CONPLEKS ROBOTECH SOFTWARE

Complete Software System for Advanced Robotics

Introduction

Conpleks offers a complete software system for advanced robots and other autonomous or semi-autonomous vehicles handling a variety of different tasks.

The software adds a set of robotic functions ready to be applied to different vehicles and applications – for instance remote controlled agile grass mowers, advanced agricultural machines, row crop machinery, high-capacity grass cutters, and other advanced implements and tools.

The software can also provide a significant value-add to many other types of machinery. The possible applications are numerous and almost only limited by your imagination.

The software is built with a layered architecture that enables smooth and controlled evolution and feature growth.

The software is mainly programmed in C++, and runs on a Ubuntu/Linux operating system. This secures an optimum performance on a wide range of hardware platforms, e.g. ARM or Intel Core processors.

The software offers good integration with industry standard GNSS positioning equipment, e.g. the Leica Geosystems range of mojoRTK GNSS systems.

Route Planning and Auto Steering

The auto-steering software package includes several standard route planning functions supporting e.g. GNSS-assisted grass cutting operations.

Auto-repeated a-b line operation.

A remote controlled robot with a GNSS-assisted operation can be programmed by manually driving a straight a-b line with the robot. Then the route planning software is able to automatically multiply and repeat the a-b line, with a line-by-line offset defined by the robots operational width.

This way a remote controlled grass mower can execute grass-cutting automatically on slope area without the need for manual corrections due to downwards slipping.

Perimeter-based operation with keep-out areas

It is possible for the operators to manually define the perimeter around a given area where the robot should operate. The route planning software will do an automatic route planning securing that the area is fully covered within the defined perimeter.

Additionally, the operator is able to define keep-out areas inside the perimeter, where operation is excluded.

Fuel-optimized off-line route planning

The route planning software offers also to plan and generate the route plans off-line – at the office – in advance. A set of route waypoints can be generated within a given area or field defined by GIS/GPS information retrieved from almost any map service provider.

The route plans can be auto-generated using various optimizing schemes, e.g. logical and easy-to-supervise routes, or fuel-efficient routes. The route planning software is also able to handle different head-land turn types, e.g. narrow or wide turns or fish-tail type turns.

GNSS Positioning and Mapping

The Conpleks Robotech software includes functions for positioning and mapping, using inputs from RTK and non-RTK GNSS systems and from IR-laser scanners.

The software is capable of building maps of the surroundings and the software is able to position and navigate a vehicle inside the created maps. The positioning and navigation can be done with high accuracy and precision.

Vehicle and Velocity Control

The Conpleks Robotech software is able to supervise and control all relevant vehicle functions through the sensor and actuator interfaces.

This is done using a collection of different controller types. Both classical PID and more advanced types of controllers e.g. adaptive type are also available.

Task Management

The mission and tasks of the robot or vehicle is handled by the task management parts of the Conpleks Robotech Software.

The Task Management activates, monitors and synchronizes the different activities carried out during operation, such as activation and deactivation of implements/tools.

Implement Management and Control

The implement control modules of the software system are transforming the high-level commands from the task management into implement specific operations, e.g. enabling the use of different implements on the same vehicle platform.