



Safety

Concerns

Program

Quality

Robot

Performance

Business

Objectives

Review

Refresh

End Effector Poses



Resolve End Effector Poses before continuing

Thing Movement



Collisions



Pinch Points



Occupancy



Simulator



Waypoints

What are Waypoints?

Waypoints are positions and orientations that are used as parts of Trajectories, and unlike Locations, do not have inherent meaning other than to allow greater specificity of the manner with which the robot moves between a pair of locations.

Safety Concerns

Pay special attention to placing waypoints around the occupancy zone of the human, since this is more likely to result in undesirable conflicts between the human and the robot.

Program Editor



Waypoints



Search...



WP 2



WP 1



WP 3



WP 4



WP 5



Machine:

Blade Conveyor Machine



Machine Initialize



Machine:

Blade Conveyor Machine



Move Trajectory



New Trajectory



Settings:



Trajectory:

Start Location



Initial Location



Waypoints:



WP 1



End Location:



Blade Fetch



Machine Stop



Machine:

Blade Conveyor Machine



Move Gripper



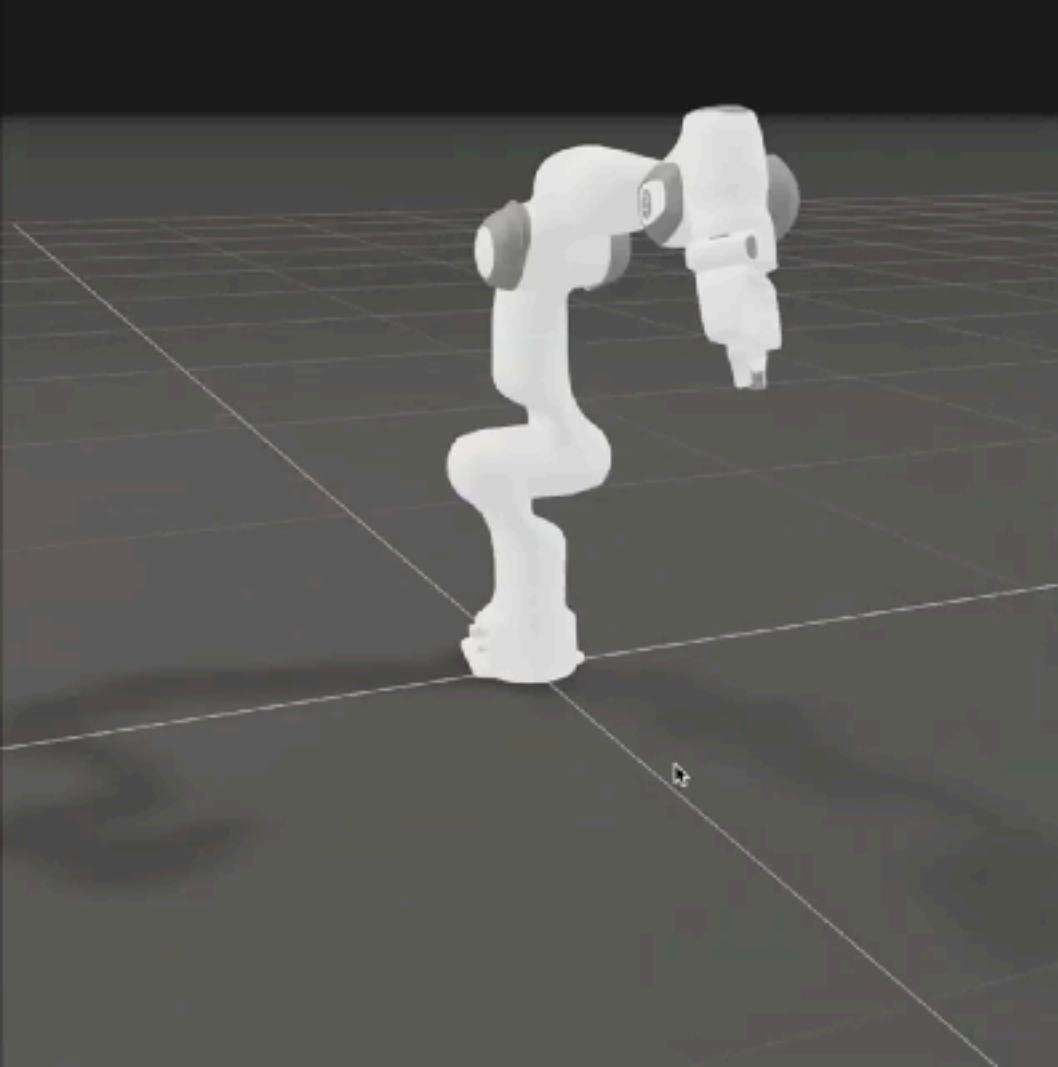
Settings:



