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Autonomic Management for Mobile Robot Battery Degradation

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Abstract : The majority of today’s mobile robots are very dependent on battery power. Mobile robots can operate untethered for a number of hours but eventually they will need to recharge their batteries in-order to continue to function. While computer processing and sensors have become cheaper and more powerful each year, battery development has progress very little. They are slow to re-charge, inefficient and lagging behind in the general progression of robotic development we see today. However, batteries are relatively cheap and when fully charged, can supply high power output necessary for operating heavy mobile robots. As there are no cheap alternatives to batteries, we need to find efficient ways to manage the power that batteries provide during their operational lifetime. This paper proposes the use of autonomic principles of self-adaption to address the behavioral changes a battery experiences as it gets older. In life, as we get older, we cannot perform tasks in the same way as we did in our youth; these tasks generally take longer to perform and require more of our energy to complete. Batteries also suffer from a form of degradation. As a battery gets older, it loses the ability to retain the same charge capacity it would have when brand new. This paper investigates how we can adapt the current state of a battery charge and cycle count, to the requirements of a mobile robot to perform its tasks.

Keywords : autonomic, self-adaptive, self-optimising, degradation
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