

VLM Agentic Interface for Dobot Magician

Enter your command:

Pick up the blue block using suction. (Hint: the z is at -50)

Run

Capturing image...

Accessing webcam...

Image captured successfully!

Getting bounding boxes for workspace from image...

Workspace Bounding Box Agent:

[200,231,655,786]

Generating bounding boxes from image...

Bounding Boxes Agent:

- [202,261,319,323] (green)
- [202,321,318,392] (green)
- [181,610,360,756] (red)
- [325,437,540,571] (blue)

Spatial Analysis Agent:

Here's a description of the spatial relationships and relevant object properties for

Objects:

- * **Blue Block:** Approximately 40x40x40mm cube, oriented vertically (on a flat surface)
- * **Green Block:** Approximately 40x40x20mm rectangular prism, composed of two 20x20x20mm blocks
- * **Red Block:** Approximately 40x40x40mm cube, oriented vertically, similar in size to the blue block
- * **White Paper:** A flat rectangular sheet, serving as the workspace. It's larger than the workspace bounding box

* **Robot Arm:** Positioned above and slightly angled towards the objects. The end e

Spatial Relationships:

- * The blue block is centrally positioned on the paper, between the green and red blo
- * The green and red blocks are equidistant from the blue block and positioned symmet
- * The robot arm is positioned directly above the blue block, implying the robot can
- * The z coordinate is given as -50, suggesting a vertical offset from some reference

Additional Information for Planning:

- * **Surface:** The blocks are resting on a flat, presumably stable, wooden surface,
- * **Lighting:** The lighting appears adequate to allow for visual feedback and camer
- * **Suction Cup:** The robot arm utilizes a suction cup end effector. You need to c
- * **Gripper Orientation:** Plan the robot arm's orientation to ensure the suction cu

Planning Considerations:

- * **Approach Vector:** Plan the path of the robot's end effector to approach the top sur
- * **Suction Pressure:** Control the suction pressure to firmly grip the blue block witho
- * **Lift Height:** Determine a sufficient lift height that ensures clearance from the su
- * **Obstacle Avoidance:** Account for the frame of the camera setup during path planning

This information should be sufficient to start developing a motion plan for the robo