Thing:

Blade Thing





Setup

DEFAULTS ROOT

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1 <?xml version="1.0" ?>
2 <!-- =====
3 <!-- | This document was autogenerated by xacro from franka_description/robots/
4 <!-- | EDITING THIS FILE BY HAND IS NOT RECOMMENDED
5 <!-- =====
6 <robot name="panda">
7   <link name="panda_link0">
8     <visual>
9       <geometry>
10        <mesh filename="package://franka_ros/franka_description/meshes/visual/link0.d
11      </geometry>
12    </visual>
13    <collision>
14      <origin rpy="0 0 0" xyz="-0.04 0 0.06"/>
15      <geometry>
16        <box size="0.23 0.2 0.15"/>
17      </geometry>
18    </collision>
19  </link>
20  <link name="panda_link1">
21    <visual>
22      <geometry>
23        <mesh filename="package://franka_ros/franka_description/meshes/visual/link1.d
24      </geometry>
25    </visual>
26    <collision>
27      <origin rpy="0 0 0" xyz="0 0.0 -0.13"/>
28      <geometry>
29        <capsule length="0.06" radius="0.06"/>
30      </geometry>
31    </collision>
32    <collision>
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34      <geometry>
35        <capsule length="0.135" radius="0.06"/>
36      </geometry>
37    </collision>
38    <inertial>
39      <origin rpy="0 0 0" xyz="3.875e-03 2.081e-03 -0.1750"/>
```



Move Part A to Loc 1

Insert Part B to at Loc 2

Rotate Part C clockwise

Space usage is a measure of how much space the robot occupies while performing a robot action.

Task specification by chatting with LLM

End Effector Pose

