Interactive Methods for Specifying Grasping Points to Robots

A semi-direct teaching method for specifying information for grasping objects in home or office environments through the generation of a teaching data is proposed in this research. Information specified during the teaching process includes: object's shape, grasping force, grasping position, and orientation. To achieve this data indication in our approach, we propose the use of a teaching tool created by us and which has the same mechanism as the hardware (gripper) placed on the robot Pioneer 3 (Fig. 1). This enables our system to carry out the teaching process without using the robot. The challenging point is how to easily obtain information on shape, grasping force, grasping position, and orientation to be used as teaching data.

In the proposed method (refer to the flowchart Fig. 2), we use an RGB-D device to get information regarding the height (in meters) relative to the flat surface of the desk and the arm of our teaching tool. The system also provides us with information about how deep (in meters) the arm of our teaching tool went into the cube. With this information, part of the teaching data is generated.

In the teaching tool, we are using force sensors to obtain the measurement of applied force (in newtons) by the teaching tool at the moment of grasping the object, but also to measure the stability of the object once it is lifted. An overview of the method approach is shown in Fig. 3. Our approach method was evaluated to determine the quality of the measurements obtained, the result of the data generated in one of our experiments it is shown in Fig. 4.

Keywords: Robot teaching, RGD-B sensor, Grasping.

Reference

[1] J. Figueroa, T. Sakuyama, Y. Miyazaki and J. OTA, Interactive Methods for Specifying Grasping Points to Robots, Prepr. 30th Annual Conference Robotics Society of Japan, RSJ2012AC4D2-5, 1/3 (2012).
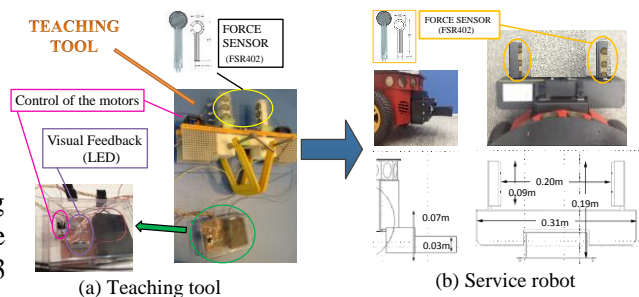
Fig.1 Teaching tool and the robot
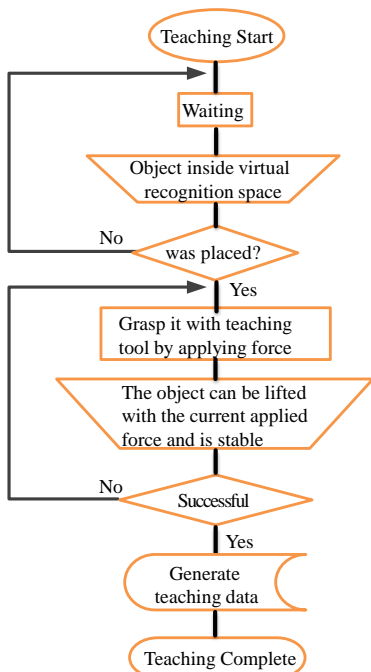
(a) Teaching tool

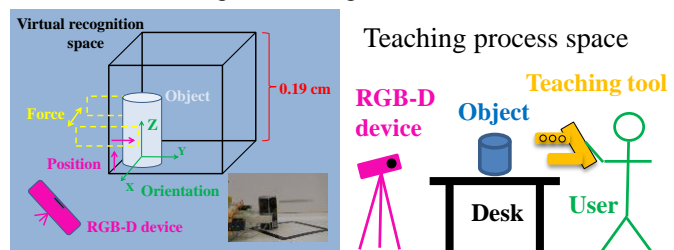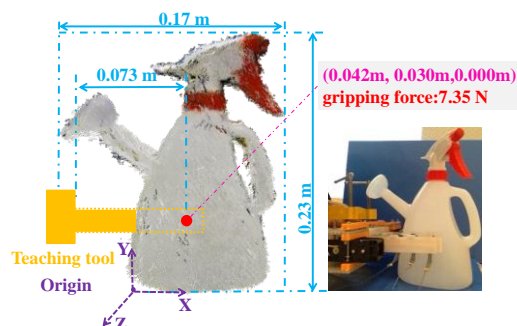(b) Service robot

Fig.2 Flowchart showing the process of teaching

Fig.3 Overview of the method

Fig.4 Teaching data generation