Objective

There are many scenarios where teleoperating mobile robots are desired. In this project, we will develop a teleoperation interface to remotely control a mobile robot in human outdoor environments. This interface will be semi-autonomous: the user will input the motions, however the robot would prevent collisions and avoid obstacles if needed. The robot will detect people/obstacles/roads and virtual replicas will be shown in the VR headset, superimposed on the raw sensor readings (Velodyne and cameras).

Project Details

This hardware that will be used for this project includes a mobile robot platform (Clearpath jackal), a VR headset (HP Reverb 2) and potentially a steering wheel designed for sim racing.

The project will have 4 milestones:

1) VR to Robot: Interfacing the VR headset and the steering wheel with the Robot Operating System (ROS) for direct teleoperation (non-assisted)
2) Robot to VR: Detecting objects/people/drivable areas using on-board sensing, and visualising them in VR.
3) Development of the assisted teleoperation by employing well-established collision avoidance algorithms
4) Conduct user studies to evaluate the effectiveness of the developed approach - and compare it with the baseline (teleoperation using a standard keyboard interface).

Prerequisites

- Strong programming skills in Python and/or C++
- Experience with Robot Operating System (ROS)