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Autoren	A. Johanning, M. Pagitz, J.M. Mirats-Tur
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Abstract

Electrically powered multi-rotor aircraft gain popularity among fire brigades, police and military units. The driving forces behind this trend are decreasing unit costs and increasing capabilities. Particularly the steady advances in sensor and microprocessor technologies allow the use of more sophisticated control algorithms. The current development of batteries that possess a significantly higher energy density will further accelerate this trend. The aim of this paper is to introduce a novel concept for scalable and modular multi-rotor aircraft. These aircraft are made from three or more identical hexagonal cells. Each cell contains two ducted, directly driven counter-rotating propellers as well as motor controllers, batteries and a control unit. Cells can be arbitrarily connected to each other to create a highly redundant, energy and cost effective aircraft for a wide range of mission requirements.