A Robot in a Nursing Home

Hans Böhme and many collaborators
Some pure facts

- **prognoses für Germany:**
  - number of over **80 years old people will almost triple from 4 million** (2005) to more than **10 million** in 2050

- **process in eastern part of Germany** especially dramatic
  - **elder cities** emerge: Hoyerswerda (soon 15,3% of citizens 80 years old or older), Suhl (12,7%)

- **demographic development in Eastern Germany** is in front of Western Germany with about **20 years**
  - 2,3 million care receivers (2008) \(\rightarrow\) 4,3 million in 2050

- **current state of Germany**
  - **8,8 Mio. pure senior homes** with specific needs of support (2008)
  - **93% of all elder people** live in their **own home**,
  - only 3% nursing homes, 4% in supported home environments (2008)
We are not alone

Stay@home robots → technologies allowing people to remain in their familiar home environments as long as possible

Care-O-Bot

GIRAF

Baby seal Paro
We are not alone (contd.)
Robots for the Elderly

Ask people if they could imagine to receive care from a robot in their home environment, you will get answers ranging between sorrow and pain.

Ask people if they would use (rent or buy) a robot that would allow them to stay in their familiar home environment as long as possible, the answers you get will be completely different.

→ point of view strongly context dependent
   - am I a caregiver or a person receiving/needling care
     • different stakeholders
     • expected benefit for ALL stakeholders

→ important aspects for the acceptance of such systems are
   - The intrinsic motivation to interact with the robotic carer?
   - What improvements regarding quality of life are possible?
August in the nursing home

- two main application scenarios
  - **watchdog function** during nighttime
    - give alerts when residents are cruising the hallways
    - detection of critical situations like cruising near stairs or falls
    - support the nursing stuff, but not aimed to replace them
    - collect experiences about how the residents react to the robot being within their home environment
  
  - **interaction with the seniors** during daytime
    - more challenging from a scientific point of view
      - and more interesting for us
    - provide actual information about
      - the actual menus
      - ongoing events or activities like music, handcrafting, dancing etc.
    - thereby taking into account that about 80% of residents suffer more or less from neurodegenerative diseases like MCI or dementia
Demenz in der Altersgruppe der 65-Jährigen und Älteren in Deutschland, 2000-2050*

Anzahl Demenzkranker unter den 65-Jährigen und Älteren in 1.000

Männer
Frauen

* 12. koordinierte Bevölkerungsvorausberechnung

Datenquelle: AOK-Leistungsdaten 2007; Statistisches Bundesamt; Berechnung: BiB

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How could a robot be beneficial for those people?

- Critique: Most of technological developments for elderly care are aimed to compensate reduced cognitive and/or motor capabilities. Frankly speaking: the trend is to observe and monitor degeneration and to countersteer with, at least sometimes questionable, technical solutions.
  \[\rightarrow\text{We have some doubt that this is the right direction.}\]

- Up to now, dementia and related diseases cannot be healed. But an interesting and rather opposite approach is to stabilize the actual status of dementia as long as possible. This would lead to
  - improved well-being of the corresponding seniors
  - a reduction of mental and physical load of the nursing stuff
  - a reduced amount of needed care
  - a better feeling of the related families and friends
  - and reduced costs
  - all in all: a win-win-situation of all involved stakeholders
  - so we call our idea: **Care4all**

Results of the study MAKS

- **MAKS** stands for effects of a new therapy treating movement disorders (**Motorisch**), supporting practices of daily life (**Alltagspraktisch**), improving cognitive abilities (**Kognitiv**) involving spiritual issues (**Spirituell**)

- made at the university medical centre Erlangen within the group of Prof. Elmar Gräßel

- this special therapeutic treatment
  - focuses on the preservation of capabilities necessary for daily living practices
    - in contrast to training to play chess, solve crossword puzzles or SUDOKU tasks
  - improves mood and reduces depression,
  - is more effective than the best actual medication
  - is sustainable over a period of at least 12 months
  - reduces risk of falls
  - is satisfying for the therapists

- but prerequisites treatment 6 days per week and at least 3 hours per day
  - cannot be provided by the rather limited resources of nursing stuff

http://www.maks-aktiv.de/
Interaction, combined with cognitive stimulation

Cognitive stimulation: The participants name different herbs, via PC and a beamer projection, make exercises with pen and paper to train attentional capabilities.
HTW Dresden
- cognitive robotics
- human-robot interaction
- systems engineering
- user studies
- evaluation

Cognitec GmbH
- person recognition
- person tracking
- tackling of crowded environments
- evaluation

Linguwerk GmbH
- speech recognition
- Dialog modeling
- gesture recognition
- evaluation

Cultus gGmbH
- stationary care
- care concepts
- overall application concepts
- evaluation

University Medical Centre Dresden
- stationary clinical treatment
- medical and occupational therapy
- overall application concepts
- evaluation

T-Systems MMS GmbH
- eHealth
- handling the developed system as medicine product
- overall application concepts

CARE4ALL

Cultus gGmbH
Klinikum Carl-Gustav Carus
Some functionalities already available

- watchdog robot for nighttime
- already evaluated in some first experiments
- nursing stuff was integrated and satisfied by the proposed solution

- Skat Application
  - with strong relation to the results of the MAKS study