Edition Controller Design of Automated Driving Bus

Partner: Advanced Smart Mobility Co., Ltd. and Aichi Steel Corporation

Introduction
There are high expectations for the development of automated buses and driverless bus operation in developed countries because of the aging population and the gradual shortage of transportation. Since only onboard sensors are not enough for measuring precise position of the vehicle, infrastructures such as magnetic markers are expected to correct it. However, comparison between infrastructures and sensors, and the appropriate interval of markers have not been stated explicitly.

Localization
Extended Kalman filter with GMPS has large potential for increasing interval of magnetic markers, which is currently set as 2m for safety operation.

Steering control
The transfer lag from the steering wheel input to the front wheel angle is measured and modelled as the second-order system. A novel six-state feedback control with gain scheduling is proposed to obtain the optimal damping.

Pilot tests
Automated driving bus has travelled over 10,000 km successfully within suburban/urban environments in Japan. The standard deviation of lateral error in precision docking using GMPS or LiDAR was under 1.25 cm, which is the criterion required for the precision docking. Experimental results also show GMPS is much robust since it provides high accuracy even in severe conditions.

Publications