Test Protocol/Report for the Environmental Model Integration Test

Test Case ID: TC_Int002

Comment: The integration test is designed to verify the interaction between the environmental model component, the LiDAR, and camera sensors, as well as the object detection component.

Test Result: Pass

Test Result Comment: The integration test is passed and the distance of the detected objects are visualized as labels on the annotated image.

Test Steps:

1. **Test Step 1:**
   - Provide recorded camera and LiDAR input to the components that contain various street-relevant objects (e.g., vehicles, pedestrians, shopping carts) at different distances and locations within the ego vehicle's path.
   - **Expected Result 1a:** The object detection component sends an object list with the detected objects to the environmental model component, including object ID, class, and confidence score.
   - **Expected Result 1b:** The environmental model component updates the environment model consistently according to the input received from the object detection component and measures the distance of detected objects accurately, publishing an annotated image with bounding boxes, class labels, and distances.

**Test Report:**

Test Environment:

- **Hardware:**
  - Autonomous vehicle model equipped with RealSense camera and 2D LiDAR
  - Model city setup with various objects (vehicles, pedestrians, shopping carts)

- **Software:**
  - ROS2 Foxy
 - Detectnet node with the newly trained model

Test Procedure:

1. The environmental model component was initialized and set up to receive input from the LiDAR and camera sensors.
2. The object detection component was started, and it began processing the camera input to detect objects.
3. The environmental model component received the Detection2DArray messages from the object detection component and the LiDAR scan data.
4. The environmental model component fused the data from the camera and the LiDAR to measure the distance of the detected objects from the ego vehicle.
5. The annotated images with bounding boxes, class labels, and distances were published by the environmental model component.

