UNIVERSITÄT PADERBORN
Die Universität der Informationsgesellschaft

The research group **GET Lab – Cognitive Systems Engineering** supports excellent candidates who would like to apply for a PhD scholarship, offered e.g. by DAAD, in the field of

Mobile Robot Navigation in Highly Cluttered Environments

The increasing need of employing robots in high-risk areas hit by natural disasters has attracted the attention of researchers worldwide to develop fully autonomous mobile robots. The main objective of these robots is to carry out the assigned tasks in places where human presence is dangerous or difficult such as search and rescue.

Usually, a real world disaster environment is partially or completely unknown and changes over time. Therefore, traditional motion planning techniques which depend on a predefined map cease to function properly and the robot is fated to collide with obstacles. To overcome this limitation motion techniques must depend on sensors detecting instantaneous changes in the environment or obstacles appearing periodically. This can be achieved by reactive navigation approaches which incorporate the sensory perceptions within the motion planning and the control loop. Consequently, robots can detect environmental changes and re-plan dynamically to attain a goal safely.

Many existing reactive navigation methods have problems in dealing with dense and cluttered environments, which is the case in most of robotic applications. Several problems may appear in such environments such as local trap situations, computational complexity, and considering the robot shape and non-holonomic constraints. Avoiding dynamic obstacles while performing tasks is another challenge. It is still an open research problem to find an efficient algorithm that enables robots to move safely in such environments.

The basic aim of this research project is to build a robust navigation algorithm which copes with the previously mentioned challenges. This approach will be implemented to be the reactive layer of our rescue mobile robot GETbot.

Your Task

Research in robot navigation, development of methods, implementation and evaluation of algorithms in the context of rescue robots.

Prerequisites

Master's degree in electrical engineering, computer science or related field. Very good C++ programming skills. Experiences in robot navigation are helpful.

If you are interested please send mail your application containing the usual documents as a single pdf file to **mertsching@upb.de**.

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