Advanced Traffic Surveillance
(Area: Surveillance & Land Technologies)

Main Goals

Surveillance

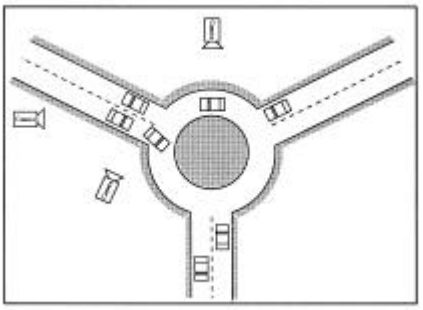
- Build and automatic traffic surveillance system to:
  - learn by observation the rules drivers use to control their vehicles
  - assess a driver's performance
  - diagnose reasons for different driving performance
- Improving on the state of the art in traffic surveillance by:
  - detecting turn and brake signals
  - tracking using multiple cameras
  - tracking over a large area by recognizing each car as it moves from one camera's field of view to the next
  - tracking in poor weather
- Providing a significant challenge for the state of the art in car tracking by:
  - comparing the results of the tracking with an independently measured "ground truth"
  - using the tracking results as input to an independent computer program

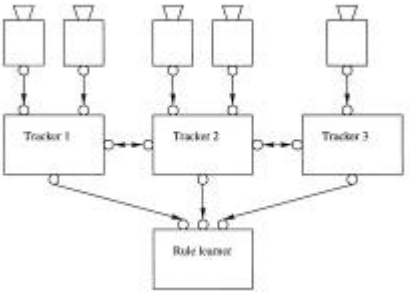
Traffic Management and Monitoring

- Build and automatic traffic surveillance system to:
  - Management of Vehicles and Roads
  - Traffic Flux monitoring,
  - Analysis & Interpretation of tracking temporal series
    - Objects
    - Driver habits

Challenges

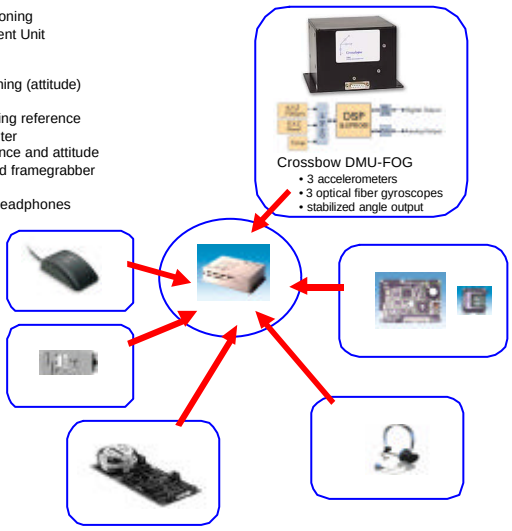
- Tracking of objects in a cluttered and dynamic environment
- Explore different network topologies of visual sensors for tracking of mobile objects
- Analysis and Interpretation of temporal tracking sequences for interpretation (data association)
- Outdoor robotics (spin-off)
- Distributed tracking systems (network of trackers)
- Visual motion trackers (tested with ground truth data)





Vehicle "ground truth" Data Logger

- Computer based "ground truth" data logger with:
  - GPS receiver:
    - time reference
    - absolute positioning
  - Inertial Measurement Unit
    - acceleration
    - angular rates
    - relative positioning (attitude)
  - Digital Compass
    - Absolute heading reference
  - 3-axis Magnetometer
    - heading reference and attitude
  - Video cameras and framegrabber
    - B/W images
  - Microphone and headphones
    - voice control



- All the equipment inside a knapsack
  - easily portable
  - powered by batteries

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