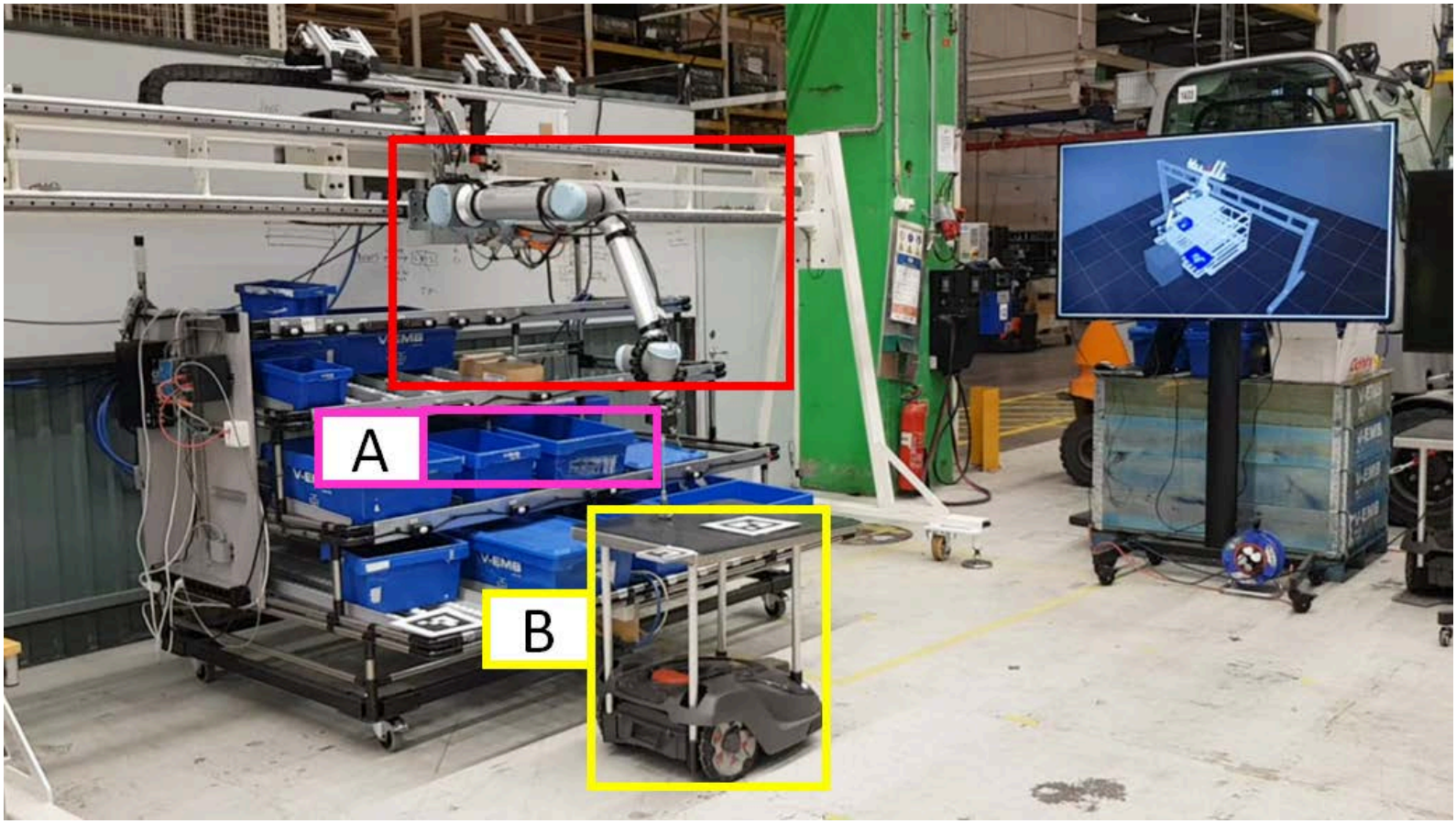
Interview Guide:

Using Behavior Trees in Risk Assessment- Think Aloud Tasks

The robot:

A collaborative robotic system, which is composed of a gantry and a mounted robotic arm (marked red box). The goal of the robotic arm is to pick items from the blue box (marked with A) and put them on a trolley robot (marked with B) to support the operators in the factory. The trolley is an autonomous robot (marked with B) that moves to the operator's location. The kits are located in the blue box (marked pink box). The robotic arm has a scanner that is used to detect and localize items.

