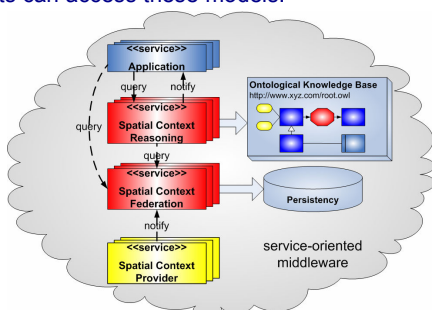
### 3. Architecture

Hybrid concept towards gathering and maintaining up-to-date traffic models.

The approach involves continuous communication between car-based ("inside-out") mobile tracking equipment in cars and road-based ("outside-in") stationary tracking equipment along the road.

The street network is separated into road sections. In the federation layer, all data of a certain area is federated in spatial context models.

In the next higher layer, ontology-based reasoning components can access these models.



### 4. Federation

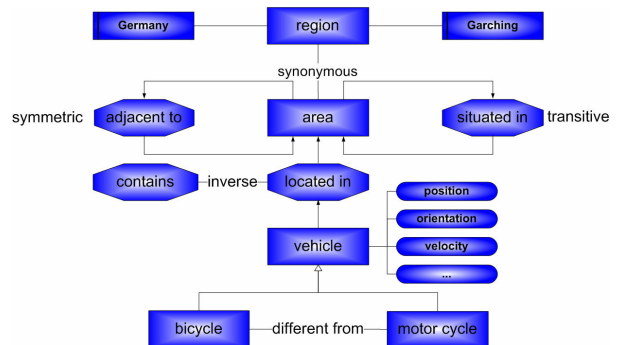
Mediates between various information sources and reasoning components and beyond that, further applications. Software components, such as trackers, act as spatial context providers and inform the federation layer about spatial data with frequencies high enough to permit real time use.

### 5. Reasoning

In each car a reasoning component dynamically connects to one or more federation servers in range to access spatial data necessary for interpreting the vehicle's situational information.

Using an ontological rule-driven approach, an abstract query is handed to the reasoner system, where it is processed by the description logic-based reasoner.

T-box information contained in ontologies describe terminological entity relationships that are used by the reasoning component to understand how to interpret assertional spatial data that is collected in the entities' environment.



### 6. Ad-Hoc Networking

When a car moves through the environment, it updates the contextual requirements of the reasoning service that specify its global position.

When it is going to leave the sector of a specific federation component, the middleware determines, that another environmental federation service has contextual attributes that now fulfill the changed need of the reasoning service. A new connection between the entered sectors federation component and the car's reasoning system is established and the present connection between the two services is removed.

