Tecnológico de Monterrey

Guadalajara campus

Integrative_Activity_1

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Modeling of multi-agent systems with computers graphics

Group 301

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Context

Congratulations! You are the proud owner of 5 new robots and a warehouse full of boxes. The previous owner of the warehouse left it in complete disarray, so it is up to your robots to organize the boxes into something resembling order and turn it into a successful business.

Each robot is equipped with omnidirectional wheels (it can drive in all four directions), can pick up boxes in adjacent cells, carry them to another location, and build stacks of up to five boxes. All robots are equipped with sensors that allow them to distinguish whether an adjacent cell is free, a wall, contains a stack of boxes (and how many), or is occupied by another robot. They also have pressure sensors that indicate if they are carrying a box.

Your task is to teach your robots how to tidy up your warehouse. The organization of the agents is up to you, as long as all boxes end up in ordered stacks of five.

Introduction

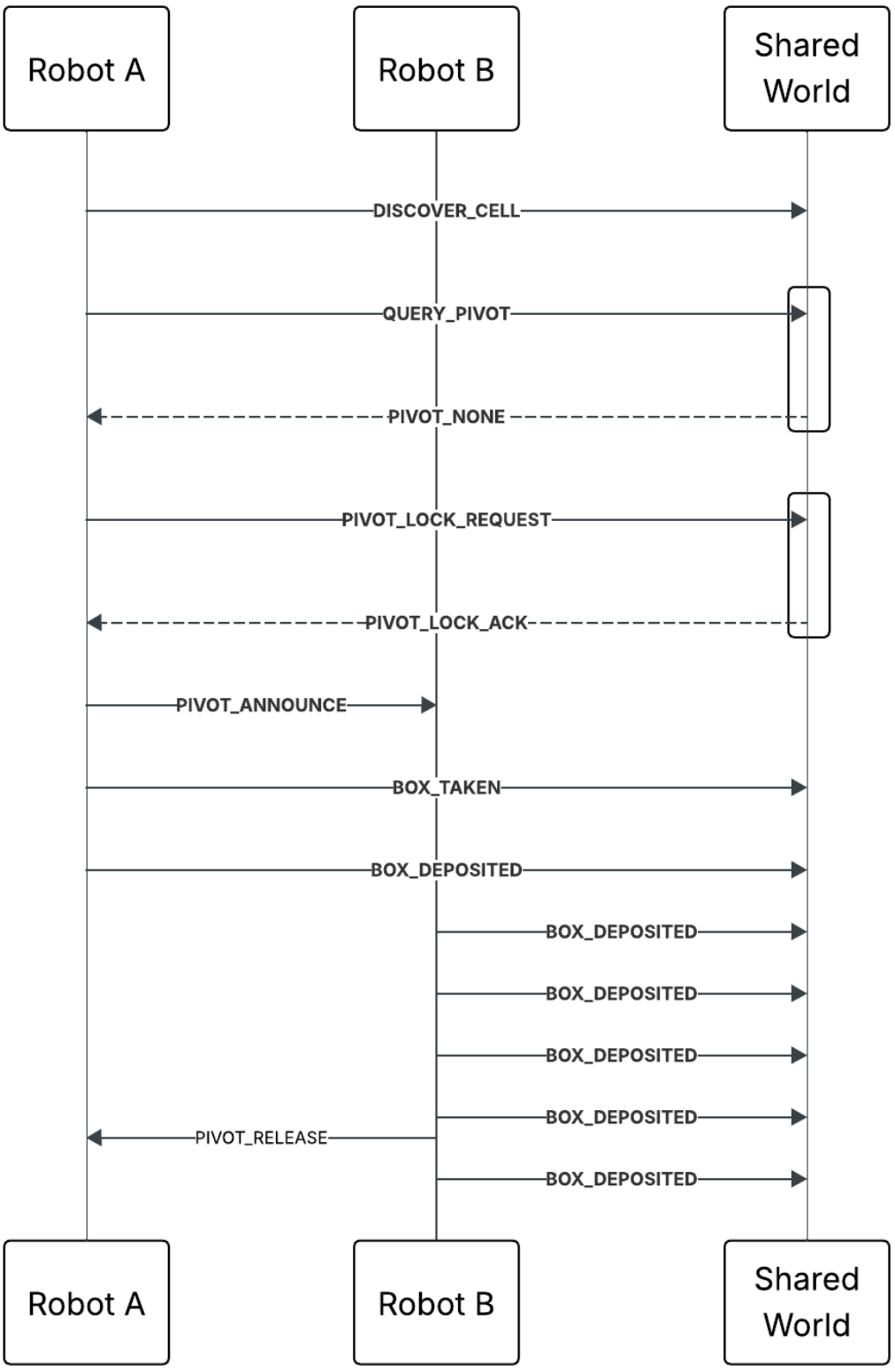
The challenge consists of multiple Agents capable of autonomously identifying tomatoes and finding them on our map. Each agent will navigate through an environment, detecting and avoiding obstacles while approaching tomatoes. The tomatoes are randomly growing randomly and once found the agents will pick up each tomato and place it in the corresponding box, coordinating their movements to prevent collisions, bottlenecks, and overlaps with obstacles placed in the map.

