Objective
- Develop robust software on a modular platform to run on an embedded real-time system
- Display metrics like telemetry on a web interface
- Implement adaptability mechanisms through wall-following and obstacle avoidance algorithms
- Utilize information from multiple onboard sensors for on-the-fly decision making

Background
- Given that human error can be considered a major factor in most vehicular accidents, the use of autonomous vehicles stands to improve the safety of transportation.
- The preceding project relied on turn-by-turn directions to navigate without adapting to track conditions or obstacles.

Components
- Hokuyo UST-10LX LIDAR
- ZED 3D Camera
- BNO055 Inertial Measurement Unit
- Ubiquiti picostation Wireless Access Point
- Nvidia Jetson TK1 running Robot Operating System on Ubuntu Linux
- Traxxas 1/10th scale RC car

Software
- The car will align itself parallel to the walls on its sides and increase its speed when no obstacle is present.
- When an obstacle is detected, collision avoidance mode selects a turning direction by segmenting the Lidar view into regions that pass obstacle.
- The algorithm then selects the mid-point in the region with the largest area.

Operation Overview
- Maneuver around imminent obstacle
- Slow Obstacle seen ahead
- Cruising speed No obstacle ahead

Sample telemetry on web interface