ROS Forklift simulation manual

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Contents

1 Main Menu

Screenshot of the main menu.

Most of the menu elements are self-explanatory, except the "Name" part in the middle. That's where you can set the username, which will be used to store the achieved score. All the scores are stored locally on the running computer.

2 Settings Menu

Screenshot of the settings menu.

There are a lot of settings that are dependent on each other. The complete list of settings and their dependencies are as follows:

- Seed - The seed used to generate everything in the level. Has no dependencies.
- Job type - They are as follows:
  - Fetch - A certain number of boxes will be prompted on the top right of the screen, and the player has to put them in the mixed (white) zones. Dependent on:
    - Completion requirement - The amount in percentages (%) required to complete the level. Affects the difficulty multiplier.
    - Zone sizes - The fetchable boxes have to be able to fit within the mixed zones, and this behavior must be set by using the correct zone sizes.
  - Sort - All the available boxes on the mixed shelves will be prompted on the top right of the screen, and the player has to put them in their respective zones. (By color.) Dependent on:
    - Completion requirement - Does not affect the amount of boxes required, so it defaults to 100.
    - Zone sizes - The mixed amount of boxes must be able to fit within their respective zones and this behavior must be set by using correct zone sizes.

- Completion requirement - Only used in fetch mode. The required (%) amount of boxes to complete the level. Has no dependencies.
- Time limit - Pretty self-explanatory, sets the time limit at which the level ends. Affects the difficulty multiplier, but it has no dependencies.
- Warehouse size - Sets the size of the warehouse in meters. The size on both axes must be a multiple of four to generate properly. Has no dependencies.
- Shelf count - Sets the number of shelves in the warehouse. The first number sets how many shelves are there in a row, and the second one sets the number of rows. The rows are the number of empty zones available, which will be split up by the zone size setting. It has no dependencies.
- Shelf distances - A shown info about the Shelf-Shelf distances and the Shelf-Wall distances used. The distances are used to check if your other settings are set up correctly. If one of the values is less than the size of the forklift, or in an even worse case they're less than zero, then the warehouse will be incorrectly generated. It is recommended to keep both values at around 8 meters. Its dependencies are:
  - Warehouse size
  - Shelf count
- Box types - The different box types that are being generated can be set from here. The toggle in front sets whether or not to generate said box, and the amount after it sets how likely it will be to generate, where 1.0 means it will always generate when it has the chance to, and 0.0 means it won't spawn at all. It's dependent on:
  - Zone sizes - The boxes require a zone in fetch mode to be generated, while they also require their zones in sort mode to have a valid place to fit them in.
- Zone sizes - The different zones take up rows within the generated shelves. The sum of the zone sizes has to be equal to the number of rows (Shelf count 2nd setting). Also be aware of the fact, that when using fetch mode, the fetched boxes have to fit within the mixed zone, and in sort mode, all the boxes need to have enough space to be sorted out. It's dependent on:
  - Box types - Don't generate zones, that are disabled within these settings, because they'll be pointless.
- Templates - Base templates included, that are mostly correctly set up. Recommended to use these.

3 Start Menu

Screenshot of the start menu.

The start menu does not have many functionalities, but they're as follows:

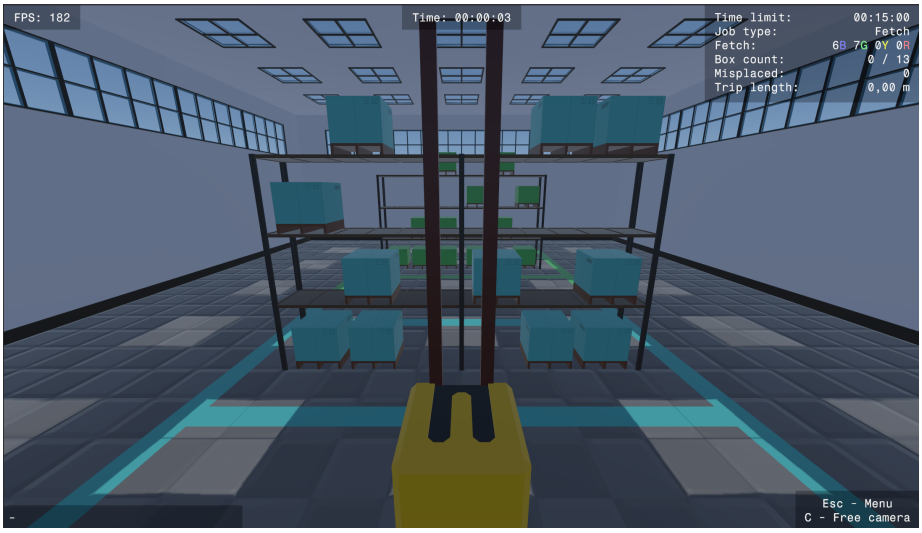
- Manual Control - Whether you want to use regular WASD controls to control the forklift or the ROS connections.
- ROS IP/Port - The address at which the program can access the ROS server if the forklift is chosen to be controlled with that.

