GRASP PLANNING ASSESSMENT BENCHMARK

Reference No / Version	RAL-SI-2020-B19-0837-V1.0 For the latest versions of the benchmark, please refer to http://www.ycbbenchmarks.com/protocols-and-benchmarks/
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Adopted Protocol	Grasp Planning Assessment Protocol
Scoring	The results are presented in terms of success ratio of lift, rotational and shaking tests, and grasp generation time. The percentage of the number of successful grasps after lift, rotational and shaking tests out of all trials for every single object and object pile experiments. Failures are also classified as follows. [F1]. If the gripper fingers or any used equipment knocks-off the object from its place while reaching-to-grasp; [F2]. If the object slips or rolls away while executing the grasp or while lifting the grasped object; [F3]. If the designed rotational test is failed; [F4]. If the designed shaking test is failed; [F5]. If no feasible hypotheses are found, e.g. due to hardware kinematics, object placement etc. (this only applies to the grasp planners with integrated reachability search). [F6]. If the hardware failed to respond due to communication drops, process timeouts, etc.
Details of Setup	Please describe in detail: • Robot type • Gripper type • Grasp planning algorithm including a reference to a paper, if possible • Collision detection / reachability method • Extra objects used • Experiment parameters such as α, β, and *N* as described in the manuscript.
Results to Submit	Grasp planner: • Planning time required to generate the grasp hypotheses • Grasp quality measure used in the planning (if any) • Success rate (successful lift, rotational and shaking tests) Grasp robustness: Scoring tables per object, evaluating the best grasp for each one of the 12 different object poses (if applicable; 6 if the object is symmetric). The grasp generation and execution for a given object pose should be repeated at least *N=3* times. In total, for a given

	object, maximum number of trials is: *number of object poses * repetitions*, i.e., for a symmetric object it is *6*N* and for a non-symmetric object it is *12*N*. - 1 point for object remaining in the gripper after lift test - 1 point for object remaining in the gripper after rotational test - 1 point for object remaining in the gripper after shaking test These three points need to be verified in the same order as presented above. <u>Please comment on</u> • Causes of errors in the process (e.g. fingers placed in bad areas, failures in the grasp control, in-hand motion of the object during testing) • Advantages and disadvantages of the gripper used. For example, if an underactuated gripper is used to present the results, would the authors expect similar results with a fully-actuated gripper? Would there be additional algorithm or sensor requirements to transfer the grasp for other gripper types? • If the gripper provides sensor data that are used to improve the execution of the planned grasp, please describe the data and how they are used in the control loop. • The perceptual pipeline, software/hardware used for pose estimation and/or visual data acquisition. • Time for planning best grasp for each object and provide computer configuration used to run the planner.