Evaluation of the MOBIL Walking & Lifting Aid

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AAATE Conference 2001, 3.-6.9.01, Ljubljana
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Original Project Idea

- Modular Tea-Trolley system for frail elderly people
  - transportation function
  - powered lifting function for objects in the household
  - some support of walking
  - option: powered movements
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Story Board
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Story Board
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Development Goals of the Project

● Combined Walking & Lifting Aid
  – alternative brake system
  – support of standing up

● Additional functionality
  – powered rollator with sensor grips
  – powered “tea-trolley“
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Prototype

Walking & Lifting Aid
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Test Bed

Powered Walking & Transportation Aid

Direct Control Mode
• sensor grips

Follow Mode
• distance sensors
• belt with beacons
• collision avoidance
Walking & Lifting Aid

- **Walking**
  - high position (rollator)
  - small dimensions
  - horizontal arm rests

- **Getting up/down**
  - from sitting or kneeling position
  - powered adjustment between low and high position
  - backwards splayed legs (stability)
  - optional: sidewards splay (close to arm chair)
Verification of the Walking & Lifting Aid

● Evaluation sites
  – FTB laboratory and test dwelling; ESV nursing home

● Evaluation criteria
  – Ergonomics, Adaptability (Flexibility), Functionality, Usability/ Versatility, Stability, Maintainability, Safety, Compatibility to environments, Acceptance

● Applied Methods:
  – Expert testing under controlled conditions: ratings
  – Comments of expert/professional test persons
  – Interviews with experts (nurses in a nursing home) and users
  – Check against user requirements
  – Observance criteria of the German catalogue for rehabilitation aids

● Discussion of test results
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Standing up with Lifting Aid
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Standing up from a chair
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Alternative “Arm Rest” Brake System

- act on front wheels
- activated by body weight
  - while standing up
  - while resting / standing (rollator)
  - when user tends to fall
- but: arms rests do not support the body weight while walking
Achievements and Conclusions

- Verification of novel concept combining
  - rollator functionality
  - lifter functionality
  - splaying function of frame

- Patent on the mechanism

- Optional high-tech functionality was proven to be feasible in principle:
  - direct control applying force sensitive grips
  - follow mode with collision avoidance

- Improvements of ergonomics and concept for the brakes are necessary
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Project Data

● Project partners
  – PRT of FernUniversity Hagen, Germany
  – FTB of Evangelische Stiftung Volmarstein, Germany
  – Scuola Superiore S.Anna, Italy
  – Domus Academy, Italy
  – Oxford Intelligent Machines, UK
  – Rehab Robotics, UK
  – Euroflex Sytems, Sweden


● Funding: CEC / Telematics Applications Research & Technological Development Programme