

Audibot Adaptive Cruise Control

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To demonstrate a sufficient understanding of the knowledge acquired with regards to autonomous vehicle navigation systems, a simulation of audibot adaptive cruise control will be developed. The first objective, level 1, will require that the team have an understanding of state space modeling, Ackermann drive, as well as how to subscribe and publish the required topics for driving the Audibot. This means that the team will have to learn and utilize the audibot_path_following package. With control of the vehicles, the team can then use GPS, LIDAR, camera, or a combination to prevent the vehicles from crashing into one another. For GPS, the vehicle's individual positions can be extracted from NavSatFix to determine distance. Careful consideration will be used with regards to the conversion of Geodetic coordinates to UTM coordinates. The team then can move to level 2 to implement LIDAR. For a sensor such as LIDAR, the input information in distance and angle from sensor_msgs/LaserScan would be used to determine the distance of the car in front. The team will likely have to extract the LIDAR return points of the lead car from the ground plane using a height filter and approximate lead vehicle distance from the closest points. Then, for a level 3 redundancy, a camera can be utilized. It's information will be processed using basic geometry in reference to other objects. The information provided in each of these cases will be used to throttle speed or apply brakes using /audibot/cmd_vel or a combination of /audibot/throttle_cmd and /audibot/brake_cmd.