

Efficient Hub Platooning Management Considering the Uncertainty of Information

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Abstract

Cooperative platooning between multiple companies can lead to improved efficiency by increasing the opportunities for forming a better platoon. A platoon service provider (PSP) is an entity that facilitates and manages the formation and operation of vehicle platoons from the same or different companies, and the hubs distributed throughout the highway network can act as PSPs. Vehicle-to-everything (V2X) communication enables the exchange of information between vehicles and various entities including road infrastructures and so on. Specifically, vehicle-to-hub (V2H) communication allows motorway hubs to collect information on incoming vehicles. V2H can consider both vehicles scheduled to arrive at a hub and those currently staying at the hub, allowing PSPs to coordinate better platoons and maximize energy savings. This study aims to design an optimal system of platoon coordination service for vehicles from multiple companies visiting the motorway hub considering V2H communication. The hub collects information such as maximum waiting time, expected arrival time, and vehicle type about incoming vehicles within the data exchange point in advance. The data exchange point refers to the extent to which the hub can collect information about incoming vehicles. The wider the data exchange point, the more information the hub can collect about more vehicles incoming to the hub. In this study, the effect of changing the data exchange point on efficient platoon management is compared and analyzed. The results proved that the earlier the information is provided, the more efficient platooning schedule is derived.

Keywords

Hub platooning, Cooperation, Heterogeneous vehicles, Uncertain information, Profit sharing

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Biographies

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Young Dae Ko received the B.S. degree in industrial engineering and the Ph.D. degree in industrial and systems engineering from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, in 2004 and

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