

# Scenario Description

## Introduction

This document defines two scenarios which will extend the KIT Bimanual Actions Dataset<sup>1</sup>. The focus is on symmetric movements which are sparsely covered in the existing scenarios. Additional captures are needed to recognize all bimanual categories presented in The Bimanual Manipulation Taxonomy<sup>2</sup>.

The setup is the same as in the existing captures. One subject performs an activity on a table with approximately a height of 90 cm. On the other side an RGB-D camera, representing the robot, is mounted on a tripod at approximately 1.70 m. For a better quality we will use the newer Azure Kinect<sup>3</sup> camera. As in the other captures we record 6 subjects (3 female, 3 male) with 10 repetitions per task.

## Scenario 1: Setting a Table

Key objects: *cup, mixing bowl, plate, spoon*

In the first scenario, the subject sets the table. The objects have to be carried from one side of the table to the other. In addition, the food which we assume to be in the bowl, has to be put on the plate. It is the subject's choice when to do this.

Temporal relations:

- The food can only be placed on the plate if the plate and the bowl are both standing on the same side (either the initial side or the other one).

Possible procedure:

- The objects are placed on the table; the subject stands in front of it.
- The subject grasps one object.
- The subject lifts and holds the object.
- The subject places the object in a different location on the table.

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<sup>1</sup><https://bimanual-actions.humanoids.kit.edu>

<sup>2</sup><https://h2t.anthropomatik.kit.edu/pdf/Krebs2022.pdf>

<sup>3</sup><https://azure.microsoft.com/en-us/products/kinect-dk/>

- The subject repeats this procedure for all objects.
- The subject grasps the spoon and puts a plastic bread (not part of the object recognition) from the bowl to the plate.
- The subject goes to its initial state.

## Scenario 2: Preparing a Dough

Key objects: *cup, mixing bowl, rolling pin, whisk*

In the second scenario, the subject prepares a dough. We assume that the bowl already contains some ingredients. The subject has to add the last ingredient, which is in the cup. After that, it has to mix the contents in the bowl with the whisk and get the dough out of it. Finally, the subject has to roll out the dough with the rolling pin.

Temporal relations:

- There has to be a mixing procedure after putting the last ingredient into the bowl but before putting the content of the bowl on the table.
- The dough has to get out of the bowl before rolling it out.

Possible procedure:

- The objects are randomly placed on the table; the subject stands in front of it.
- The subject grasps the cup and adds the content to the bowl.
- The subject grasps the whisk and mixes the contents in the bowl.
- The subject puts the whisk aside and gets the dough out of the bowl.
- The subject puts the bowl aside.
- The subject grasps the rolling pin and rolls out the dough.
- The subject puts the rolling pin aside and goes to its initial state.