

New online mechanism for electric vehicle charging

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Researchers at the University of Southampton have designed a new pricing mechanism that could change the way in which electric vehicles are charged.

It is based on an online auction protocol that makes it possible to charge electric vehicles without overloading the local electricity network.

The paper entitled Online Mechanism Design for Electric Vehicle Charging was presented this week at AAMAS 2011 — the Tenth Conference on Autonomous Agents and Multiagent Systems, and outlines a system where electric vehicle owners use computerised agents to bid for the power to charge the vehicles and also organise time slots when a vehicle is available for charging.

Dr Alex Rogers, University of Southampton computer scientist and one of the paper's authors, says: "Plug-in hybrid electric vehicles are expected to place a considerable strain on local electricity distribution networks. If many vehicles charge simultaneously, they may overload the local distribution network, so their charging needs to be carefully scheduled."

To address this issue, Dr Rogers and his team turned to the field of online mechanism design. They designed a mechanism that allows vehicle owners to specify their requirements (for example, when they need the vehicle and how far they expect to drive). The system then automatically schedules charging of the vehicles' batteries. The mechanism ensures that there is no incentive to 'game the system' by reporting that the vehicle is need earlier than is actually the case, and those users who place a higher demand on the system are automatically charged more than those who can wait.

University of Southampton computer scientist Dr Enrico Gerding, the lead author of the paper, adds: "The mechanism leaves some available units of electricity unallocated. This is counter-intuitive since it seems to be inefficient but it turns out to be essential to ensure that the vehicle owners don't have to delay plugging-in or misreport their requirements, in an attempt to get a better deal."

In a study based on the performance of currently available electric vehicles, performed by Dr Valentin Robu and Dr Sebastien Stein, the mechanism was shown to increase the number of electric vehicles that can be charged overnight, within a neighbourhood of 200 homes, by as much as 40 per cent.

This research follows on from Dr Rogers' and Professor Nick Jennings' work on developing agents that can trade on the stock market and manage crisis communications and Dr Rogers' iPhone application, GridCarbon for measuring the

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carbon intensity of the UK grid.

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