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Your ref.	**Our ref.**	**Project No. / File code**	**Date**
Your ref	Our ref	Project / File code	2018-04-25

Force-feedback control for advanced manipulation of deformable objects

In this MSc assignment, the student(s) will focus on force-feedback control of 7DOF Panda arm from Franka Emika for advanced cutting of deformable food objects such as ham. This MSc assignment is in close collaboration with a project called iProcess (www.iprocessproject.com) lead by SINTEF where the focus is the robotic manipulation of deformable food objects. The experiments can be done on a dummy 3D model of a relevant object.

Main tasks in this assignment are:

- Set up the robot and interface for real-time control and force sensing.
- Based on the experimental setup develop a force-feedback control that is able to control the robot arm to follow a point contact and estimate the contact point location.
- Develop a method that is able to control a dummy knife-tool to maintain a line to face contact of the relevant object
- Apply the methodology to generate some simple cutting trajectories applied to dummy object but also preferably also to the real-food object.
- Discuss the evaluation for the given case, discuss the challenges and the future work.

For the experimental work, the student will have access to a 7-DOF robot arm, dedicated work station and a force sensor mounted on a knife tool to experiment with. The experimental part of the work is expected to be carried out at SINTEF Ocean robot lab. The implementation is expected to be done in C++ and Python, so the prerequisite is that the candidate has a knowledge of C++ and Python.

Main supervisor: prof. Jan Tommy Gravdahl, NTNU

Co-supervisors: Dr. Morten Lind, Senior Scientist, SINTEF RM, Dr. Ekrem Misimi, Senior Scientist, SINTEF Ocean.