

**International Workshop on Health & Well Being
Sophia Antipolis, 19.09.2011**

Session: Social Interaction and Robotics

**Staying at home in old age –
Contribution of new technologies and organisational concepts to
maintain independence and quality of life**

Prof. Dr. Barbara Klein

Fachhochschule Frankfurt am Main – University of Applied Sciences



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Overview

- **Increasing wellbeing through different approaches**
- **Technology and organisational concepts**
- **Conclusions**




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Approaches to increase well-being

- Pleasure, fun, self-forgetfulness, being active, being under control
 - Feeling to be useful, meaningful life
 - Social contacts, feel intimacy and love
 - Sense of secureness/ security
- 
- Emotions
 - Social Interaction
 - Secureness/ Security/ Safety
 - Building and living environment
 - risk reduction
 - burglary
 - falls
 - health related risks



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Fachhochschule Frankfurt am Main – University of Applied Sciences

University of Applied Sciences:

10,000 students from more than 100 nations,
ca. 900 teaching and research staff

Faculty 1: Architecture, Civil Engineering

Faculty 2: Computer Sciences and Engineering

Faculty 3: Business and Law

Faculty 4: Faculty of Social Work and Health:

2,000 students, 70 teaching and research staff

- B.A. Courses in Social Work and Nursing
- Variety of M.A. courses and training programmes (Social Work M.A., Case management for independent and Accessible living M.Sc., Advanced Practice Nursing M.Sc., Nursing and Health Management M.A., Counselling and law M.A., Music Therapy, M.A.)

Germany, Frankfurt



www.wikipedia.com



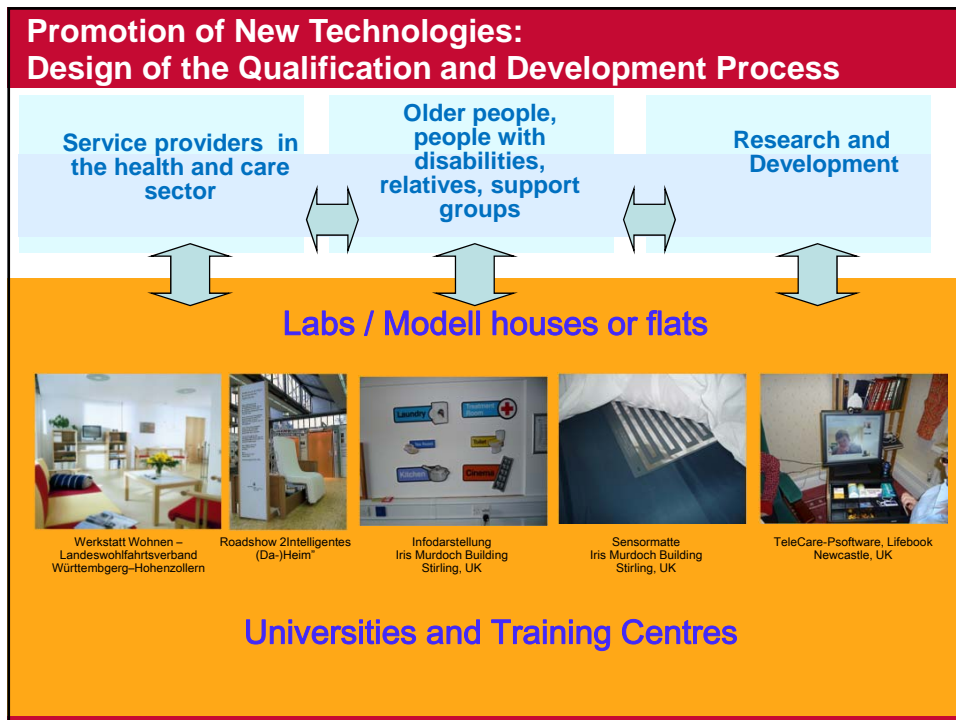
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Pictures: www.wikipedia.de

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Permanent Exhibition »Accessible Living«

The floor plan shows a layout of 12 numbered rooms and areas within the Rudhof building. The rooms include:

