UR5 programs:

1)picknplace.cpp:

This MoveIt C++ program is used to pick an item from the shelf given its coordinates. The fixed coordinates of the item must be calculated and entered at 61 line of the program. The program performs the following actions:

1. Initializes the ROS node and the MoveGroupInterface for the arm planning group.

2. Moves the arm to a ‘pick’ position.

3. Retrieves the current pose of the arm's ‘tool0’ joint.

4. The coordinates of the item in shelf w.r.t to base of shobot is used as target pose.

5. Plans and executes the motion to reach the target pose.

6. Adjusts the position of the target pose slightly to move inside the shelf.

7. Plans and executes the motion to reach the adjusted target pose.

8. Activates the gripper suction by calling a UR (Universal Robots) hardware service.

9. Moves the arm to the basket and drops the item.

2)picknplacerealsense.cpp:

This MoveIt C++ program is used to pick an item from the basket using object detection and place it infront of the head camera to detect bar programs. An TF2 object detection model and dodo detector is used to identify and locate the item. The program performs the following actions:

1. Initializes the ROS node and the MoveGroupInterface for the arm planning group.

2. Moves the arm to a ‘itembasket’ position to view basket with RealSense camera.

3. Dodo detector identifies and retrieves the coordinates of item in basket w.r.t base of shobot.

4. Retrieves the current pose of the arm's ‘tool0’ joint.

5. Plans and executes the motion to reach the item.

6. Activates the gripper suction by calling a UR (Universal Robots) hardware service.

7. Moves the arm in front of the head camera.

8. Places the item in different poses to identify the bar programs.

9. Plans and executes the motion to reach the adjusted target pose.

10. Moves the arm to the basket and drops the item.

3)ur5\_anscer.cpp:

This MoveIt C++ program is used in coherent with move\_anscer.py and anscer\_avg.py for the shobot to move to the shelf pick item and return home autonomously.

The program performs the following actions:

1. The program is executed by move\_anscer.py after shobot reaches shelf.

2. The program follows the same function of the picknplace.cpp.

3. Translational error correction is performed in this code to rectify anscer platform’s error.

3. Subscribes to the averaged pose data published by anscer\_avgpose.py

3. The difference between the shelf waypoint’s coordinates is subtracted from the averaged pose and subtracts it from the coordinates of shelf item.

4. Arm picks item and moves to home location.

5.After completion of program a completion status is published.

6.The move\_anscer.py is subscribed to the completion status.

7. Shobot moves to home position.