Progress Report: Using ROS2-CARLA Bridge to Integrate LiDAR into CARLA

Author: Ruifeng Zhang | **Unity ID:** rzhang38

1. Progress Report

1. Literature Review and Initial Setup

- Conducted review of ROS2-CARLA bridge documentation and related research papers.
- Successfully set up ROS2 environment on my local PC.

2. Basic Pipeline Development

- Implemented a ROS2 node and built a basic ROS2-CARLA communication pipeline for LiDAR data.
- Tested the latency and throughput of the ROS2-CARLA bridge under different configurations.

3. Open Problems

1. Real-Time Data Streaming Efficiency

- Tests showed inconsistent latency in LiDAR data streaming. Some times the connection seems unstable.
- **Solution:**
  - Break down the latency in order to find the cause.
  - Learn and experiment with more configurations.

2. Loading Data from LiDAR Device

- Utilizing LiDAR data within ROS2 is to be done.
- **Solution:**
  - Integrate LiDAR device with **ROS2**.

3. Machine Learning Model Integration

- The next step involves integrating ML models (e.g., YOLO for object detection) into ROS2 for real-time LiDAR processing. The main challenge is maintaining low latency.
- **Solution:**

    - Implement the machine learning models, improve efficiency if needed.

4. Plans

- **March**: Integrate LiDAR into ROS2 and implement the machine learning models (2 weeks), then feed the data back to Carla with the pipeline (2 weeks).
- **April**: Use the LiDAR data to replace Carla's virtual LiDAR functions(2 weeks). Optimize the efficiency and robustness of the system(1 week).