

# 3<sup>rd</sup> trackframe day Overview

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## Organizational Overview

### Cooperative project: science/industry

- **Funded by:**

Bayerische Forschungstiftung (BFS)

- **Duration:**

March 1, 2006 – February 28, 2009

- **Partners:**

- Bayerische Motoren Werke AG
- EADS Deutschland GmbH
- peyclon integration GmbH
- Technische Universität München

## Motivation

The computation of object and user poses

- Is gaining importance in industrial applications
  - Virtual Reality
  - Augmented Reality
  - Ubiquitous Computing
  - Robotics
- Is offered increasingly – yet, only in highly integrated special solutions
  - Single, specialized sensors
  - Specialized sensor fusions
  - Typically with limited range, or with respect to special applications
- Is generally not easily reusable across different applications
  - Different points of reference
  - Missing / different specifications of precision
  - Different (application specific) dynamic requirements (context)

## Goal

Development of a framework that is independent of specific devices and applications and provides tracking services depending on the current context in heterogeneous wide-area environments.

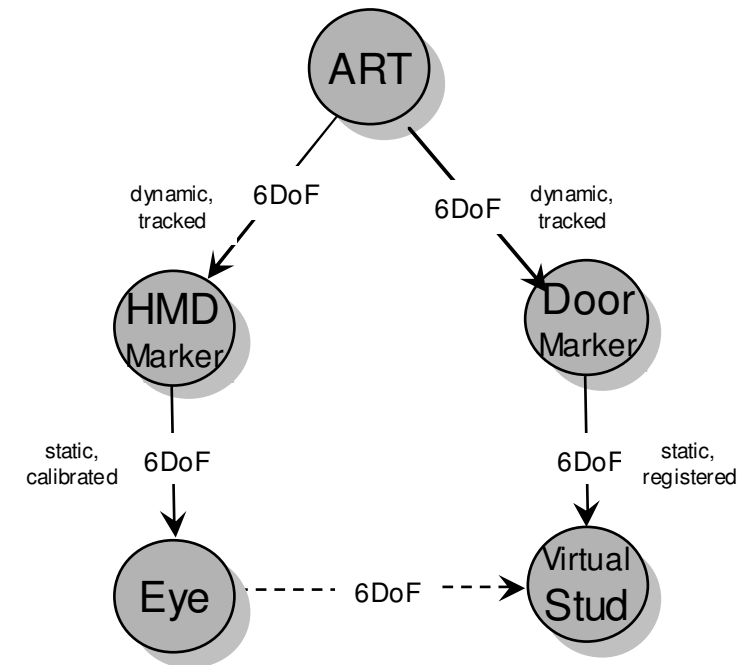
- Critical aspects:
  - Explicit description of spatial relationships (Spatial Relationship Graph)
  - Automatic translation into data flows between sensors, fusion algorithms, and applications (Data Flow Network)
  - Efficient, robust and precise applicability in realistic applications

## Approach

- YEAR 1: Specification of tracking requirements w.r.t. realistic industrial applications
  - Description of concrete scenarios
  - Specification of a roadmap w.r.t. the complexity of the requirements
- YEAR 2: Development of a tracking framework that focuses on satisfying these requirements
  - Design and development of the underlying framework
  - Evaluation and integration of existing tracking devices and sensor fusion algorithms
  - Development of new technologies/algorithms as needed
- YEAR 3: Demonstration and evaluation of the system for specified scenarios
  - Tests of the principle functionality
  - Analysis regarding the economic value of the framework

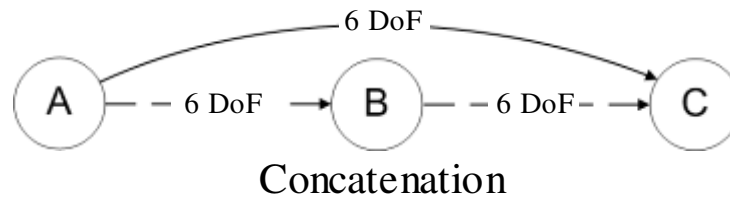
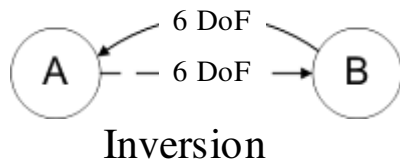
# Ubitrack Concepts

