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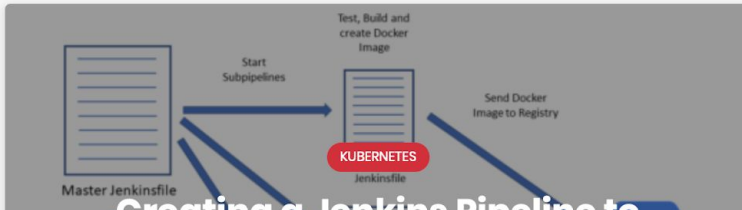HOCHSCHULE DER MEDIEN | BLOG.MI Computer Science

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Vorher

Nachher

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Bidirectional Power Transfer for a Smart Load Management for Electric Vehicles

10. NOVEMBER 2019 ~ BENJAMIN KOWATSCH ~ LEAVE A COMMENT

Abstract The global expansion of electromobility is progressing rapidly. The chinese city of Shenzhen has the world's first and largest fleet of electric buses with more than 16,000 buses. A gigantic charging infrastructure for 5805 electric buses was established to cope with this. It reaches peak loads of 464.4 megawatts which is an enormous challenge to the grid. The use of a smart load management to avoid peak loads is indispensable. In combination with the Bidirectional Power Transfer (BPT), new perspectives open up and smart load management is efficiently enhanced.

The objective of this paper was the analysis and evaluation of the BPT for a smart load management for Electric Vehicles (EVs) regarding depot charging. This paper explains the relevant technologies and standards with respect to BPT. This was followed by the extension of Open Charge Point Protocol (OCPP) 2.0 for BPT, a prerequisite for the prototype implementation of the optimization algorithm including various strategies.

The results reveal that load management for depot charging profits substantially from BPT and that optimized planning in advance is a key factor, albeit increasing complexity. Currently, the amount of BPT-enabled EVs is marginal and certain relevant standardizations have not been adapted yet. The results of this paper contribute to an efficient and smart load management and the necessary adaptations of the standardizations towards the future growth of BPT-enabled EVs.

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