

Shared Autonomous Electric Vehicle (SAEV) Fleet Operations: Range, Ride-sharing, and Smart-charging Decisions

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Abstract

Optimal operations of on-demand shared autonomous electric vehicle (SAEV) or “robo-taxi” service requires careful siting of charging stations, smart vehicle dispatching with charging (and discharging) choices, and thoughtful relocations to lower empty travel, customer wait times, emissions, and operating costs. These tradeoffs and synergies are explored for the Austin, Texas region using an agent-based model. Optimization routines lowered average wait times by 39% while increasing daily trips served by up to 28%, as compared to SAEV repositioning with heuristic charging. Sparser station siting lowered capital costs, and day-ahead charging optimization lowered power costs by about 15% and emissions damages by 3% (while raising profits slightly).