

A Flexible Real-Time Eco-Drive Strategy for Electric Minibus

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Abstract : Sustainable mobility has become one of the major issues of recent years. The challenge in reducing polluting emissions as much as possible has led to the production and diffusion of vehicles with internal combustion engines that are less polluting and to the adoption of green energy vectors, such as vehicles powered by natural gas or LPG and, more recently, with hybrid and electric ones. While on the one hand, the spread of electric vehicles for private use is becoming a reality, albeit rather slowly, not the same is happening for vehicles used for public transport, especially those that operate in the congested areas of the cities. Even if the first electric buses are increasingly being offered on the market, it remains central to the problem of autonomy for battery fed vehicles with high daily routes and little time available for recharging. In fact, at present, solid-state batteries are still too large in size, heavy, and unable to guarantee the required autonomy. Therefore, in order to maximize the energy management on the vehicle, the optimization of driving profiles offer a faster and cheaper contribution to improve vehicle autonomy. In this paper, following the authors' precedent works on electric vehicles in public transport and energy management strategies in the electric mobility area, an eco-driving strategy for electric bus is presented and validated. Particularly, the characteristics of the prototype bus are described, and a general-purpose eco-drive methodology is briefly presented. The model is firstly simulated in MATLAB™ and then implemented on a mobile device installed on-board of a prototype bus developed by the authors in a previous research project. The solution implemented furnishes the bus-driver suggestions on the guide style to adopt. The result of the test in a real case will be shown to highlight the effectiveness of the solution proposed in terms of energy saving.

Keywords : eco-drive, electric bus, energy management, prototype

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