Technology and innovation challenges for ambient assisted living

dr. Péter Hanák
Biomedical Engineering Knowledge Centre
Budapest University of Technology and Economics
hanak@emt.bme.hu
http://www.emt.bme.hu
Background

National

• Silvergate-112 R&D&I project (NKTH-grant) http://silvergate112.eu
• eVITA Initiative http://evita.njszt.hu
• eVITA 2008 Conf.
• BME Biomedical Eng. Knowledge Centre http://emt.bme.hu

AAL-1 projects at BME

• CARE – Safe Private Homes for Elderly Persons http://care-aal.eu/
• CCE – Connected Care for Elderly Persons http://www.dapforum.org/page.jsp?id=27
• DOMEO - Domestic robot for Elderly Assistance
Healthy ageing

Does healthy ageing mean

- health concious living (and ageing)?
- regularly monitored daily and leisure activities?
- regularly measured health status?
- assisted living (with correction for deteriorating abilities)?
- active ageing, resulting in / leading to
  - more years at work, later retirements?
  - more voluntary activities for the community?
  - more leisure time to enjoy oneself?
- more? or others?
"Healthy ageing describes the ongoing activities and behaviours you undertake to reduce the risk of illness and disease and increase your physical, emotional and mental health. It also means combating illness and disease with some basic lifestyle realignment that can result in a faster and more enduring recovery.” (http://www.seniors.gov.au, Australia)

"Healthy ageing is the process of optimising opportunities for physical, social and mental health to enable older people to take an active part in society without discrimination and to enjoy an independent and good quality of life.” (http://www.healthyageing.nu, Healthy Ageing project, 2004-07)

"Active ageing includes life-long learning, working longer, retiring later and more gradually, being active after retirement and engaging in capacity-enhancing and health-sustaining activities.” (European Commission)
Healthy ageing, revisited

• Healthy ageing is an attempt to keep an elderly person's health condition at its possible optimum. (the author's definition)

• The goal of healthy ageing is sustainable health.

• In AAL-times, we use ICT-tools to achieve the above goal. Two kinds of situations have to be supported with elderly people:
  – Everyday situations
  – Emergency situations
Everyday situations

Examples

- Keeping mental freshness
- Keeping physical condition
- Fighting with loneliness
- Living with (light) dementia
- Supporting / logging / measuring daily tasks
  - Medicament consumption
  - Drinking, eating
  - Walking, shopping
  - Sleeping
  - Other activities

Entertain while train and measure

Play games, communicate

Track and warn

Log and warn
Emergency situations

Examples

• Fall and inability to move
• Passiveness, inactivity
• Health condition change
• Getting lost due to dementia

Measure, store, evaluate, alarm
One of the nicest sides of AAL is that it offers so many technology and innovation challenges for the R&D community. +

serious ethical, legal and psychological issues to solve.

A few of them are listed and commented on the next slides. Some of them are really serious and difficult to solve.
Examples

- Wired / wireless
- Power consumption / battery power supply
- Reliable indoor wireless connection
- Seamless indoor / outdoor usage
- Wearable / environmental sensors
- Reliable fall / motionlessness detector
- Unmanned operation and telemaintenance
Wired or wireless?

P. Hanák: Technology and innovation challenges for AAL
AAL Forum, Vienna, 30-09-2009, Session 3 „Healthy Ageing”
Wired or wireless?

Wireless? Which one?

- Wifi?
- Bluetooth? Medical Bluetooth?
- ZigBee? 2.4 GHz or 868 MHz?
- Wimax?
- Proprietary?

Interference and connectivity problems...
Wired or wireless?

Going wireless means going battery powered

“Yes it’s the smallest, slimmest watch in the world. The only ‘down – side’ is the battery!”
Battery powered

“The docs just install the artificial heart. We at Al’s garage do the maintenance on the battery.”
Battery powered
Innovation challenges

Examples

• Interoperability and vendor independence
• Plug-and-play devices
• Functional complexity vs. simplicity of handling
• Innovative user interfaces – **tangible interfaces**
• *Entertaining* training, combined with *measurement* and *data acquisition*, followed by *evaluation* and *change detection*, and, if needed, *warnings* and *alarms*
• Combined, simultaneous evaluation of data stemming from different sources
• ICT for older women!
Mental freshness

• **Entertainment – training / rehabilitation – measurement – evaluation / coupling – feedback / warning / alarming:**

  **Serious games**

1. Show the symbol and its pair
2. After few seconds the pair disappears
3. Miniaturize the symbol, and put somewhere in the board
4. Hide the symbol with a ball, and show other "empty" balls. After few seconds, the balls are going to move in random directions.
5. When the balls stopped to move, the Player have to choose the right ball, that hides the symbol.
6. After that, the Player have to choose the symbol’s pair, that was shown at the beginning of the level.
Physical rehabilitation


Nine hole peg tester
New interfaces needed

TV-sets and remote controllers are considered as the most familiar devices to elderly people.

Do you really think elderly persons can handle this?

Wii Remote
- Few buttons
- Bluetooth
- Infrared
- Acceleration sensor

In the Silvergate-112 project we are making experiments (games for the elderly, menu control).
Innovative interfaces

Elderly persons need tangible interfaces

“A tangible user interface is a user interface in which a person interacts with digital information through the physical environment.” (Wikipedia)

http://jive.benarent.co.uk
ICT for women needed

• Women live approx. 6 years longer than men!
• Many elderly women live alone, much less elderly men do
• It is (so far) a neglected aspect!
• Young men develop tools – will elderly women use them?
Telecare

Wanted!
Social innovation

Thank you for your attention.