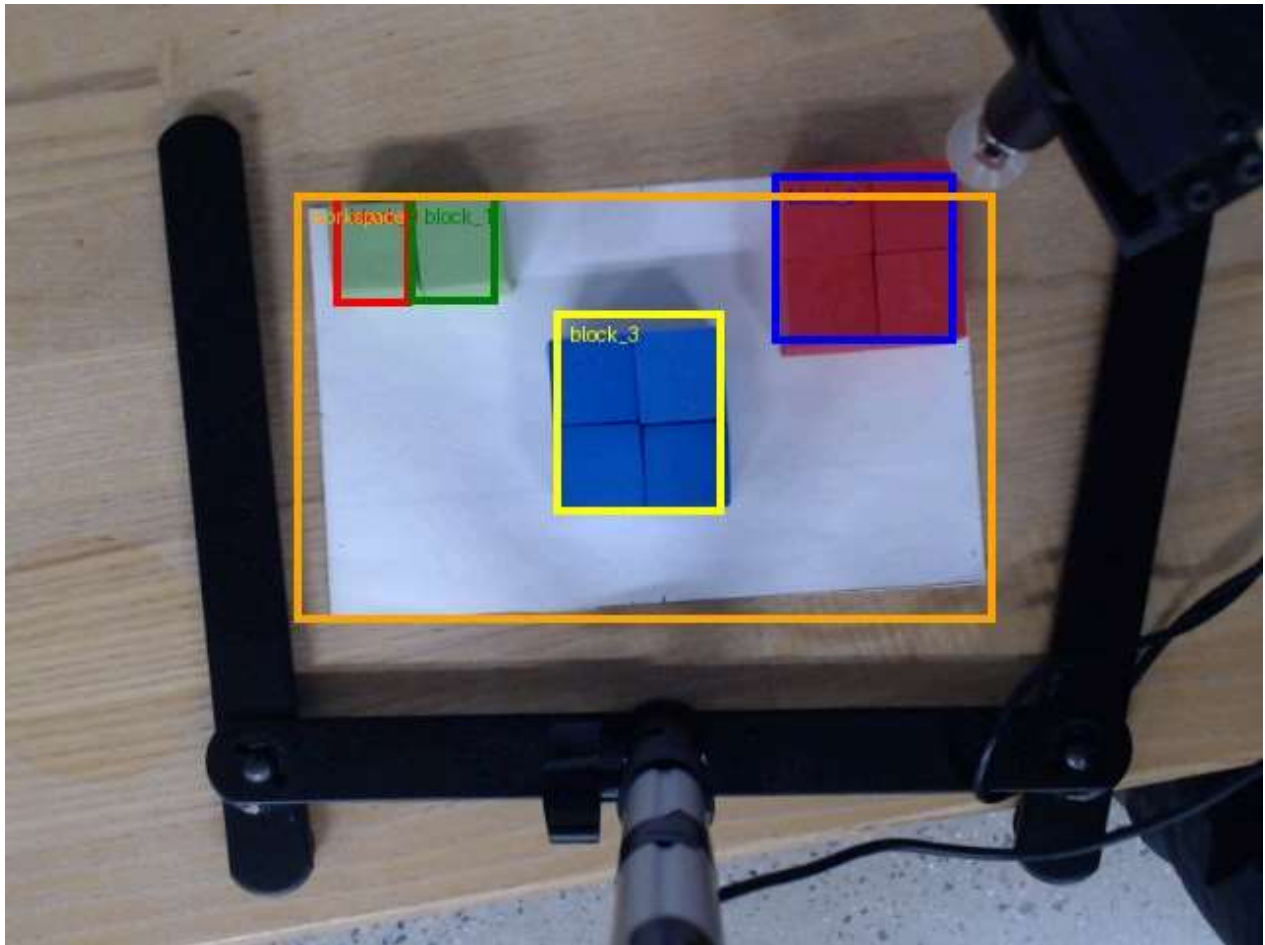


Image with Bounding Boxes

```
[231. 200.]
[786. 200.]
[231. 655.]
[786. 655.]]
```

```
{'block_0': [(299.5604395604396, 89.18918918918924), (299.5604395604396, 66.84684684
```

```
{'block_0': [89.18918918918924, 299.5604395604396, 66.84684684684687, 273.8461538461
```

```
{'block_0': {'coordinates': [89.18918918918924, 299.5604395604396, 66.84684684684687
```

Logic Steps Agent:

Dobot Magician Pick and Place: Blue Block with Suction

These steps assume the Dobot Magician's coordinate system is aligned with the provid

****Step 1: Calculate Approach Point****

```
* **Determine Center of Blue Block:** The bounding box for the blue block is [25.77,
* x_center = (272.53 + 225.27) / 2 = 248.9
```

```

    *  $y_{center} = (25.77 + (-22.52)) / 2 = 1.625$ 
* **Determine Approach Height:** The z-coordinate is given as -50. We need to appro
* **Approach Point:** The approach point (x_approach, y_approach, z_approach) will b

**Step 2: Move to Approach Point**

* Use Dobot's API (or its graphical interface) to move the robot arm to the calculat

**Step 3: Activate Suction**

* Activate the Dobot Magician's suction pump with appropriate pressure. The pressure

**Step 4: Descend to Grasp Point**

* Move the robot arm vertically downwards from the approach point to the top surface

**Step 5: Verify Suction and Lift**

* Pause briefly to verify that the suction cup has successfully gripped the blue blo
* Slowly lift the blue block vertically to a safe height above the other blocks. Fo

**Step 6: Move to Drop-off Location**

* Choose a drop-off location within the workspace. Let's assume (250, 50, -30). Th

**Step 7: Move to Drop-off Point**

* Move the robot arm to the chosen drop-off point (250, 50, -30). Move the arm hori

**Step 8: Release Suction**

* Deactivate the Dobot Magician's suction pump.

**Step 9: Retract Arm**

* Carefully retract the arm to a safe position away from the block, for example (250

**Important Considerations:**

* **Safety:** Always operate the Dobot Magician within its workspace limits and tak
* **Error Handling:** Implement error handling for potential issues such as insuffi

```

- * ****Fine-tuning:**** The approach and lift heights, as well as the suction pressure, must be fine-tuned.
- * ****Workspace Limits:**** Strictly adhere to the workspace limits (x: 200-300, y: -10 to 10, z: 0-100).

This detailed plan provides a structured approach to picking up the blue block. Remember to adjust the approach and lift heights, as well as the suction pressure, based on the specific environment and robot capabilities.

Coding Agent:

```
```python
import DobotDllType as dType

Connect to Dobot
api = dType.load()
state = dType.ConnectDobot(api, "", 115200)[0]
print("Dobot Connected...")

Set parameters (adjust as needed)
dType.SetHOMEParams(api, 200, 200, 200, 200)
dType.SetPTPJointParams(api, 200, 200, 200, 200, 200, 200, 200, 200)
dType.SetPTPCoordinateParams(api, 200, 200, 200, 200, 0)
dType.SetPTPJumpParams(api, 10, 200, 0) # Adjust jump height if necessary
dType.SetPTPCommonParams(api, 100, 100, 0)

Step 1: Approach Point Calculation (already done in problem description)
x_approach = 248.9
y_approach = 1.625
z_approach = -30

Step 2: Move to Approach Point
ptpMode = 2 # Linear mode
dType.SetPTPCmd(api, ptpMode, x_approach, y_approach, z_approach, 0, 0)
dType.dSleep(2000) # Wait for movement to complete

Step 3: Activate Suction
suction_cup = 1
enable_pump = 1
ctrl_mode = 1
dType.SetEndEffectorSuctionCup(api, suction_cup, enable_pump, ctrl_mode)
dType.dSleep(1000) # Wait for suction to engage

Step 4: Descend to Grasp Point
x_grasp = 248.9
```

```

y_grasp = 1.625
z_grasp = -50
dType.SetPTPCmd(api, ptpMode, x_grasp, y_grasp, z_grasp, 0, 0)
dType.dSleep(2000)

Step 5: Verify Suction and Lift
z_lift = -20
dType.SetPTPCmd(api, ptpMode, x_grasp, y_grasp, z_lift, 0, 0)
dType.dSleep(2000)

Step 6 & 7: Move to Drop-off Point
x_dropoff = 250
y_dropoff = 50
z_dropoff = -30
dType.SetPTPCmd(api, ptpMode, x_dropoff, y_dropoff, z_dropoff, 0, 0)
dType.dSleep(2000)

Step 8: Release Suction
enable_pump = 0
dType.SetEndEffectorSuctionCup(api, suction_cup, enable_pump, ctrl_mode)
dType.dSleep(1000)

Step 9: Retract Arm
z_retract = 0
dType.SetPTPCmd(api, ptpMode, x_dropoff, y_dropoff, z_retract, 0, 0)
dType.dSleep(2000)

Disconnect from Dobot
dType.DisconnectDobot(api)
print("Dobot Disconnected...")

...

```

Python code successfully written to demo-magician-python-64-master\DobotControl.py