Continuous localization of mobile units and computer controlled navigation that builds upon this, e.g. automatic guided transport systems, have become a basic technology in automation and logistics. At the same time, most existing localization systems require the installation of components such as reflectors, conductor loops, etc. in the work area and/or the use of expensive sensors such as laser scanners on board mobile systems.

The core technologies include:
- visual odometry and incremental tracking of changes in position by observing fixed points in the environment
- simultaneous visual localization and mapping with distinctive orientation points already present in the environment (landmarks) to navigate precisely

Available options include:
- integration with common sensor systems; e.g. wheel odometry, inertial measurement systems, etc.
- integration of infrared illumination solu-
Special Solutions for Special Environments

Specific applications or client requirements may necessitate special solutions. We are able to flexibly modify the methods of visual position scanning, e.g., to incorporate the particular attributes of orientation points. For instance, in a project contracted by the Emschergenossenschaft, we developed a special system that visually scans and tracks a floating sewer system inspection robot’s position. Usable in concrete pipes with diameters of 1.4 m to 2.8 m, the system determines the robot’s forward movement extremely precisely. In addition, this special system enables the robot to reliably relo- cate any position with a tolerance of less than 2 mm.

Portions of this work were completed in the project Applied Virtual Technologies Focused Long-range on the Product and Production Equipment Life Cycle AVILUSplus, which is closely related to the AVILUS Technology Network, a consortium of business and research partners that is developing efficient technologies in the context of virtual and augmented reality.

The joint project AVILUSplus is being supported by the Federal Ministry of Education and Research as part of its ICT 2020 program.

4 Option: Additional infrared reflecting landmarks.  
Photo: Sven Kutzner  
5 Special solution: Visual inspection robot localization in concrete pipes.