Title: Report on Reinforcement Learning Work for Autonomous Car in Carla Simulator

**Executive Summary:**

This report outlines our efforts in developing an efficient reinforcement learning (RL) model for autonomous cars within the Carla simulator. The primary aim was to create a model capable of navigating the simulated environment effectively using inputs such as cameras, Lidar, and GPS. The selected RL algorithm for this task was Proximal Policy Optimization (PPO), chosen for its demonstrated performance in similar domains and its suitability for managing continuous action spaces.

**1. Approach**:- Our approach comprised the following steps:

Step 1: Literature Survey

Step 2: Find Code for Paper

Step 3: Test Base Code in Carla Simulator

Step 4: Evaluate Pretrained Weights in Carla Simulator

Step 5: Initiate Training if Pretrained Weights Prove Effective

Notably, the training time was emphasized to be efficient.

**2. Basis for Selecting PPO:**

The choice of PPO was grounded in its proven success in comparable domains and its effective handling of continuous action spaces. Initial testing results further supported its suitability for our autonomous car model.

**3. Results on Pretrained Weights:**

Evaluation of the model on pretrained weights revealed the following:

1. The car moved properly within the Carla environment.
2. An issue arose at intersections, leading to premature termination of the car's run.

**4. Intersection Problem:**

The "intersection problem" was identified as a challenge, referring to the difficulty of learning optimal policies when multiple agents interact. Extensive debugging efforts were undertaken to address the termination issue at intersections, resolving the problem and ensuring proper car movement.

**5. Training Results:**

Initial training results were promising, but challenges emerged after 500 episodes. Issues included diminishing rewards and core dumps. Attempts to resolve these problems by updating the Carla version to 9.10 provided temporary relief, but the learning process slowed down significantly, leading to a decision to abandon the model.

**6. Reason for Model Rejection:**

The model was rejected due to its failure to train properly in our system. Despite initial successes, persistent issues and diminishing performance led to the conclusion that the model was not suitable for our specific requirements.

**Conclusion:**

This report provides a comprehensive overview of our RL work for autonomous cars in the Carla simulator, emphasizing the challenges faced, steps taken, and the decision to reject the initial model. The findings underscore the complexity of RL model development and the need for adaptability in addressing unforeseen challenges. Future endeavors will involve exploring alternative RL algorithms and refining the training process to achieve optimal results.