- Spatial Relationship Graph (SRG)

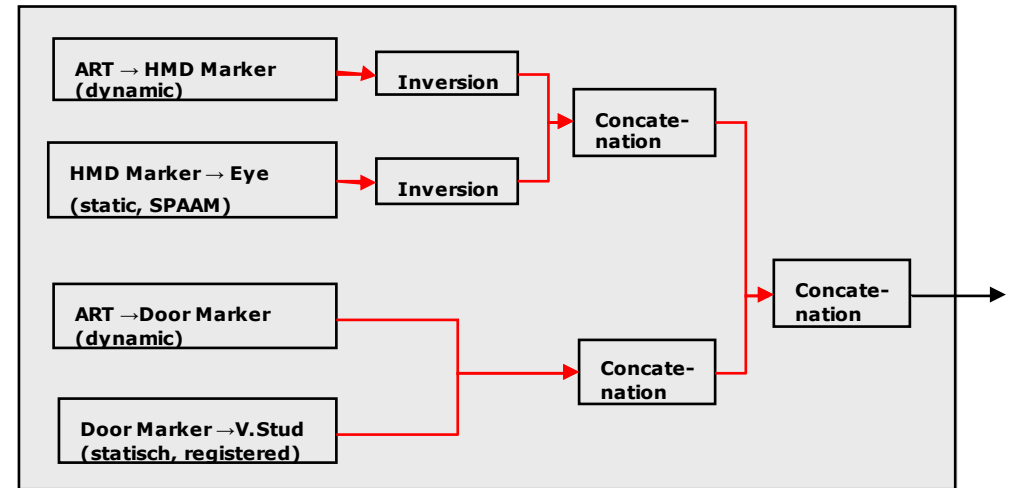
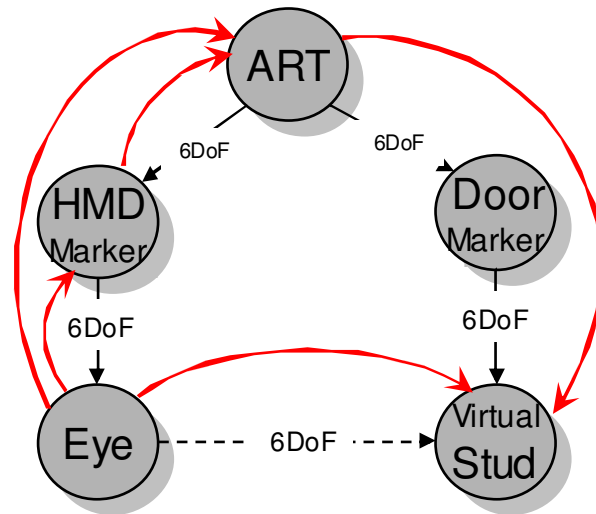


