RoNiSCo: Robotic Night Shift Companion

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Ambient Assisted Living

• Background: Demographic change
• Problem: Large deficit on care personnel
• Goals:
  – Increasing quality of life in residential care facilities
  – Goal: Benefit/facilitation for patients as well as for personnel
  – Assistance system can not and shall not replace personnel
• Considering legal and ethical aspects

Applications

• Entertainment
  • IP-Telephony
  • Playing games: Skat
  • Social Networking
• Night-watch
  • Therapeutic Aspects
    • Cognition and motion therapy
    • Music therapy
Motivation

Problem:
• Dementia patients tend to wander around at night
• Large, occluded hallways makes keeping an eye on every location difficult

Suggested Solution:
• Support the few personnel by a robot, who
  – Detects straying people
  – Informs personnel
  – Keeps patients busy until help arrives
• Personnel has access to smart phone and basis station
Motivation

• Why a robot:
  – Distract or bind the resident until help arrives
  – Support the nursing personnel with first aid equipment “at hand”
  – Privacy & costs: No camera in each room necessary
  – Send the robot to a specific spot where something might have happened

• Overall benefit: personnel has more time to spend with the residents

• Patrol service requested by caregivers as well as listed in studies:

  Hebesberger, et al., What do staff in eldercare want a robot for? An assessment of potential tasks and user requirements for a long-term deployment, in IROS Workshop on "Bridging user needs to deployed applications of service robots" (Hamburg 2015)
What do we need?

- Robot needs to follow a user defined set of way points
  - Localisation & understanding the environment
  - Navigation

- Person recognition / fallen person detection
  - Robot needs to cope with false positive hypotheses

- Information terminals: smartphones + laptop
  - Simple user interface for all relevant information: battery charge, position description, state message, map with robot's position
  - Robust protocol to safely provide critical information
  - Different levels of alertness

- Dialogue system
• Communication via wireless network setup: may lead to loss of network connection if the signal strength is too low
• Inform caretakers about the disconnected device
• Network connection needs to be protected against illegitimate access: protecting collected data & limitation over the robot's control
Android Small Talk Application

- Using a web based chatbot that relies on Weizenbaum’s Eliza
- Different personalities available

- Using Google’s API for ASR + TTS

- Limited possibilities for responding to the user’s input:
- Usually resulted in awkward answers
Interacting with detected person

Small Talk (in real life 😅)
- Dialogue about primarily general topics; might be more specific later
- Mainly used to develop relationship between dialogue partners
- Switching between passive and active role

Transfer to the robot: RoboTalk
- State machine like modelling of dialogue stages:
  - Proactive:
    - What did you study?
    - How is your family?
  - Supportive:
    - That sounds interesting!
    - Life is hard, but unfair.
  - Reactive:
    - I know a lot, but not about this…
Experiments

• Comparison of Eliza and RoboTalk
• Test subjects provided by senior’s academy
• Video recordings + Questionnaires
• Overall concept perceived as positive
Conclusion & Outlook

• Proof of concept for a system to support caretakers in stationary retirement home during night shift.
• Mobile robot patrols corridors instead of a caretaker.
• In case of incident connected client devices receive a message.
• Caretakers approved the robot because they had time to do important work instead of patrolling on the floors themselves.
• Residents enjoyed the presence of the patrolling robot and its appearance.
• Caretakers performed their work while the robot patrolled the floor.
• RoboTalk improvement compared to Eliza:
  → answers makes more sense, better stays at topics
  → Emotions (e.g. laughter) very positive
• Eliza entertaining but incoherent
Thank you, for your attention