Test Results:
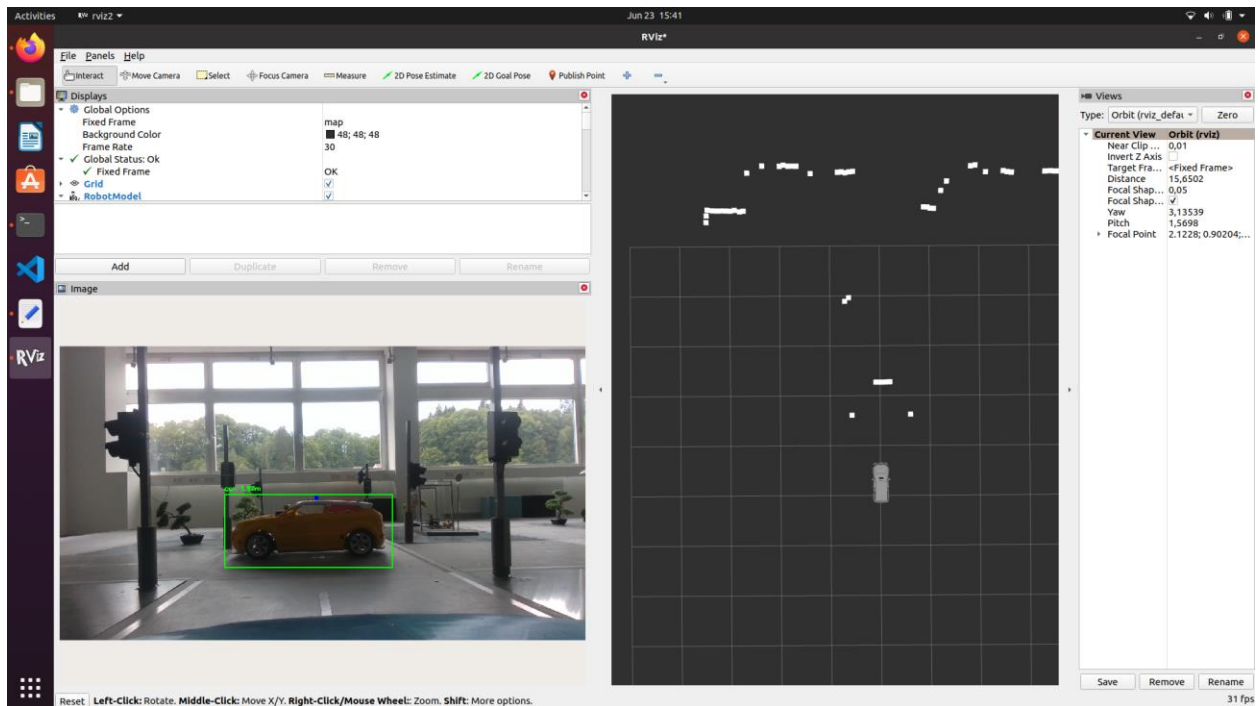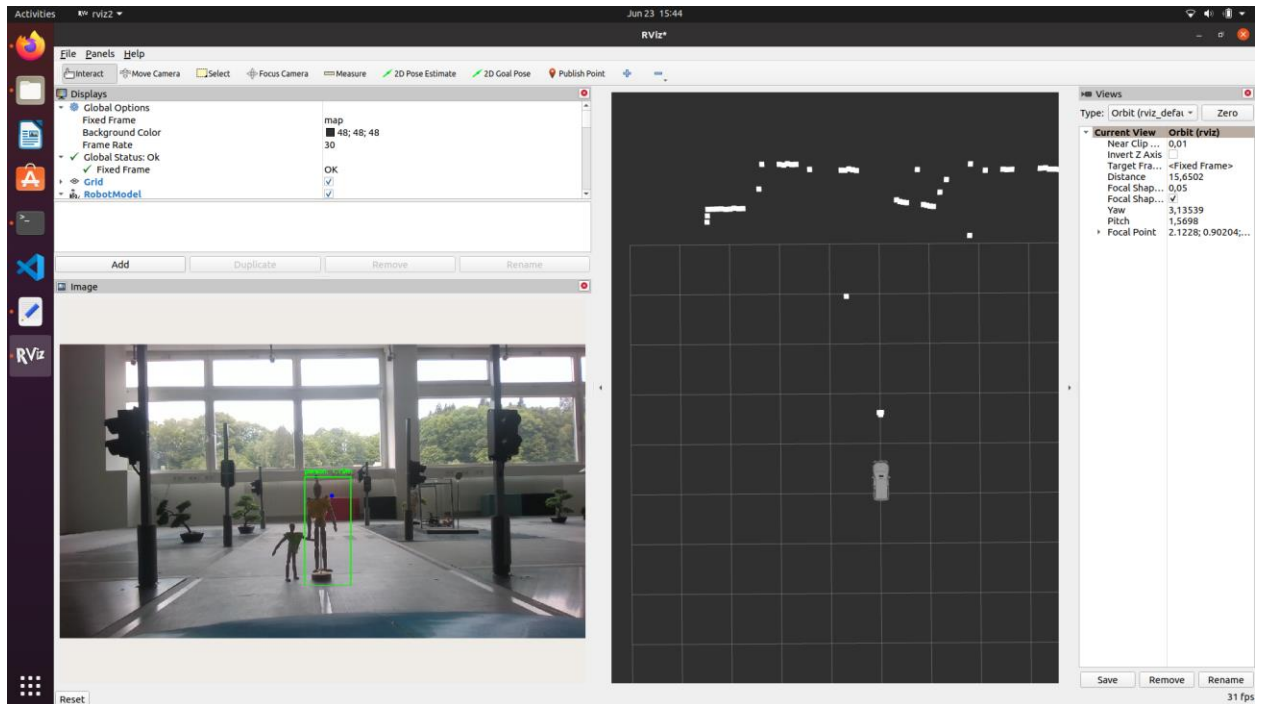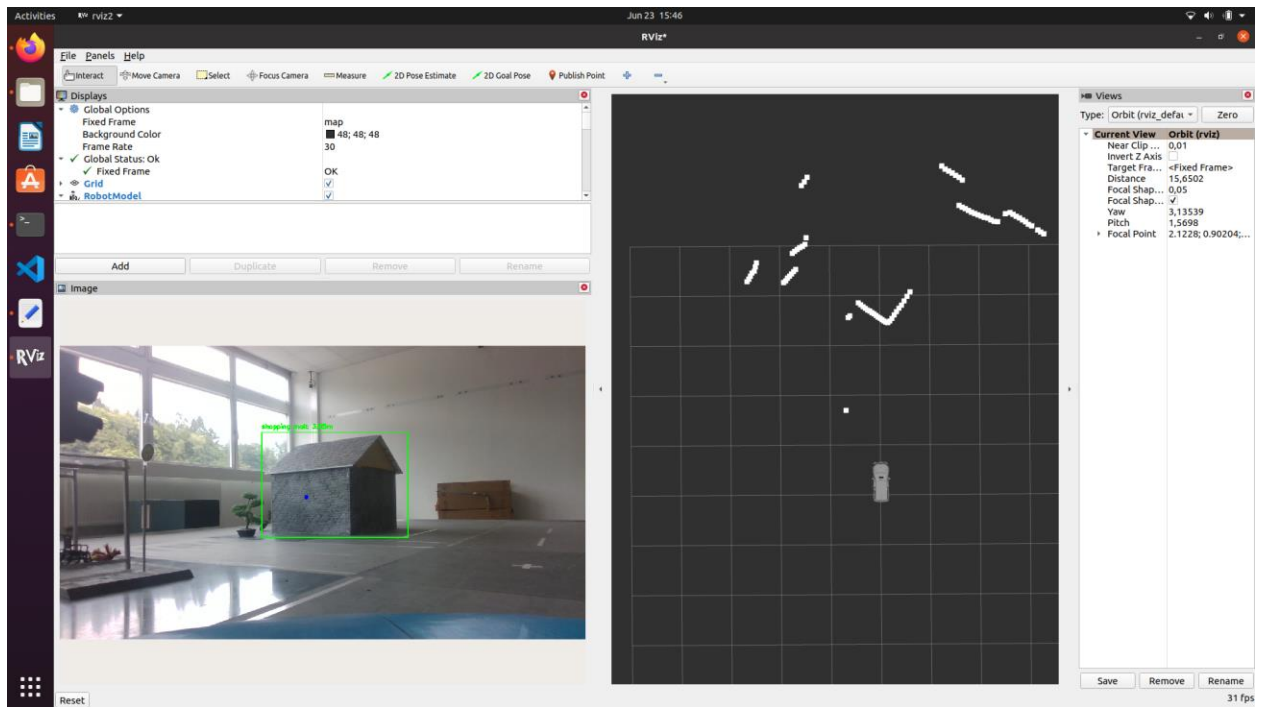
- The object detection component successfully detected and classified the street-relevant objects in the camera input and sent the Detection2DArray messages to the environmental model component.

- The environmental model component accurately measured the distances of the detected objects and published annotated images with bounding boxes, class labels, and distances.
- The annotated images were verified to ensure the distances were accurately labeled and matched the actual distances of the objects in the test environment.

Conclusion: The integration test for the environmental model component passed successfully. The component accurately measured the distances of the detected objects and published the annotated images as expected.