Current applications in autonomous off-road robotics

Abstract: Design and realization of autonomous mobile outdoor robots is a complex undertaking particularly when it comes to master concrete real-world outdoor scenarios. The demanding requirements of tasks like outdoor environment model acquisition, planning in unstructured and often dynamic environments and autonomously detecting and recovering from failure have to be dealt with. Also standard indoor sensing and data processing techniques are often not directly applicable and have to be revised to be used in an outdoor scenario. In this context trials and challenges have been realized as a form of benchmark for testing the robustness of autonomous robots and the algorithms controlling them. The European Land Robot Trial (ELROB) has been introduced as the European counterpart to the Grand/Urban Challenge allowing to demonstrate and compare the capabilities of unmanned systems in realistic scenarios and terrains. This talk presents several real-world applications of autonomous outdoor/off-road robots developed at the Institute for Real-time Learning Systems of the University of Siegen, Germany. Many of them were successfully demonstrated at the ELROB 2010 but do also originate from research projects and cooperations with industrial partners. The presented experiments were conducted on land-based robots (AMOR and DORIS), aerial robots (PSYCHE) and cooperating groups of both robot types. The talk will cover topics like 3D scene reconstruction, exploration of previously unknown outdoor terrain, autonomous object following (person and vehicle), ground-air cooperation and airborne sensing.

Speaker Bio: Lars Kuhnert received his Dipl.-Inform. in Computer Science from the University of Karlsruhe (now Karlsruhe Institute of Technology), Germany, in 2008. Currently he is a PhD student at the Institute for Realtime Learning Systems at the University of Siegen, Germany. He is the team leader of team AMOR participating in the European Land Robot Trial (ELROB) 2008 and 2010. His research interests include robot control architectures, autonomous outdoor robots, autonomous exploration, and 3D outdoor scene interpretation.