
Abstract

Field robotics has become an increasingly active research area in the past 50 years, and there is great potential in using autonomous field robots to perform precision tasks in biological production and related applications. But the products available on the market today are limited to small robots that solve simple tasks such as mowing, and automatic tractor steering that navigates through a planned route under the supervision of an operator.

The outdoor environment in which the robot operates is often very complex. This places great demands on the robot's ability to perceive the environment and based on this behave in a way that is appropriate and productive with respect to the given task while being safe for nearby people, animals and objects. Researchers are challenged by the considerable resources required to develop robot software capable of supporting experiments in such a complex perception and behavior. The lack of collaboration between research groups contributes to the problem, the scientific publications describe methods and results from the work, but little software for field robots are released and documented for use by others.

The hypothesis of this work is that an application oriented open software platform for multi-purpose field robotics will reduce the resources required for experimental research considerably due to reuse of existing work across projects and robotic platforms. This thesis describes the FroboMind field robot software platform developed in this work and presents FroboMind use cases in precision agriculture and humanitarian demining.

Use of FroboMind in various projects have shown that it does save resources using a common software platform across projects and robotic platforms and that it thus facilitates the task of carrying out experiments in the field. FroboMind is used today by other universities, and some companies use FroboMind as a basis to develop new field robotic products.