Project Sumup: Sorting robot with a twist

- Create an algorithm that allows a robot arm to identify and sort objects (e.g., colored cubes) into designated bins based on their color
- Use the Panda robot manipulator and assume to know the color of the objects
- For each detected object i:
    - Compute the picking position $\mathbf{p}$pick,i and the placing position $\mathbf{p}$place,i based on the object's color
    - Use inverse kinematics to obtain the rob configurations $\mathbf{q}$pick,i and $\mathbf{q}$place,i .
- Control strategies to compare:
    - Joint-space trajectory interpolation: move from pick to place positions using interpolated joint trajectories between qpick,i and qplace,i .
    - Resolved-rate motion control: Use Cartesian velocity control to reach pick and place poses smoothly
- Analysis: plot and compare trajectories for both strategies (joint and Cartesian space), analyze end-effector path smoothness, execution time, and sorting accuracy.

Extra steps: mock a camera so that the robot has to find the location and colour of the spheres based on visual input. The sensing could be done in two ways:

1. Usage of OpenCV to process the camera image, using HSV color masking to find the pixel coordinates of each berry.
2. Using a Convolutional Neural Network that takes the raw camera image as direct input, and is trained to learn its own policy for "seeing" the berries.