Motion Planning for Industrial Robots

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Modern robot programming is performed off-line, i.e. the programmer uses a three-dimensional computer model of the robot and its work cell, in which the robot easily can be controlled and moved to the desired configurations. When the program is complete it can be simulated and verified before it is down-loaded to the real robot.

When a robot is to be moved from an initial configuration to a final configuration, it is unlikely that the straight-line path is feasible due to the obstacles in the cell. It is then necessary to add a number of via-points to the path in order to avoid collisions. If the work cell is complicated or cluttered, much time is spent on finding such via-points.

This talk concerns a project which aim is to is to develop an algorithm -a motion planner- that automatically generates collision-free paths. These paths are required to be dynamically acceptable, and optimised with respect to time, energy consumption, etc. The main application is industrial robots with six to nine degrees of freedom (joints), working in a known static environment. The project is a joint venture between Chalmers University of Technology and Prosolvia Systems AB, Göteborg, and the motion planner will be a part of RobotStudio, a product developed by Prosolvia.

This problem has received much attention the last fifteen years, and there are a number of motion planners based on a variety of approaches. Unfortunately, current motion planning techniques are still too slow to be effective, as they need several minutes, or hours, of computation.