

Traffic Jam Assist

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Motivation

Software-based electronic control systems are increasingly being used in the automotive industry to provide convenience and safety features to vehicle drivers and passengers, with increasing levels of automation and control authority. A growing trend is to assist the driver in maintaining safe control over the motion of the vehicle in a variety of circumstances including, but not limited to, congested traffic conditions, adverse weather and road conditions, varying states of health of vehicle equipment, and varying skill levels of drivers. Previously such assist has been provided in the form of information or warnings to the driver, but increasingly such assist will be provided by actively manipulating actuators that control vehicle longitudinal acceleration and deceleration, lateral direction, and vertical displacement. The long term trend is towards partial or even fully autonomous operation of a single vehicle, or even of groups of vehicles.

Traffic Jam Assist Description

Traffic Jam Assist is based on the Adaptive Cruise Control(ACC) system common to most modern vehicles. Basic Cruise control simply maintains a constant speed. While it will adjust to uphill and downhill conditions, it depends on the driver to determine if you are getting too close to the vehicle in front and adjust the speed or even disengage. ACC uses a forward looking radar to identify a target vehicle and determine the closing rate to that target. Ideally the closing rate should be zero. It can be positive in that the closing distance is growing and no action is needed. If negative then you are getting too close to the target and need to slow down and maintain a set distance. Typically the drive has 3 selections for the distance. In addition if a forward looking camera is available you can add lane following which keeps you in the middle of the lane you are in. If you try to change lanes without signaling it will resist your attempt. Not to the point of not allowing it, but it will be annoying.

To this we wish to add, only on particular limited access highways, the ability to adjust to traffic flow by stopping behind the target vehicle in the case of slow and stopped traffic. If the target vehicle then starts back up the vehicle you are in will also start up, following at the set distance and controlling the closing rate. Your set speed has not changed and should you change lanes your vehicle will resume the set speed assuming there are no other target vehicles.