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EUROPA



European Robotic Pedestrian Assistant

Cognitive Systems
 Robotics

7th FRAMEWORK PROGRAMME
 European Commission
 Community Research

<http://europa.informatik.uni-freiburg.de>

2009-2012

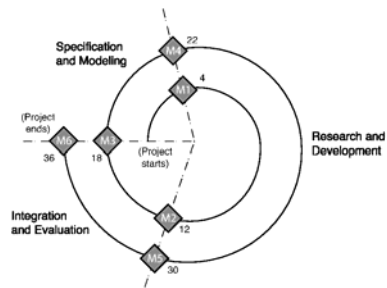
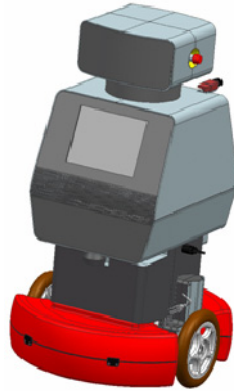
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EUROPA

In the **field of robotics**, there has recently been a tremendous progress in the development of **autonomous robots** that offer various services to their users. Typical services include support of elderly people, cleaning, transportation and delivery tasks, exploration of inaccessible hazardous environments, or surveillance. Most of the systems developed so far, however, are restricted to indoor scenarios, non-urban outdoor environments, or road usage with cars. There is serious lack of capabilities of **mobile robots to navigate safely in highly populated outdoor environments**. This ability, however, is a key competence for a series of robotic applications.

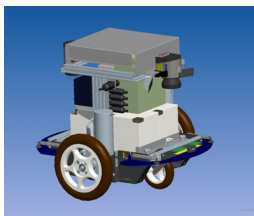


Project Structure

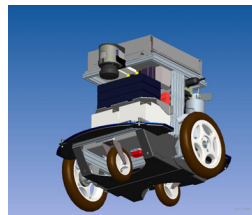
EUROPA follows an iterative **spiral life-cycle**. The individual phases of this life-cycle are an analysis of the initial requirements, rapid proposition on new basic research ideas and design, the development phase, and an integration and validation phase. This process is repeated to allow for an incremental improvement of the project system.

Project Goals

The goal of EUROPA is to bridge this gap and to develop the foundations for **service robots** designed to autonomously navigate in **urban environments outdoors** as well as in **shopping malls and shops** to provide various services to users including **guidance, delivery, and transportation**. Based on data gathered with its sensors, the robot will acquire a detailed model of the environment, detect and track moving objects in the environment, adapt its navigation behavior according to the current situation, and communicate with its users in a natural way, even remotely.



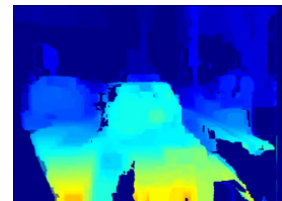
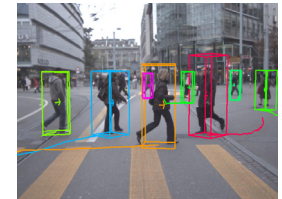
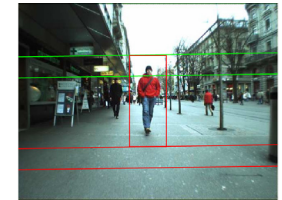
EUROPA is targeted at developing novel technologies that will open **new perspectives for commercial applications of service robots in the future**.



First Results

Development of

- an **end-user requirement study** for future commercial uses of the EUROPA system
- a **new robotic platform**
- **novel algorithms** for getting better depth images by fusing range and vision data
- a highly efficient algorithm for stereo matching
- new algorithms for efficient pedestrian detection in **video and 3D range data**
- a **real-time multi-person tracking approach** based on those detections
- a new **stereo vision SLAM algorithm** that can produce large-scale topological maps in real-time
- an efficient **laser-based approach** for learning accurate maps
- a novel algorithm for utilizing **aerial images** for robot navigation
- a **novel terrain classification system**
- an approach for processing locative expressions such as “The car is between the two tree” to support human-robot interaction
- a first version of a **dialog interface** that can cope with complex queries



Outlook

Currently, the individual components and software modules are integrated into a single robotic control architecture so that all computations can be carried out on the robot itself. In July and August 2010, first experiments in Zurich (CH) downtown and real world evaluations in Freiburg (DE) downtown are carried out. After completing the first evaluation phase in summer 2010, the second development phase starts with the goal of investigating new approaches for robust and efficient navigation in dynamic urban environments. During that time, evaluations and demonstration of the platform in Freiburg (DE), Zurich (CH), and Oxford (UK) will be conducted.