Link for GITHUB

<https://github.com/Natsuw/Reconstruction-with-a-camera-based-for-static-manipulator.git>

This repository demonstrates UR5 move around with different texture model in Gazebo and ROS, then reconstructed in colmap.

**Installation**

This project was tested in **Ubuntu 18.04** with **ROS Melodic**, **COLMAP-3.6-cuda**.

Make sure you have installed Python2.7 and some useful libraries/packages, such as Numpy, cv2, etc.in ROS.

Install ROS Melodic, Gazebo, RViz, Moveit, official universal robot.

Link for universal robot: [universal\_robots - ROS Wiki](http://wiki.ros.org/action/show/universal_robots?action=show&redirect=universal_robot)

Link for COLMAP Installation: [Installation — COLMAP 3.7 documentation](https://colmap.github.io/install.html)

**Install this repository from Source**

Firstly, set up a catkin workspace (see [this tutorials](http://wiki.ros.org/catkin/Tutorials)).

Download official universal robot to workspace, [universal\_robots - ROS Wiki](http://wiki.ros.org/action/show/universal_robots?action=show&redirect=universal_robot)

Then clone the repository 🡪 <https://github.com/Natsuw/Reconstruction-with-a-camera-based-for-static-manipulator.git> into the src/ folder. It should look like /path/to/your/catkin\_ws/…   
Make sure to source the correct setup file according to your workspace hierarchy, then use catkin\_make to compile.

Assuming your official universal robot folder is ~/catkin\_ws, you should use the following commands:

$ cd ~/catkin\_ws/src

$ git clone https://github.com/Natsuw/Reconstruction-with-a-camera-based-for-static-manipulator.git

$ cd ..

$ catkin\_make

$ source devel/setup.bash

Under catkin\_ws/src there are four folders. Two for image saver(xxx\_image\_saver)

One is the official universal\_robot (you should download this folder from official site, the link had provided above)

And another is ur5\_go\_pkg (main repository from github).

**Replace and Change Files**

***Under directory catkin\_ws/src/universal\_robot/ur\_description/urdf/***

Opefile ur5\_joint\_limited\_robot.urdf.xacro, and **make the following change to the joint limit:**

shoulder\_pan\_lower\_limit="${-2\*pi}" shoulder\_pan\_upper\_limit="${2\*pi}"

***Under directory catkin\_ws/src/ur5\_go\_pkg/src***

There are two folders which are **launch** and **worlds**, copy and paste to catkin\_ws/src/universal\_robot/ur\_gazebo

Build the code under directory catkin\_ws/

$ catkin\_make

$ source devel/setup.bash

**Run the code with ROS and Gazebo**

**For the BLOCK model**

# launch Gazebo with UR5 and block model

$ **roslaunch ur\_gazebo view\_test\_ur5.launch**

# launch Moveit

$ **roslaunch ur5\_moveit\_config ur5\_moveit\_planning\_execution.launch sim:=true**

**#** The main file for UR5 run

$ **rosrun ur5\_go\_pkg moveit\_block\_demo.py**

**#** Save image in ur5\_image\_save

$ **rosrun ur5\_go\_pkg block\_vision.py**

# Code are not using, only for testing

roslaunch ur5\_moveit\_config moveit\_rviz.launch config:=true (not using, show in moveit)

rqt\_image\_view (not using, image view)

**For the Beer model**

$ **roslaunch ur\_gazebo view\_beer\_ur5.launch**

$ **roslaunch ur5\_moveit\_config ur5\_moveit\_planning\_execution.launch sim:=true**

$ **rosrun ur5\_go\_pkg moveit\_beer.py**

$ **rosrun ur5\_go\_pkg beer\_vision.py**

COLMAP

Press Ctrl+C to quit the program and then it will automatic save images into folder beer\_image\_saver or ur5\_image\_save.

1. Install the colmap in official document.

Create a new project as start.

Load saved images from self-crate folder into Images.

1. Processing the feature extraction and feature matching
2. Start 3D reconstructed to see the angle pose for the object.
3. Dense and fusion the object, colour point clouds.
4. Finished reconstruction.