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Structure and control strategies of exoskeletons for fatigue limitation of a healthy man

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Abstract: During last few years an idea of exoskeletons amplifying human force and reducing body effort during activities turned to be a real solution. Because of many interdisciplinary problems – medical, mechanical and mechatronics – and individual features of human body, designs are still looking for better and better solutions. A lot of money are spent for research, especially when we take into account almost unlimited application of such an equipment. Some designers are following the leaders in this domain and don't see other efficient solutions which are well known for many years. In this paper authors present overview of solutions and applications of exoskeletons for healthy men with oriented on ergonomics and energy management aspects. For energy management aspects authors present analyses of typical movement and energy conversion in human body. The mechanic, electric and hydraulic drive solutions are presented and characterized by their possibilities to follow the human body. The new hybrid solution with energy saving and recuperation is presented. Authors of this paper aim on providing a concise comparison between most commonly used control strategies for exoskeletons for healthy persons. The paper will focus on reviewing most common strategies and analyzing them in terms of utilizing in products for the rescue services and the army. The conclusions for each solution will be backed up with authors experiences on this field coming from developing own solution of a lower limb exoskeleton for soldiers and rescue services.

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