The faculty of Engineering of the Vrije Universiteit Brussel invites you to attend the public defense leading to the degree of

**DOCTOR OF ENGINEERING SCIENCES**

of **Matthias Näf**

The public defense will take place on **Monday, 8th November 2021 at 4:00pm**.

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**DEVELOPMENT AND VALIDATION OF FLEXIBLE BACK SUPPORT EXOSKELETONS**

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Abstract of the PhD research

Lower back pain is the leading cause of disability worldwide. Compression forces on the spine were identified as a risk factor to develop lower back pain. In order to reduce these forces, body-worn back exoskeletons were developed. In industrial settings, however, these exoskeletons sometimes are perceived as hindering and restricting the motion of the wearer. To address these issues, we developed flexible passive and active back support exoskeletons, which allow for larger ranges of motion. Furthermore, to reduce hinderance, clutches and differential mechanisms are introduced. Tests with subjects show that, compared to their rigid counterparts, flexible exoskeletons allow for a larger range of motion while still providing substantial support. Further, we show that the use of clutches leads to less hinderance during walking. To achieve acceptance in the industry, further technical advances of this concept are needed.