

20-Item Quiz

Identification (10 items)

1. What formula does the coordinated robot swarm use to assign tasks?
2. Where are the optimal values stored in the coordinated robot swarm system?
3. What type of graph is used to map the warehouse?
4. What are the four variables used to define a node in the warehouse mapping system?
5. How does the warehouse system prevent head-on collisions between robots?
6. How do autonomous robots locate the nearest node when outside the warehouse?
7. What script is used to coordinate the robots by assigning tasks and locations?
8. Describe the role of the Robot.cs script.
9. How do proximity sensors work in the warehouse robot system?
10. What actions do robots prioritize when they detect another robot on their right?

Enumeration (10 items)

11. List the states a robot goes through from "NotReady" to "Unloading."
12. Enumerate the movement controls used to navigate the camera in the simulation environment.
13. Enumerate the key components managed by the Warehouse_orders.cs script.
14. List the steps involved in adding a new node to the warehouse system.
15. Enumerate the functionalities provided by the Robot_actuator.cs script.
16. List the features simulated by the RobotWheel.cs script.
17. Enumerate the steps a robot takes when picking up an order.
18. List the scripts involved in the warehouse robot system's navigation and task assignment.
19. Enumerate the factors considered by the Warehouse_orders.cs script when selecting a robot for a task.
20. List the actions taken by the robots when they reach their maximum box load capacity.

5-10 Item Multiple Choice Quiz

1. What are the four variables used to define a node in the warehouse mapping system?
 - A) Two strings and two booleans
 - B) Two integers and two booleans
 - C) Two floats and two strings
 - D) Two doubles and two booleans
2. How do proximity sensors work in the warehouse robot system?
 - A) Using GPS signals
 - B) Using ultrasonic sensors
 - C) Using triggers and box colliders
 - D) Using infrared sensors
3. What script is used to coordinate the robots by assigning tasks and locations?

- A) Warehouse_orders.cs
 - B) Robot.cs
 - C) Warehouse_node.cs
 - D) OptimalRoute.cs
4. How do robots calculate the angle between their direction and the target location?
- A) Using a compass
 - B) Using a gyroscope
 - C) By rotating as needed to head directly toward the destination
 - D) By following a pre-defined path
5. What is the purpose of the warehouse.cs script?
- A) To manage the shelf information
 - B) To initialize all nodes and robots in the scene
 - C) To calculate the optimal route between nodes
 - D) To simulate the pneumatic actuator

Objective Evaluate the understanding of the warehouse robot system, focusing on the coordination, navigation, and task assignment of robots.

Task

1. Short Essay (250-300 words)
 - Explain the overall architecture of the warehouse robot system.
 - Describe how the coordinated robot swarm operates to optimize efficiency.
2. Flowchart
 - Design a flowchart that shows the states a robot goes through from "NotReady" to "Unloading."
3. Scenario-Based Question
 - Given a scenario where a new node is added to the warehouse, describe how the scripts would handle this addition and ensure seamless integration.

Answer key:

Answer Key for 20-Item Quiz

Identification (10 items)

1. A formula to assign tasks based on minimal distance.

2. PlayerPrefs.
3. Directed graph.
4. Two integers and two booleans.
5. By ensuring nodes maintain a single direction of circulation.
6. Automatically locate and move to the nearest node.
7. Warehouse_orders.cs.
8. Manages all basic behaviors of robots autonomously, including moving to nodes, following paths, and rotating towards target locations.
9. Using triggers and box colliders.
10. Give priority to the robot detected on their right.

Enumeration (10 items)

11. NotReady, Available, OnWayToPick, PickingUp, OnWayToDrop, PrepareUnloading, RampGoingDown, Unloading, RampGoingUp.
12. W (forward), A (left), D (right), S (backward), Space (up), LShift (down).
13. Task assignments, metrics calculation, selecting robots for tasks, changing robot statuses.
14. Modify the integers and booleans for the new node, adjust the Unity Inspector settings, ensure the optimal route calculation script considers new connections and directions.
15. Emulates pneumatic actuator functionality, uses triggers and box colliders, enables the robot to pick up and drop boxes.
16. Simulates servo-motor and wheel movement, receives speed parameters, stops wheels when the robot is stationary.
17. Transition to OnWayToPick, move to the node, switch to PickingUp, use the robotic arm to pick up the order.
18. Warehouse_orders.cs, Robot.cs, Warehouse_node.cs, OptimalRoute.cs.
19. Distance to the order, number of orders processed, robot capacity, weights determined by Warehouse_training.cs.
20. Change to OnWayToDrop, head to the unloading zone, unload boxes, return to Available state.

Answer Key for 5-10 Item Multiple Choice Quiz

1. B) Two integers and two booleans
2. C) Using triggers and box colliders
3. A) Warehouse_orders.cs

4. C) By rotating as needed to head directly toward the destination
5. B) To initialize all nodes and robots in the scene