PROJECT PROPOSAL

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1. **Title of the project:** Virtual self-driving car using reinforcement learning (Moway)

2. **Overview of the Project:**

   The project is about designing and developing a virtual self-driving car using reinforcement learning to mimic the behavior when it is running with a set of another self-driving car or human cars. This can be used to observe the impact that the self-driving car can have on damping the traffic bottlenecks caused by manned vehicles. This framework can be simulatable in a different traffic situation and different phenomena.

3. **Objectives of the Project**

   The objective of the project is

   - The main objective of this project is to design and implement a virtual car in a virtual environment.
   - This framework can be simulatable in different traffic situation and phenomena.
   - Learning from the input in the designed virtual environment and drive autonomously.
   - This is able to detect the obstacles (2D environment pixels) in the pathway of the virtual environment and travel throw the path safely.

4. **The Need for the Project**

   There is more type of autonomous vehicles in this new technology. But there are only a few simulating frameworks to test those autonomous vehicles and lack of tools to simulate different traffic phenomena in the presence of autonomous cars.

5. **Scope of the Project**

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6. **Deliverables**

   The deliverable of the project will be a computer-based software system which acts as a 2D GUI framework platform which can be simulatable in a different traffic situation and different phenomena.

7. **Overview of Existing Systems and Technology**

   There are many kinds of self-driven virtual and real car available. They use a Q-learning, neural networks, Pygame and also reinforcement learning.

   - Flow: Architecture and Benchmarking for Reinforcement Learning in Traffic Control

Flow is a new computational framework, built to support a key need triggered by the rapid growth of autonomy in ground traffic: controllers for autonomous vehicles in the presence of complex nonlinear dynamics in traffic. Leveraging recent advances in deep Reinforcement Learning (RL), Flow enables the use of RL methods such as policy gradient for traffic control and enables benchmarking the performance of classical (including hand-designed) controllers with learned policies (control laws). Flow integrates traffic micro simulator SUMO with deep reinforcement learning library rllab and enables the easy design of traffic tasks, including different networks configurations and vehicle dynamics.

8. **References**

[1] PAN, X., YOU, Y., WANG, Z. AND LU, C.
Virtual to Real Reinforcement Learning for Autonomous Driving
In-text: (Pan et al., 2019)

[2] Journal STILGOE, J.
Machine learning, social learning and the governance of self-driving cars
In-text: (Stilgoe, 2017)

[3]WU, C., KREIDIEH, A., PARVATE, K., VINITSKY, E. AND BAYEN, A. M.
Flow: Architecture and Benchmarking for Reinforcement Learning in Traffic Control
In-text: (Wu et al., 2019)