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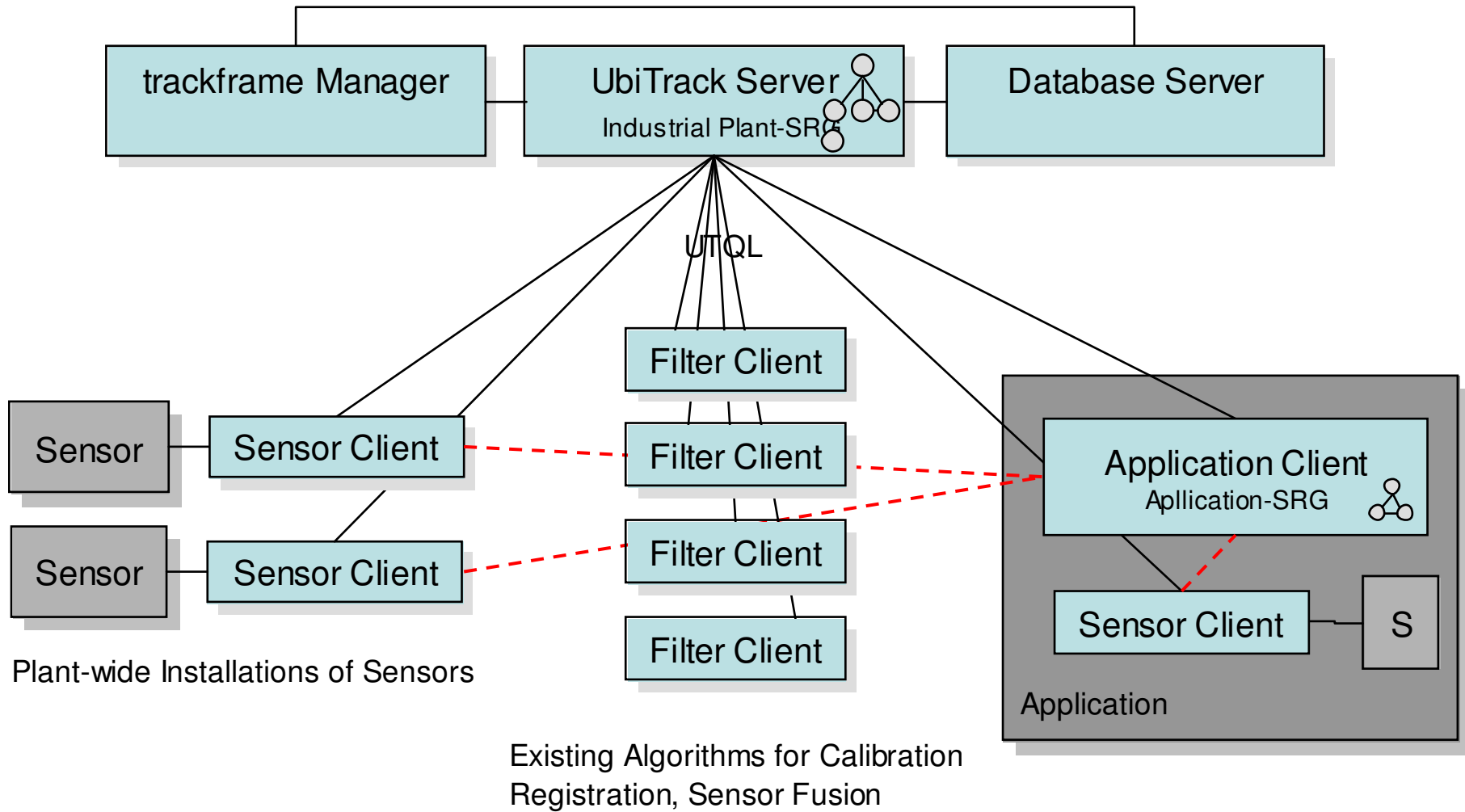
- Spatial Relationship Patterns



- Automatically generated DataFlowNets (DFNs)



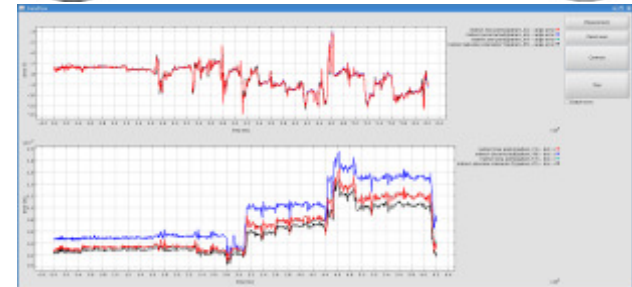
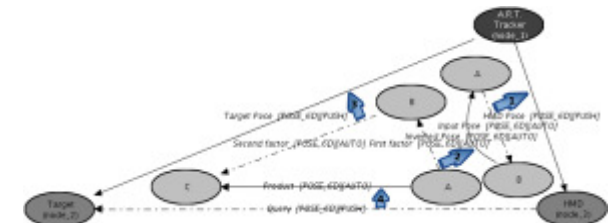
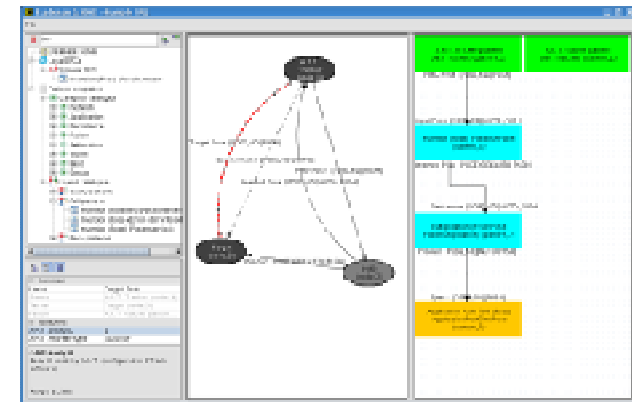
# Ubitrack Architecture





