A Mobile Approach to Ambient Assisted Living

IADIS Wireless Applications and Computing 2007
July 6-8, 2007

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Presentation Outline

• About Us
• Project Overview
• Ambient Assisted Living
• System Architecture
  • Overview
  • Core
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• Conclusion
About Us

• Virtual Human Interface Group
  Head: Barnabás Takács, PhD.  http://www.vhi.sztaki.hu/
• Created in the fall of 2005
• Main research interests:
  • „Natural” interfacing of computers with humans
  • Teaching with VR using nonverbal feedback
  • Phobia treatment and physical rehabilitation in VR environments  http://www.virmed.net/
  • Panoramic telepresence  http://www.panocast.net/
  • Health care in the home, AAL
Ambient Assisted Living

- AAL includes:
  - assistance to carry out daily activities
  - health and activity monitoring
  - getting access to medical and emergency systems
  - facilitating social contacts

- Received accentuated priority in R&D plans of the European Union within FP7

- Total commitment (Nov 2006): €21.45 million
Project Overview

- Lifestyle and Health Management System
- Modular architecture, variable components

Main goals:
- Increase motivation and compliance of patient
- Provide basic physiological measurements at home
- Offer remote health monitoring and assistance
- Reduce the number of personal visits to the doctor
- Aid social integration of patients with limited mobility
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System Architecture — Overview

sensors  core  connectivity
System Architecture — Core

- Ultra Mobile PC (UMPC)
  - Small frame, ...
  - ... touch screen, ...
  - ... portable computer;
  - with built-in wireless devices
    - Bluetooth, WiFi, GPS

- Acts like a set-top box
- Shows photos when idle
- Offers menu when activated
- Collects data continuously
System Architecture — Sensors

• Monitor health & fitness
• Regular measurements:
  • Body weight
  • Blood pressure
  • Respiration, lung capacity
  • Etc.

• Continuous readings — 24/7:
  • Skin temperature, conductance
  • Movement, acceleration
  • Etc.

• Wireless data access
Architecture — Effectors & Connectivity

- **Effectors**
  - Pill dispensers
  - Robots (LEGO, Roomba)
  - Ambient displays
  - Etc.

- **Connectivity**
  - WiFi, Bluetooth, ZigBee, 3G
  - Connect:
    - System with sensors
    - System with central database
    - Patient with doctor & family
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Integrated Functionality — Health Monitoring

- Data collection from sensors
- Local logs
- Remote storage in the central database

- New measurements plotted immediately
- Historical data — trends watch
- Proximity detection
Integrated Functionality — Communication

- Emergency call
- With the push of a button
- Automatic data transmission:
  - Patient details (name, age)
  - Accurate position from GPS

Convenient
- Video and phone calls

Communication via Skype with
- the doctor
- members of the family
Functionality — Virtual Exercises & Motivation

- Monitoring vs. maintenance
- Exercising: opportunity & motivation
- Cognitive exercises
- Mood assessment: Beck scale
- Physical exercises
- Relaxation exercises
Integrated Functionality — 3rd Party Services

- Auxiliary services by 3rd party providers
- User forwarded to web pages
- Showing local weather maps
- Offering home delivery of medicine
- Providing dietary advice
- Etc.
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Central Medical Database

- Medical database called *INes*
- Web based interface
- Centralized recording & archival
- Rule based diagnostic system offers semi-automatic data analysis
- Doctors can:
  - Review patient’s medical data & history
  - Create questionnaires & treatment protocols
  - Attach and view additional documents, images, etc.
Conclusion

- LHMS = health care system for home
- Prototype, proof of concept system
- Main features:
  - Noninvasive health monitoring
  - Health maintenance via exercising
  - Redundant, wireless communication
- Future work:
  - Refine and extend feature set
  - Explore use of effectors
  - Evaluate system on larger scale
Thank you!

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