During this action, it appears that the robot gripper is coming very close to the environment and the gripper fingers are moving quickly.

During this action, it appears that the gripper may be moving in a potentially dangerous manner. Specifically, this involves cases where the gripper moves quickly in the direction of its outstretched fingers, such that they could result in problems if coming in contact with a worker's soft tissue.

Pinch Points

During this action, it appears that the robot's movement creates areas that would

OUTPUT:

Type a message...

Send



Move Part A to Loc 1

Insert Part B to at Loc 2

Rotate Part C clockwise



Move Part A to Loc 1

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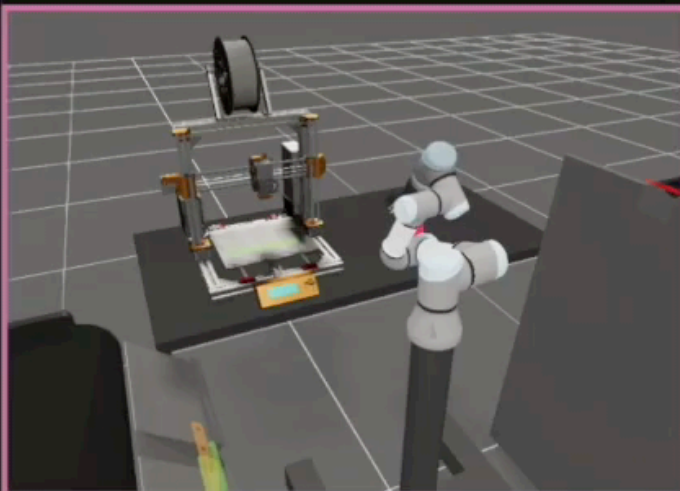
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WP 5



Machine: Blade Conveyor Machir



Machine Initialize



Machine: Blade Conveyor Machir



Move Trajectory



New Trajectory



Settings:



Start Location: Initial Location



Waypoints: WP 1



End Location: Blade Fetch



Machine Stop



