Introduction

Objectives & Motivations
- The general goal is to develop a framework for integrating the VISSIM simulator with a robot vehicle platform for synchronizing virtual and real vehicles and exploring effects and applications involving inter-vehicle communication.
- To provide a repeatable testbed environment for evaluating the reliability of hardware controllers in multiple simulated traffic scenarios, reducing development cost and time, testing a new novel approach of a managed motorway system.

State of the Art
- Most research conducted in individual or integrated traffic simulators, have not coupled the simulators with a robot platform.
- A large number of real robot vehicles needed to make up different traffic scenarios for evaluating vehicle flow or motorway without help of simulation world.

Software Architecture

Technology platform
- PTV VISSIM - a microscopic traffic flow simulator for evaluating multi scenarios and new driving logic algorithms.
- RobuBOX - generic hardware and software modules based on Microsoft Robotics Studio framework for developing industrial service robots.
- RobuCAB - one mobile vehicle composed of 4 wheel -drive electric chassis with on-board PC.

Overview of the project design

Prototype Implementation

- Implement VISSIM simulated vehicles with robuCAB module real-time wireless communication.
- Build same motorway prototype in VISSIM and robuBOX simulated environment separately.
- Drive robuCAB module by keyboard controller for passing real-time position to VISSIM. Meanwhile, the camera from the robot platform will show neighbour vehicle information from VISSIM.
- Synchronize VISSIM simulated vehicles with robuCAB module, compare position record and evaluate inaccuracies.

Evaluation Result

Environment parameters
- Robot max speed :5 m/s
- 3-lane road length :300 m, Each lane width :5 m
- Transportation frequency :0.1s
- Total time :1 minute

Result Analysis
- Inaccuracy increases if robot steering angle too often.
- Inaccuracy bigger if more stopping.

Further Information

- Future Work
  - Evaluate it in more complex simulated traffic network
  - Deploy it in real robuCAB hardware

Contact Information
- Email: liy1@tcd.ie