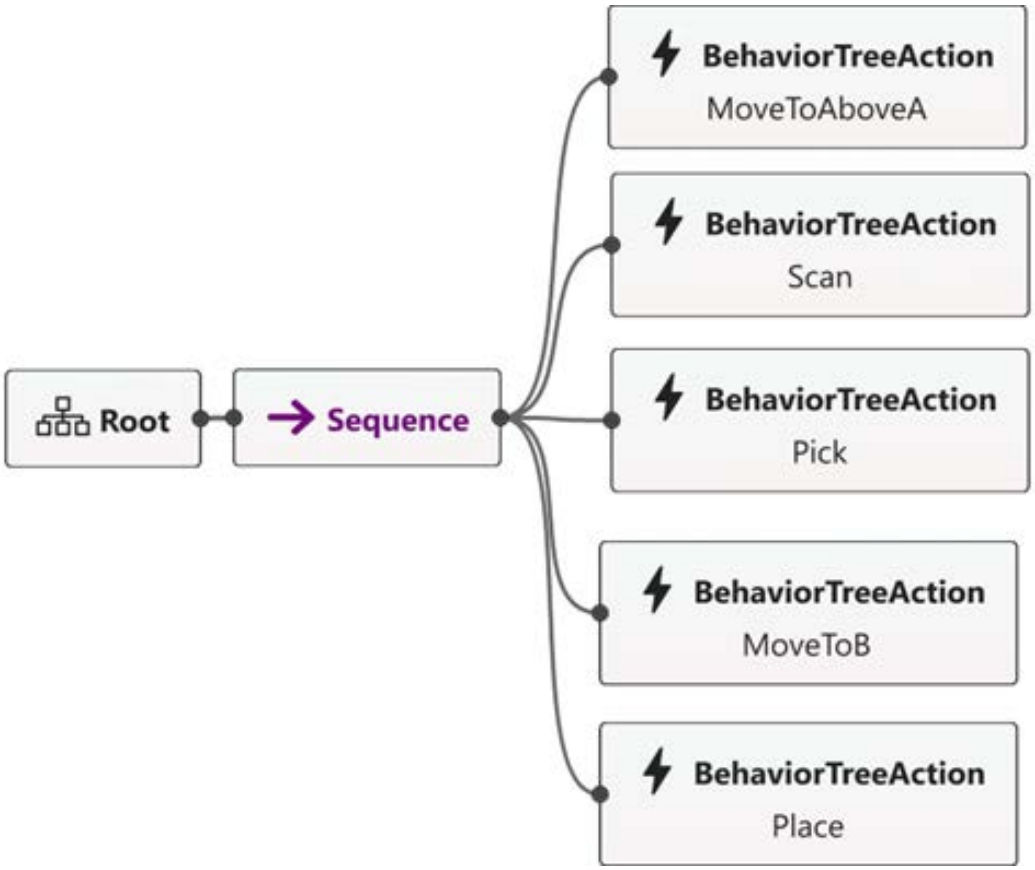


The scenario:

The blue box contains multiple tools. The robotic arm chooses a specific tool to perform various operations using the scanner.

The system should allow the operators and robots to work in a shared zone without endangering the operator.

The task is for the robotic arm to pick items from location A (the blue box) and place them on a trolley robot (location B).



The risk assessment task:

Your task is to brainstorm potential failures for the above scenario and fill the Failure Mode and Effects Analysis (FMEA) template.

To help you with the process, we provide you with a simple behavior tree of the above scenario. The behavior tree shows the sequence of the needed actions to pick and place a specific item from the blue box.

Transferring the risk assessment output task:

In this task, you are asked to transfer your outcome from the risk assessment into a behavior tree tool.

The interviewer will now give you control over her screen to allow you to use Groot. Use the example below for our mapping template to map the FMEA output into the behavior tree tool. This example is already filled in the tool if you want to check it again.

	Process-FMEA	**Example**	**Mapping**
	Action	Pick	
	Pre-requirement	Pre-requirement blue box is scanned;	” description”
Characteristics of failure	Potential failure mode	(1) item not picked, (2) item dropped;	” failureIf”
	Potential effect(s) of failure	Potential effect of (1 and 2) process delay (performance affected);	” description”
	Potential causes of failure	Causes for (1 and 2) grasping point not accurate; Causes for (2) gripper performance deterioration;	” description”
Future controls	controls detection	Detect (1 and 2) the operator detects failure;	” failureIf”
	Controls prevention	Prevent by (1 and 2) NA;	” description”
	Recommended action	(1 and 2) after # of attempts stop execution;	” onFailure”