Industrial Robotics Script:

Hi, welcome to our Dual Robot Bottle Sorter

To improve efficiency when cleaning an environment, we have programmed two cobots to collaboratively dispose and sort cups and cans within its known environment. Our system utilises the Widow X250, a 6DOF robot that has seen extensive uses in the home, office, and industrial environment. Along with this, we also have the highly maneuverable UR3e with 6 DOF and an adaptable end effector, with this version comes added safety features over its standard UR3 counterpart. Our robots can be used in any indoor environment with the capacity to maintain safety features and can also be manipulated in various configurations. For the Widow X250, two sliding finger Grippers are used, and with the UR3e utilising the Robotiq two-finger gripper.

When designing our environment, we implemented these robots in a kitchen for cleaning up and disposal of sorted cups and cans. These can be used in a variety of scenarios, after a party or for easy recycling and sorting items. We have also implemented a variety of safety features such as a standing fire extinguisher for any fires, a warning sign to keep users and operators aware of the robot being in action, light curtains placed in the perimeter of the robot operation to act as an emergency stop when any object or users enter the perimeter, and an e-stop on the table outside of the light curtain perimeter for any emergencies to stop the two robot’s mid operation

Robot motions are precisely managed through Resolved Motion Rate Control, utilizing cartesian trajectory to generate linear trajectories. This method enables accurate regulation of both the robot's velocity and the end effector's orientation during transitions between target transforms, ensuring spill-free handling of any remaining liquid in cups and cans.

Here we can show the collision detection in action with the movement of the Widow X250. This aims to avoid the table leg by finding the most efficient trajectory.

Here we demonstrate the light curtain in action with a cup simulated being thrown into the working environment of the robot. Once the cup enters the vicinity of the placed curtains, a visual barrier appears to indicate this and will stop the operation of the robots.

Along with our system, we utilize an interactive and simple Graphical User Interface (GUI) to manipulate the individual joints of each robot. Here we start with the Widow X250 joint and then also with the UR3e. In addition, XYZ cartesian movement can also be applied as seen.

We also simulated a physical estop using an Arduino, push button and LED light, where when the push button is pressed the light will remain static until it is pushed again to resume operation.

Here we also have the real UR3 robot demonstrating the same movement for the pick and place of the cup.

For future development, we can implement this in a restaurant setting where the cobots can work together to clean up tables and dishes by setting them up in a mobile trolley. This can make it easier for sorting empty dishes and cups into the trolley, making the waiter’s job easier and more efficient as it can be done in one run, rather than multiple runs.

Thanks for watching and please support our Dual Robot bottle sorter.