- 7: Aktionsfläche (Action area)
- 8: Aktionsfläche (Action area)
- 9: Aktionsfläche (Action area)
- 10: Aktionsfläche (Action area)
- 11: Aktionsfläche (Action area)
- 12: Aktionsfläche (Action area)
- Other rooms: 1, 2, 3, 4, 5, 6, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

- Since 1999 developed together with the VdK (non-profit organisation for social law and social policy, Office at the university “Counselling for independent living)
- 150 m²
- design and equipment of the bathroom kitchen suitable for people in wheelchairs
nursing care beds, hoists
Assistive technologies, mobility aids
- Currently redesign and refurbishment

Rudhof

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Redesign of the Permanent Exhibition »Barrierfree Living«



Picture:
Rotoflex-
bed of
caretec

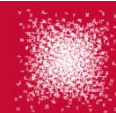


Picture:
sensefloor,
future
shape

- Increased security through ambient assisted living, telemonitoring and telecare, light technologies
- Emotional and social robotics

Target groups:

- 2,000 students of the Faculty Social Work and Health at the University
- Students of nursing colleges in Frankfurt
- Multipliers such as counsellors for independent living, support groups
- Older people or people with disabilities, relatives and friends



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Increased Security through new Technologies

- More security in new constructed buildings (GIRA, Zumtobel, Werner Gebäudeautomation)
- Digital power line which allows to operate a variety of devices and appliances through one interface (I-Pad, large screen and monitor)
- Avoiding risks through controlling of
 - access
 - lights
 - windows and heating
 - smoke detector
 - fall mattress, help line incorporated 1. relative, 2. service provider
- Having fun through operating
 - multimedia such as TV, DVD, . . .



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Increased Security through new Technologies



- **More security in existing buildings through Loc Sens system (scemtec automation GmbH)**
- Can be built in 30 minutes into any flat or house
- Inobtrusive
- Five sensors measuring the combination of movement, temperature and light intensity
- Installation in corridor, kitchen, bathroom, living- and bedroom
- Comparison with user profiles
- Any significant difference triggers a helpline



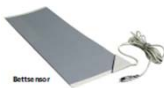
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Increased Security through new Technologies



- **Increased risk reduction through telecare (Tunstall)**

- Technologies such as
 - base alarm
 - pendants or wristband
 - falls alarm
 - epilepsy sensor
 - sensor-based medication dispenser/reminder




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Emotional robotics in Social Care

- Approaches in Social Care in nursing homes are:
- Work with groups and individuals
- Objectives: physical, mental and emotional activation/ empowerment through
 - Memory training
 - Joint singing and dancing
 - Creative activities
 - Gymnastics, rhythmic movement training
 - Playing games
 - . . .
- Implementation of new technologies
 - e.g. robototherapy



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What is Robo Therapy? 1

- Robototherapy is defined as a framework of human–robotic creature interactions aimed at the reconstruction of a person’s negative experiences through the development of coping strategies, mediated by technological tools, in order to provide a platform for building new positive life skills.
- In a broader sense, **the innovative concept of robototherapy offers methodological and experimental justification for the use of non–pharmacological interventions based on stimulation, assistance, and rehabilitation techniques** for people with physical and cognitive impairments, special needs, or other psychological problems.

Libin, A. & Libin, E. Person – Robot Interactions From the Robopsychologists Point of View: The Robotic Psychology and Robototherapy Approach. Invited Paper. [Proceedings of the IEEE, Vol. 92, No. 11, November 2004, pp.1789-1803.](#)



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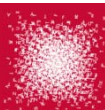
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What is Robo Therapy? 2

- The goal of psychologically-oriented robototherapy in studying person–robot interactions is twofold:
 - (1) offering a research-justified modification of the robotic creature’s appearance and behavioral configuration that will be well-suited for the particular type of psychological and physical profile (e.g., specially designed robots for persons with depression, cerebral palsy, attention deficit disorder, sensory disintegration, dementia, physical immobility, anxiety, autism, loneliness, etc.), and
 - (2) providing individually–tailored non–pharmacological interventions based upon people’s needs and preferences.