# Current Status

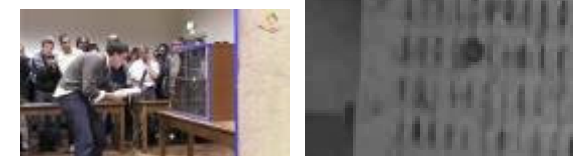
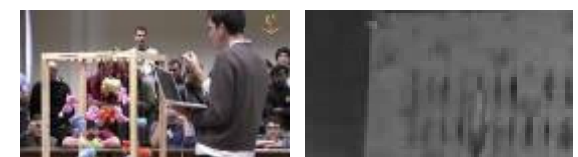
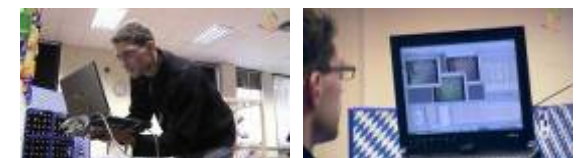
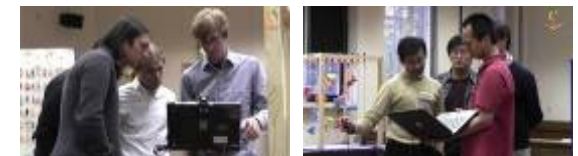
- Library (Ubitrack library):
  - Integration many sensors
  - Specific tracking, registration, calibration and fusion algorithms
  - UTQL
- Interactive tool (trackman):
  - Generation of SRGs
  - Semi-automatic generation of DFNs
- Runtime support (Ubitrack server, trackman)
  - Automatic generation of DFNs (response to UTQL queries)
  - Error propagation
  - Error analysis tools
  - Dynamic adaptation to changing availability of services



# Tracking Contest at ISMAR'08

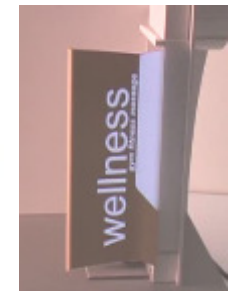
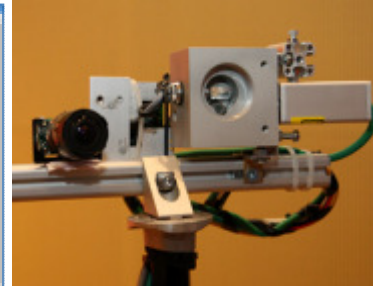
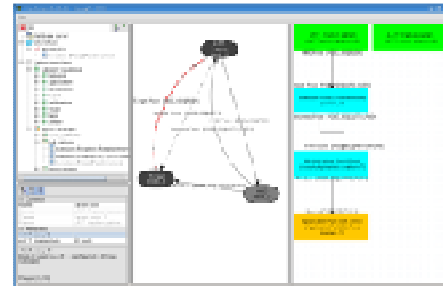
- Task:
  - Pick 16 items in a large room
  - Given: 3D positions
  - Only navigation hints on mobile display
- Participation:
  - Applications: 7
  - Setup: 5
  - Competition: 3
- Results:
  - Only optical (marker/marker-less) approaches

Team	Items	Time
Univ. Oxford	16	8:48
metaio	15	10:43
Fraunhofer IGD	7	25:16
Univ. Bristol	-	



## Today's Presentations (Activities in Year 3)

- Indirect tracking (BMW - peyclon)
- Dealing with complexity: trackman (peyclon)
- Parasitic tracking (TUM - EADS)
- Laser projector for AR (TUM/ForLog – BMW – EADS)
- Odometric sensor (TUM - BMW)
- Application scenarios (EADS)
- Demonstrations



Thank You