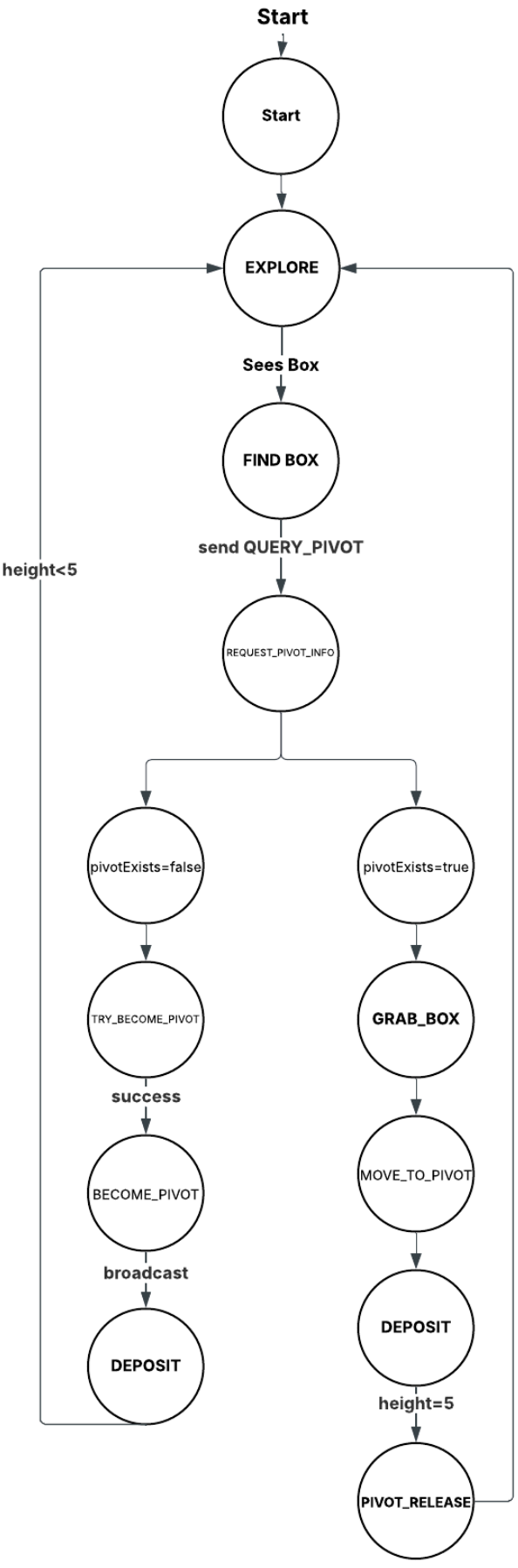
The simulation highlights how multiple agents can combine perception, decision-making, navigation, and collaboration to perform a sorting task efficiently in a dynamic, obstacle-filled scenario.

Diagrams

Class Diagram

Agent Protocol




Start
Start
EXPLORE
Sees Box
FIND BOX
send QUERY_PIVOT
height<5
REQUEST_PIVOT_INFO
pivotExists=false
pivotExists=true
TRY_BECOME_PIVOT
GRAB_BOX
success
BECOME_PIVOT
MOVE_TO_PIVOT
broadcast
DEPOSIT
DEPOSIT
height=5
PIVOT_RELEASE

Cooperative Strategy Diagram