Libin, A. & Libin, E. Person – Robot Interactions From the Robopsychologists Point of View: The Robotic Psychology and Robototherapy Approach. Invited Paper. [Proceedings of the IEEE, Vol. 92, No. 11, November 2004, pp.1789-1803.](#)



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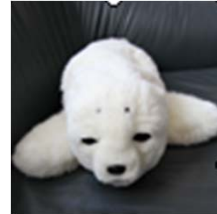
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Emotional robotics

- Robotic which stimulates to social interaction
- Robots develop an own „personality“
- Robots seem to act and react on the interacting person
- The interacting person can develop an emotional attachment to the robot / however the robot does not



Pleo



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Robots for entertainment/recreational purposes

AIBO

<http://de.wikipedia.org/wiki/Aibo>



PLEO

Foto: Barbara Klein 2010, 2011



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Therapeutic Robots



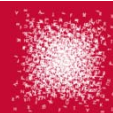
Bild: Barbara Klein 2008

Therapeutic Seal PARO
developed by Dr. Takanori Shibata
of the National Institute of Advanced
Industrial Science and Technology (AIST),
Japan many pilots on nearly all continents
with different user groups



<http://de.engadget.com/2010/10/05/ceatec-2010-fujitsu-zeigt-sozial-bar-natuerlich-fur-einsame-kin>

**CEATEC 2010 Fujitsu presents a
teddybearbot for seniors and
lonley children.**



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Emotional robotics at FH FFM

- University of Applied Sciences in Frankfurt am Main has
1 PARO since Dec. 2008
2 PLEOs (2009, 2010)
- Experiences with emotional robotics at the University of Applied
Sciences in Frankfurt since summer term 2009 in different
modules
- Students are enrolled in the Bachelor Course in Social Work



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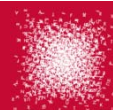
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Teaching research projects in B.A. Social Work

- Module: Quality of Life and User Orientation in residential and nursing care
- Question:
What can contribute to quality of life of people living in residential and nursing care homes? Exam: project work in 4 weeks
- Objective is that students get an insight in different aspects of social work in care homes
- Social Work in care homes comprises a variety of tasks – also recreational activities and therapy
- In huge care homes the social worker mainly manages the process and organises professional and voluntary staff, in smaller care homes the social worker offers recreational activities



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Teaching research projects in B.A. Social Work

- Practise Module: Social Institutions in the health care sector
- What are possible target groups?
Can emotional robotics contribute to social interaction?
Can emotional robotics contribute to quality of life?
Exam: Practise experience and a report
- Advice and early intervention
- children between 2 and 5 years, preparing for an integrative kindergarten (pre-school)
- children with special needs in group and individual intervention
- Case study of a young women, severely disabled
(not able to communicate)



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Research design

- Information of the relevant persons, parents, relatives
- Consent of the institution
- Informed consent of parents or legal custodian etc.
- Questionnaire
- Depending on the module between 3-5 or 5 to 10 interventions with the emotional robot
- Video shooting of the interventions
- Additional interview with relatives
- Additional interview with professionals
- Analysis of the records



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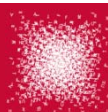
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Objectives of the course

- Students are taught on social work in care homes the role of recreational therapy and how to do that
- Interventions are group and individual interventions
- They have to conceptualize the process and topics to talk about e.g. to build on biographical issues etc.
- Videographies, sociogramms
- Project report and a presentation and discussion



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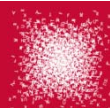
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Currently 8 project reports on Paro

	When?	What	Where?	Female	Male	Total
M20-P1	SoSe 09	PARO	care home	10	-	10
M20-P2	WiSe 09/10	PARO	care home	3	3	6
M20-P3	WiSe 09/10	PARO	care home	3	1	4
M20-P4	SoSe 10	PARO	care home	5	1	6
M20-P5	SoSe 10	PLEO	care home	4	0	4
M20-P6	WiSe 10/11	PARO	care home	8	0	8
M20-P7	WiSe 10/11	PARO	care home	4	0	4
M20-P8	WiSe 10/11	PLEO	care home	7	1	8
M20-P9	WiSe 10/11	PLEO	care home	6	1	7
M18-1	WiSe 09/10	PARO	early	3	1	4
M18-2	WiSe 09/10	PARO	care home	1	0	1
M22-1	WiSe 10/11	PLEO	APF	2	0	2
Total				56	8	64



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Can emotional robotics contribute to social interaction and communication?

