Autonomous. Intelligent. Hardware-independent. With KUKA Navigation Solution, we have created an intelligent navigation solution based on SLAM methodology for self-navigating vehicles in the mobile robotics sector. It contains all the components for the autonomous navigation of a vehicle, integrated on a modular basis, including active path detection and software for simultaneously commanding and controlling multiple vehicles in swarms.

- Freely scalable, modular setup
- Autonomous navigation based on SLAM
- Includes fleet management system

Mobile KUKA platform + Nav-Box & navigation software = your solution
KUKA Navigation Solution

Maximum autonomy for mobile robots and platforms

Intelligent orientation, positioning, response. KUKA Navigation Solution knows the destination and the best way to get there – every time. It reacts to obstacles and changes in real time, and it manages and coordinates all known vehicles in the surroundings by means of the SLAM (Simultaneous Localization and Mapping). The platform can then localize itself using this map. The system responds to changes in the environment – which occur frequently in a flexible logistics system. Furthermore, the autonomous path planning has been expanded. The hardware-independent software can be used for different platforms and simulates programming. The modular KUKA Nav-Box software allows the integration of third-party software. Thanks to the system architecture of the KUKA Nav-Box, existing platform fleets can be simply updated and other platforms can be added or removed from the existing system.

Autonomous navigation. KUKA Navigation Solution opens up a wide range of potential applications for mobile robot systems. It enables the fully autonomous control of mobile platforms in logistics and material flow systems, safety-critical environments such as foundries, and without the need for artificial markings in their environment. The KUKA Navigation Solution software acquires the data of the safety laser scanners and wheel sensors and uses them to create a corresponding map of the surroundings by means of the SLAM method (Simultaneous Localization and Mapping). The platform can then locate itself using this map. The system responds to changes in the environment – which occur frequently in a flexible logistics system. Furthermore, autonomous path planning has been expanded. Use of virtual paths makes it possible to move the platform exclusively along predefined routes. It consistently retains its maximum flexibility at all times.

Maximum flexibility and usability. KUKA offers an Eclipse-based development environment that can be used to program applications in Java. The user-friendly software interface with its intuitive user-configuration options allows for quick and simplified programming. The modular KUKA Nav-Box architecture for the requirements of mobile robotics allows the integration of third-party software. Thanks to the system architecture of the KUKA Nav-Box, existing platform fleets can be simply updated and other platforms can be added or removed from the existing system.

Hardware-independent software. The hardware-independent navigation software can be used for different platform configurations. It can handle any motion principle, including hybrid locomotion with claw wheels in any environment, such as the KUKA intralog. Setting of the machine parameters is performed via a standardized interface. For individual customer requirements, the modular software has suitable interfaces for different user levels. Adaptation of the final application is simplified for system integrators by means of interfaces to the vehicle software and to the programming interface of the application.

1 mm

Ultimate precision. The KUKA Navigation Solution offers the following systems for high-precision positioning of your mobile platforms in its environment:

- Fine localization for precise determination of the vehicle position relative to the object or in an environment.
- Fine positioning for increased positioning accuracy.
- CAD-based object recognition and tracking, e.g. for picking up loads.

Freely scalable, modular setup. With the Nav-Box, KUKA is presenting its navigation solution for fleet management with autonomously navigating vehicles. The combination of industrial PC for installation in an unmanned transport system and the corresponding navigation software adds up to a solution that is as flexible as it is mobile. Additional features, such as "Object recognition and tracking" and "Relative positioning", enable coordinated planning and execution of jobs and ensure data consistency between all vehicles.

Technical specifications

KUKA Navigation Solution

Floating section: Navigation Solution

Customer

Enterprise Resource Planning (ERP)

Warehouse Management, Material Flow Control

Fleet Management

- Fleet planning, traffic management and job scheduling. Software on a central computer with interfaces to the logistics and material flow system. Material planning, high-level planning and scheduling

- Vehicle Coordination System (VCS) / programming environment. Software on a central computer for vehicle management, maintenance, data management and programming. Interface to the individual vehicles.

Vehicle Navigation

- Mapping: Consistency, robustness, scalability and domain independence

- Localization: Robustness and accuracy without adapting the environment

- Path planning: Any level of autonomy, depending on application and customer requirements

- Object recognition & tracking: Navigation relative to the workpiece, safeguarding of logistics process

- 3D-user interface: Sensor data integration for recognition of obstacles to increase machine safety

KUKA Nav-Box hardware: Standardized industrial PC hardware with software interfaces for independent vehicle operation.
Industrie 4.0
Prepared for transformation of the worlds of production

Smart Production, Internet of Things or Industrie 4.0. Even if the names and terms used vary from one country to another, they all share the same goal: the creation of elementary competitive advantages – at both company level and in global competition.

Work on the factory of the future is thus in full swing worldwide. This involves intelligent, networked industrial production and logistics processes on the basis of cyber-physical production systems (CPPS). Or, to put it simply: factories that, by means of advanced networking, respond intelligently to changing tasks and continuously reconfigure themselves. The factory of tomorrow should be able to organize and continuously optimize its production processes, thereby countering the consequences of another development: demographic change. New solutions are called for because of falling birth rates and increasingly aged populations in modern industrial societies. Without the "smart factory", it will be simply impossible to achieve a productivity increase on this scale at the same time as effectively husbanding our existing natural resources.

In order to make new working environments both highly productive and ergonomically beneficial for the labor force, KUKA is developing central key technologies: collaborative robots, mobile assistance systems, autonomously controlled vehicles and intelligently networked automation solutions that support humans in the work setting, easing the workload in a variety of ways.

In collaboration with experts from diverse sectors, KUKA is now already implementing highly flexible, digitized manufacturing processes that will open up new opportunities in a competitive environment and lastingly change the way we work and produce.