4 Manual Controls

The manual controls are as follows:

- W/S - Controls the main motor speed to move forwards/backward.
- A/D - Controls the rotation that is achieved by using the motors on the two sides at different rpm.
- Q/E - Controls the fork's motor to be lifted or lowered.
- ESC - Goes back to the main menu.
- C - Switches the locked camera to a third person freely rotating camera, and back.

5 Game Screen

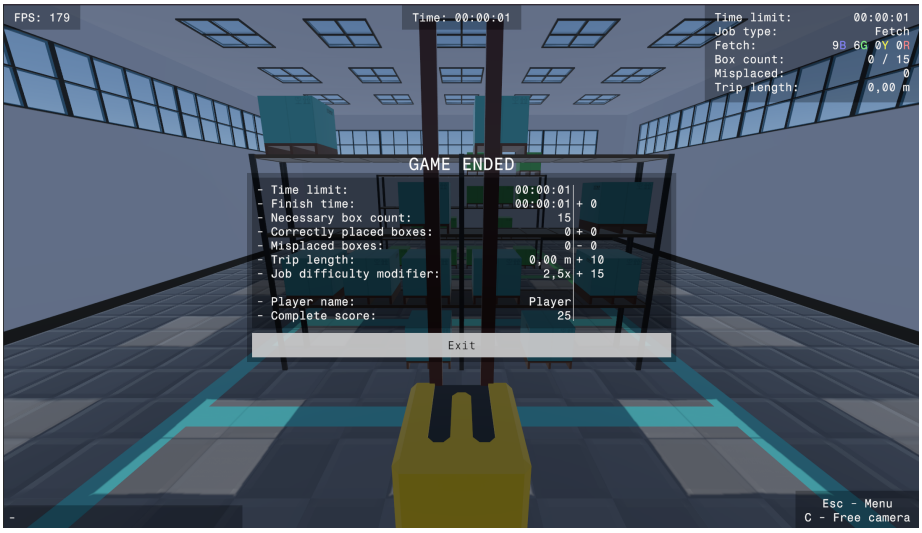


Screenshot of the game screen.

The game screen consists of multiple smaller elements. They're as follows:

- Top left: The frames per second produced by the game, necessary to check the performance.
- Top middle: The timer. When it hits the time limit, the level ends.
- Bottom left: Additional messages are displayed here. Currently a placeholder.
- Bottom right: Some of the controls are displayed here.
- Top right: Most of the important statistics are displayed here.
  - Time limit
  - Job type
  - Fetch/Sort - The number of boxes that are needed to be moved.
  - Box count - The number of boxes placed correctly out of all the necessary boxes.
  - Misplaced - This shows the number of boxes that have been placed in an incorrect zone.
  - Trip length - The length of the trip done by the forklift.

6 End Screen



Screenshot of the end screen.

This screen shows the information used to calculate the score, and the final score itself.

7 Technical Documentation

ROS Channels

The ROS publishers:

- "unityToRosTransform" - The position and rotation of the forklift within the space.
- "unityToRosForkHeight" - The position of the fork.

The ROS listeners:

- "rosToUnityMotorSpeed" - The motor speed used while moving forwards and backward. [-1.0 / 1.0]
- "rosToUnityRotationSpeed" - The difference between the left and the right side used to rotate the forklift. [-1.0 / 1.0]
- "rosToUnityForkSpeed" - The fork's movement speed. [-1.0 / 1.0]