- Touching the seal: stroking, cuddling, petting the robot, kissing, hugging the robot
→ new form of interaction, especially for persons with dementia
→ effects observed: stimulating as well as reducing aggressiveness
- Mimic expressions: eye-contact, smiling, grinning, laughing,
- Verbalisation → uttering, imitating the sounds, talking to the robot - similar like talking to a baby
- Social interaction with other residents
one project report states that two women with dementia talk about how horrible it is not to recognise their own folks or not to remember the name of your own husband



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Effects of emotional robotics . . .

- Emotional robotics seems to promote social interaction: with the robot and with other persons
- Emotional robotics seems to contribute to regulate emotions: stimulating and relaxing , people feeling in charge
- The therapeutic seal PARO seems to be most suitable for people with cognitive impairments any age
- Emotional robotics seems to affect emotions in a positive way. This might contribute to a better work environment.
- Emotional robotics can trigger caring behaviour, which can contribute to gain sense in life for people with cognitive impairments



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Ethical issues

“Over years, I become convinced that in nursing homes, seniors become fascinated by relationships with robots because, among other reasons, they bring to the surface tensions about seniors’ autonomy in their institutions.

A robot that needs you promotes a fantasy of autonomy: seniors feel competent because something depends on them.

Yet, robots can also disrupt fictions of autonomy. They can send the message, “Now you know that you are totally dependent. Play with this toy. You are like a child.” This push and pull makes the robots compelling even as they disturb”

Turkle, Sherry (2011): Alone together. Why we expect more from technology and less from each other



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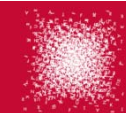
Social Interaction through GIRAFF

<http://www.giraff.org/>

- Giraff: videoconference on wheels
 - “it allows you to visit loved ones across the Internet and move around their home just as if you were physically there. It has a camera and display (so you can see and be seen), a speaker and microphone (so you can talk and listen) all mounted on a base with motorized wheels.
- Easy To Use
- Those who live in the home where it is placed don't have to do anything except receive visitors just as if they knocked on the door. The Giraff is operated completely by remote control through the internet. The Giraff faces the wall and bows its display in a "sleeping" position to ensure privacy when not in use.



www.giraff.org/products.html



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Social Interaction through GIRAFF

- How It Works
 - download software to your PC from our web site, obtain authorization from your care provider, and then connect to the person you want to visit through the Giraff.
- How You Use It
 - The software operates basically like a videoconferencing system. You can also use your mouse to move around the home, down hallways and from room to room. There is no special equipment required, just your computer and webcam.
- The average time it takes first-time users to become comfortable moving around a home with a Giraff is less than two minutes



<http://www.giraff.org/products.html>

www.giraff.org/products.html



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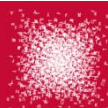
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First Implementation in students' project

- June 2011: explorative study in a nursing home
- Objectives were to find out:
 - Does GIRAFF work (technically)?
 - How do residents react?
 - What does staff think about it?
 - Are there more opportunities in it?
- Technically, GIRAFF worked fine
- Residents were mainly interested and had fun
- Staff tended to be reluctant in the beginning, because they worries about their workplace
- Currently we apply for funding to explore different scenarios in the nursing home



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Conclusion

- High potential of the discussed technologies
- Necessary to define scenarios and implementation fields
- Necessity to carry out randomized control trials in order
 - to obtain relevant data on the effects
 - to develop recreational or other therapies
 - to obtain knowledge for organisational and service design
- Necessity of new work organisation and new professions (e.g. telecare technician)
- Necessity to develop qualification tools for carers, professional staff, engineers, architects, etc.



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