Machine: Blade Conveyor Machir



Move Gripper

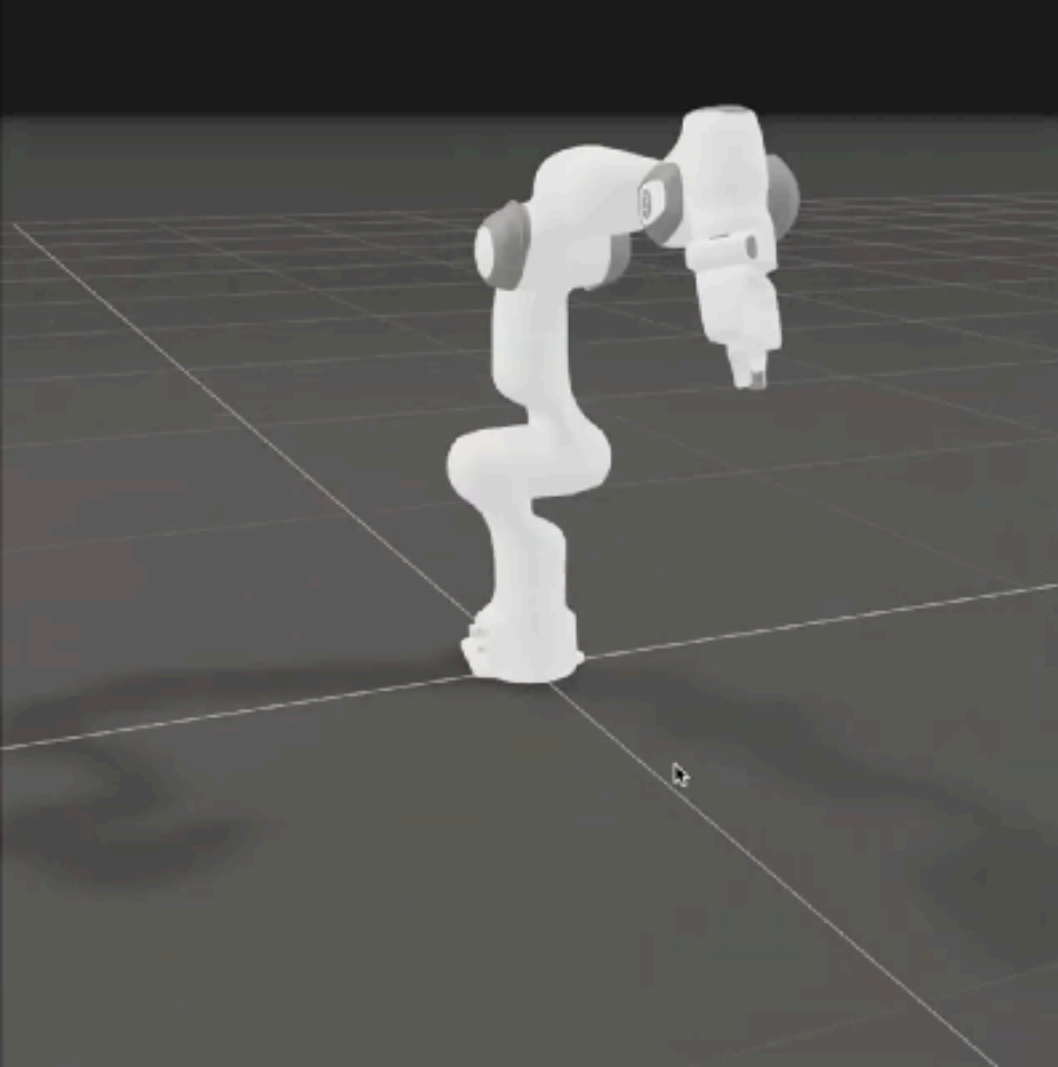


Settings:



Thing: Blade Thing

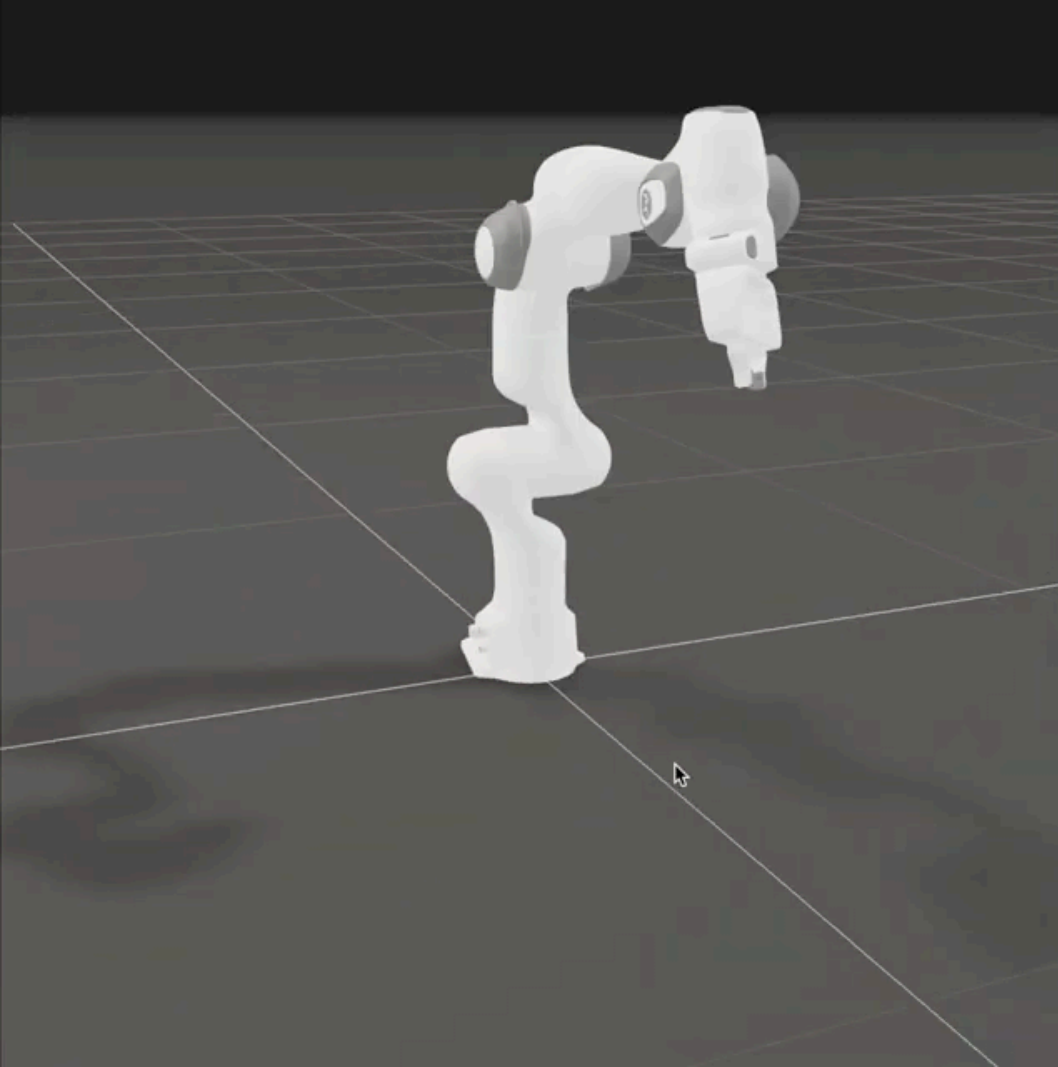




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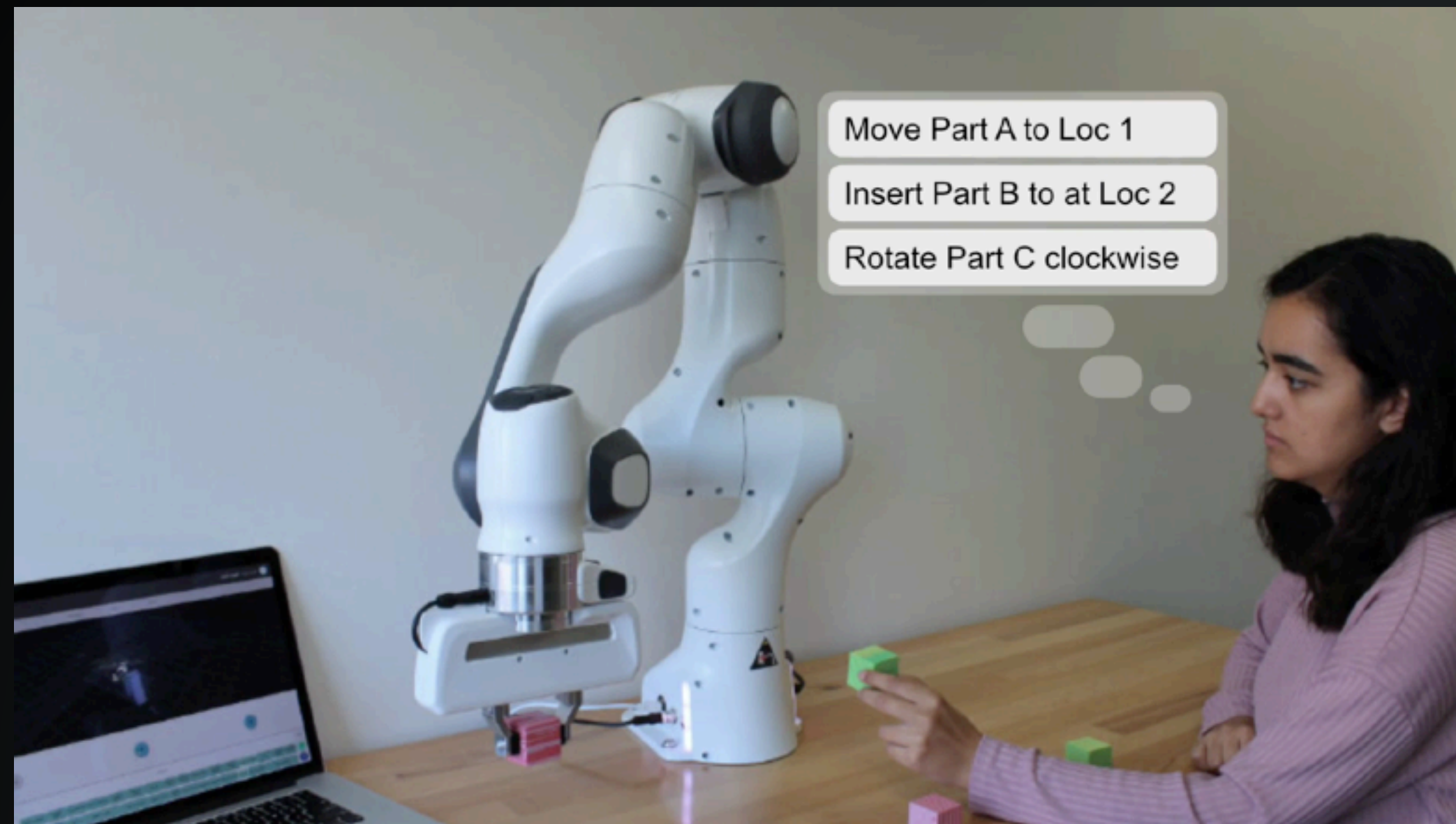
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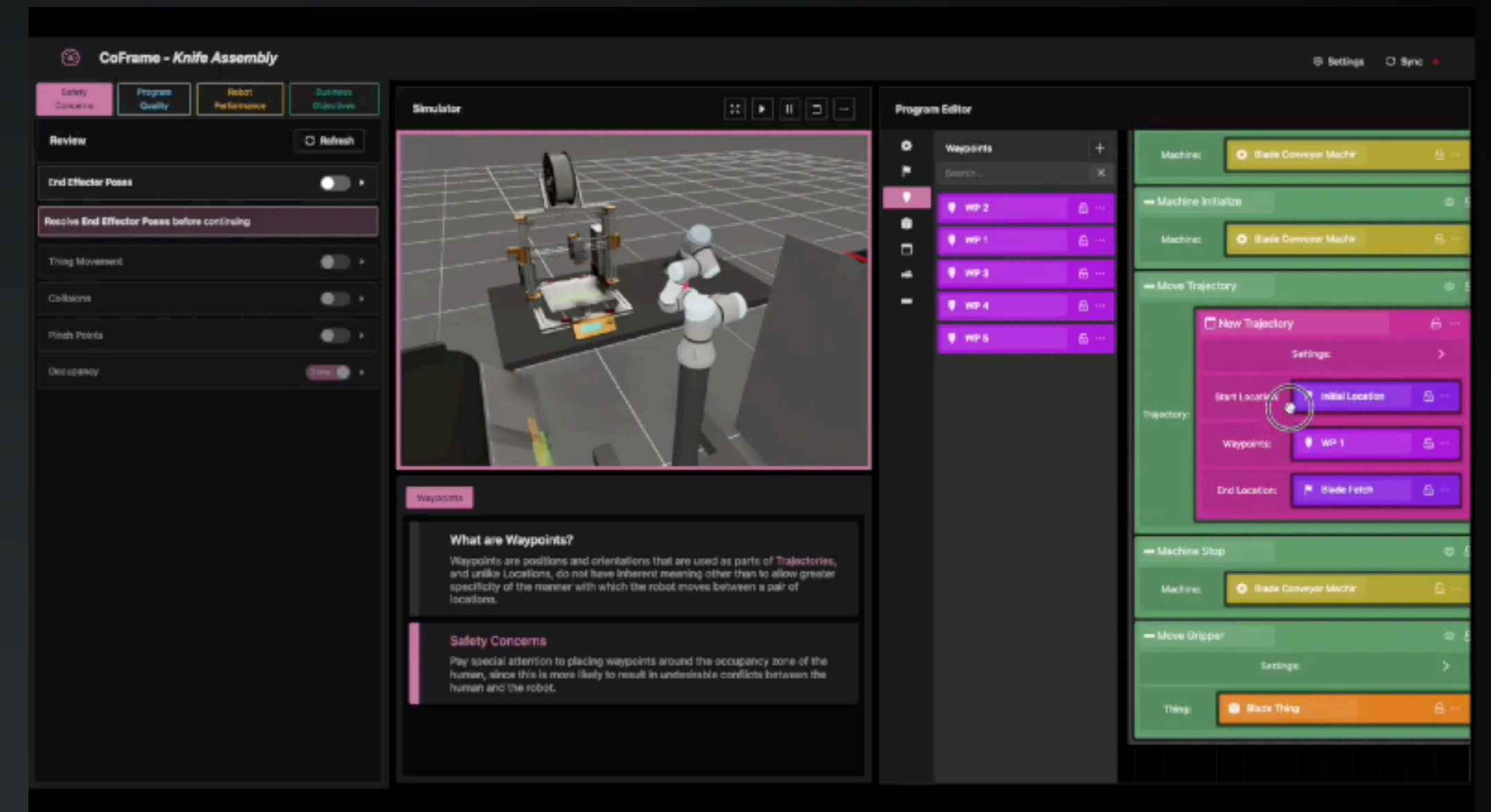
OUTPUT:

Type a message...

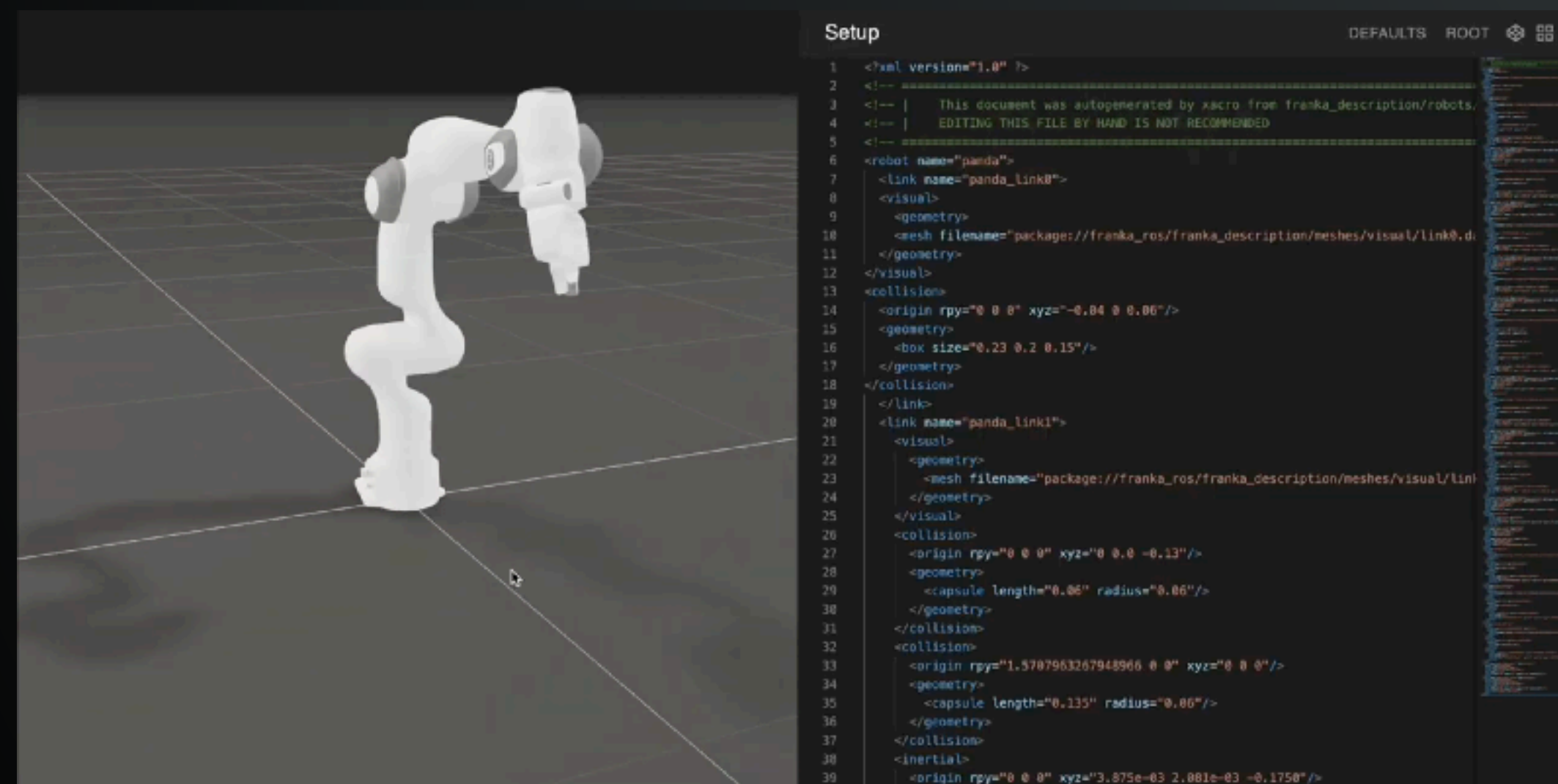
Send



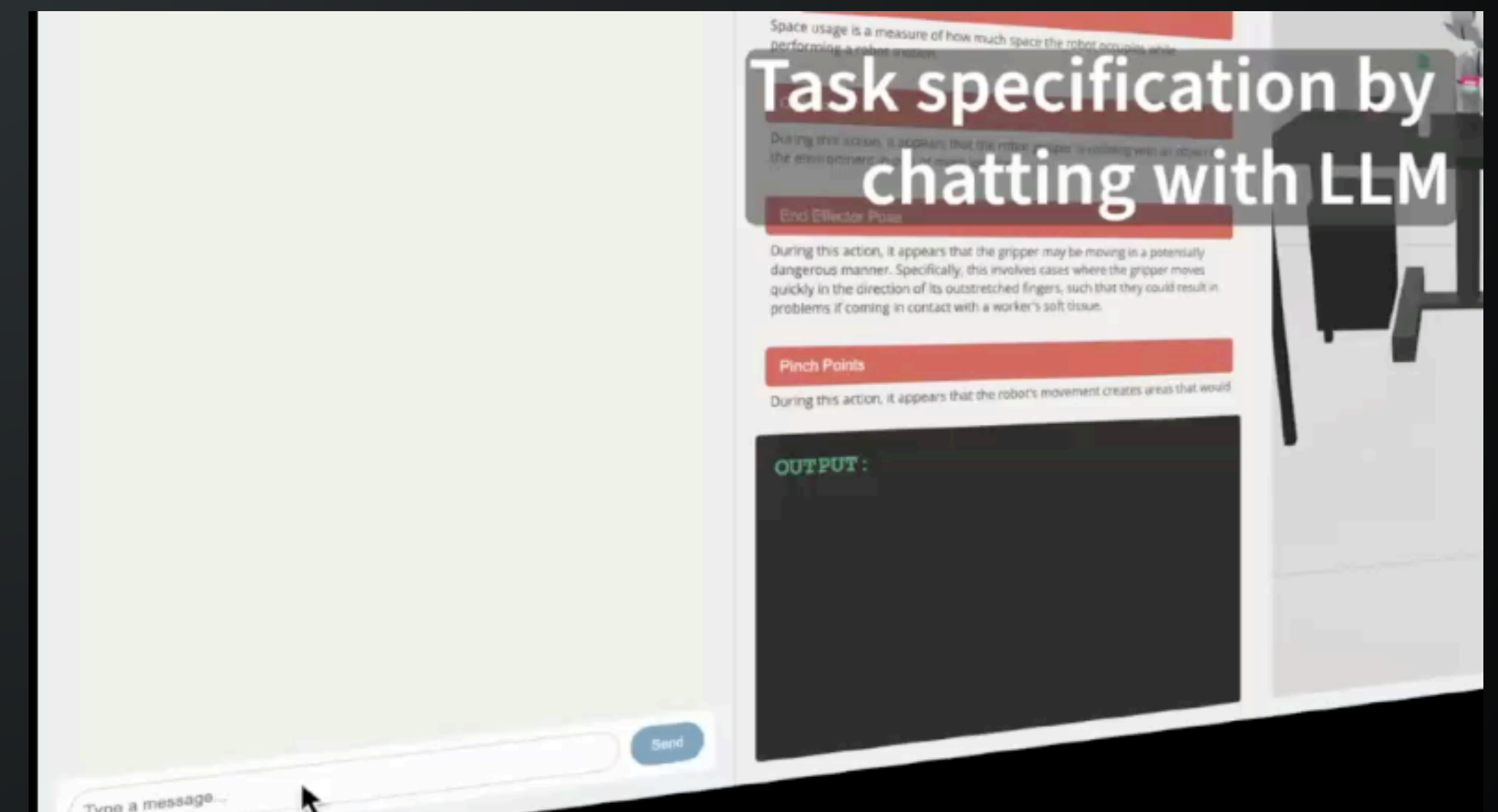
Task modeling, robot programming, human-robot teaming



Analysis of program quality, safety, business objectives



Programming expressive motions



Programming using natural language with LLMs

A woman with long dark hair in a ponytail, wearing a light-colored jacket, is seated and gesturing with her hands while interacting with a white humanoid robot. The robot has a tablet on its chest displaying a colorful molecular model. The background is dark and textured.

5

Area 5:

Responsible, Accessible Design of AI Systems

CHI 2023 HONORABLE MENTION
HRI 2024, CHI 2025