

***The ReAbleChair,
a prototype in The BaltSe@nioR (BSR) Project***



Foto: S.B. Skille

ReAbleChair -description

The BaltSe@nioR (BSR) project complies with EU, national, regional policies and strategies. It aims at responsible development and prosperity of EU citizens. By combining traditional furniture industry with ICT in cross-sectional specialization the project aim to provide concepts and solutions for active and assisted living products based on ICT solutions dedicated to elderly people that will be presented in the form of 3D virtual models, models and prototypes.

The ReAbleChair prototype follows an original design by Professor Artur Serrano at NTNU where a chair with integrated force plates would be used to analyze different movements of older adults when sitting and standing up. The prototype was built at the BSR workshop in October 2017 in Poznan (Poland). The workshop used innovation camp methodology where the idea was to develop innovative new product concepts between the borders of various scientific disciplines in multicultural environment of BSR countries. Prior to the workshop, Sigrid Bye Skille and Siri Munch Wahl, Master students at NTNU under the supervision of Professor Artur Serrano, planned the production of a prototype of the ReAbleChair that could be used in assessment of the sit-to-stand movement performed by the elderly.



Foto: S.B. Skille

Building the ReAbleChair



During the workshop in Poznan, the NTNU students (together with other BSR students and representatives from furniture companies) redesigned a chair. Integrating four force plates (two in the seat and one in each armrest) and choosing textiles to give the chair a natural look.

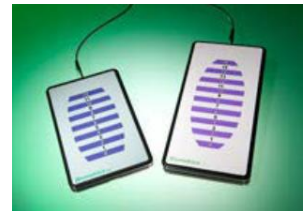
Foto: S.B. Skille

Specifications of the ReAbleChair after redesigned:

- Base material: wood
- Standardized height of 46 cm
- The angle of the seat is perpendicular to the back.
- New armrests and sitting structure fits the force plates and the wire adaptation
- The chair is designed with quality materials that are suitable for elderly people

Specifications of forceplates and A/D converter:

- Forceplates: provided by Biometrics Ltd, United Kingdom
 - LxWxH: 200x125x14 mm
 - Weight: 790 g
 - Cable connector in front of the long side.
- A/D converter:
 - Force signals collected with DataLOG MWX8 (Biometrics Ltd, United Kingdom) connected by Bluetooth to a personal computer.
 - Data processing software: DataLOG
 - Frequency: 500 Hz



Use of the ReAbleChair

The main purpose of developing the ReAbleChair was to collect quality data on how different people are conducting sit-to-stand movement. Furthermore, using this data to analysis and evaluate physical function and in clinical reasoning. The force plates was consciously placed in each arm, as research shows that the use of armrests and/or the degree of use, can give insight on a person's movement pattern.

Standing up from a chair can be considered as a demanding and complex movement, and all people perform this movement differently. Research and testing situations are often "artificial" and do not necessarily reflect how the person moves naturally. By creating the ReAbleChair with an appearance of an "ordinary chair", the user does not know their being tested. Thus, the probability can increase performance of natural motion, rather than unnatural.

In addition, the use of the ReAbleChair prototype has the possibility to of integrating various exercises for elderly. Through the software provided by Biometrics Ltd., a person could for example play different exer-games by simply moving in the chair, using pressure on the force plates to move objects or other types of control in a game. Such exer-games can provide both physical and cognitive training.

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References:

- Biometrics Ltd. Force Plates. Accessed: 2018-23-10. 2015. URL: <http://www.biometricsltd.com/forceplates.htm>
- Biometrics Ltd. DataLOG. Accessed: 2018-23-10. 2015. URL: <http://www.biometricsltd.com/datalog.htm>

Publications:

Wahl, S. M., «Test-Retest Reliability of Sit-to-Walk Parameters in Healthy Older Persons as Measured by a Custom-Made Armchair», Master thesis, NTNU, 2018.

Skille, S. B., «Investigating the clinical value of measuring use of armrests in healthy older adults using a novel sensor-equipped armchair», Master thesis, NTNU, 2018.