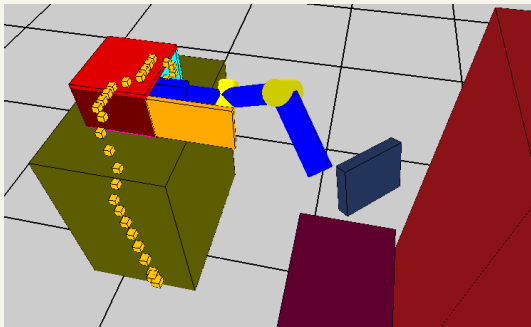


# Autonomous Manipulation in Service Robotics

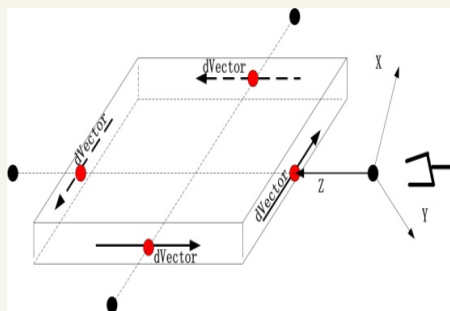
## Motion Planning



- \_ Motion planning is based on the Cartesian space usage, which results in smaller calculation times
- \_ Manipulator avoids obstacles and in the same time has smooth motions
- \_ Algorithm is suitable for real-time applications in service robotics but also for industrial usage
- \_ Figure shows an example of the planned path for the task "moving to the inside of a microwave"

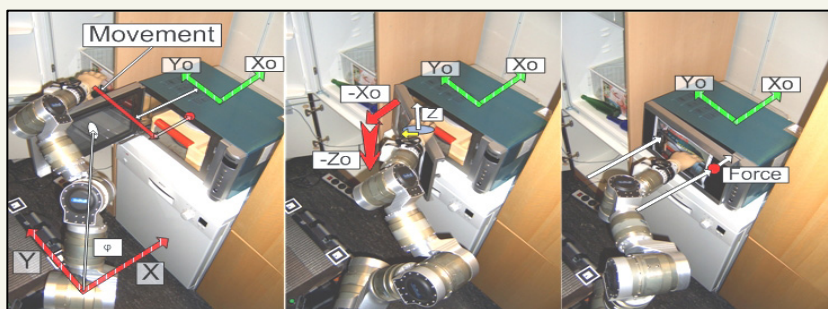
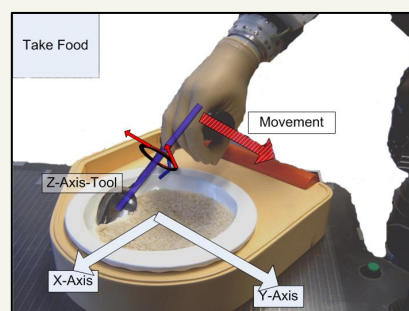
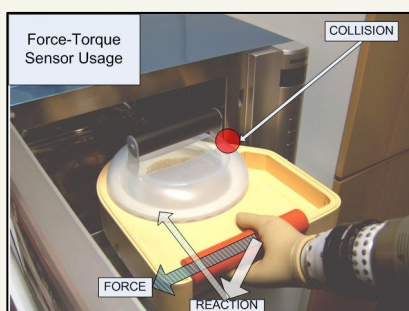
## Grasping Frames Calculation

- \_ On-line calculation of object grasping frames increases the flexibility of the system during execution
- \_ Figure on the right side depicts the calculation of the frames for an object with the shape of a cuboid. For example, this is used for handling of books



## Manipulative Tasks in Real Scenarios

- \_ Efficient motion planning algorithms are used for the realization of manipulative tasks. Figures bottom show the force-torque sensor usage for dealing with model uncertainties in case of tasks related to the food preparation scenario



## Aim

- \_ Designing algorithms that can allow real-time planning of robot motions as well as object handling

## Research

- \_ Fast motion planning for redundant manipulators
- \_ Real-time obstacle avoidance in changing and dense environments
- \_ Adaptive (on-line) calculation of object grasping frames
- \_ Realization of manipulative tasks in service robotics scenarios
- \_ Using force-torque sensor for increasing the robustness during execution

## Contact Person

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