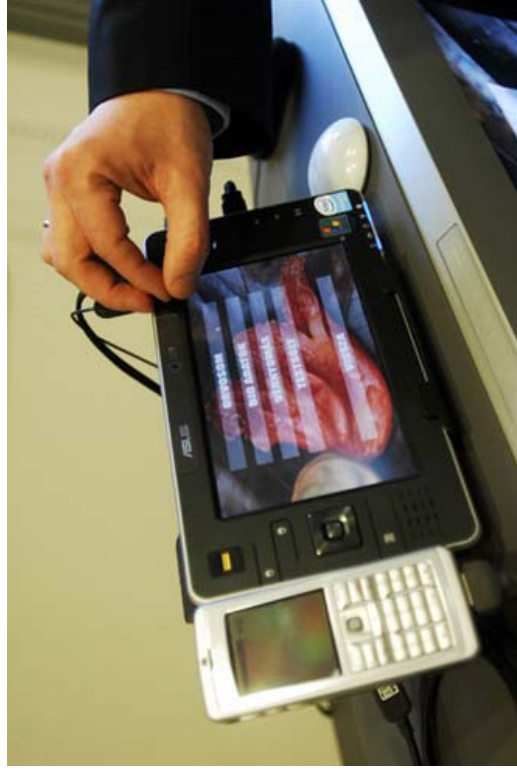


# A Mobile Approach to Ambient Assisted Living

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## Presentation Outline

- About Us
- Project Overview
- Ambient Assisted Living
- System Architecture
  - Overview
  - Core
  - Sensors
  - Effectors & Connectivity
- Integrated Functionality
  - Health Monitoring
  - Communication
  - Virtual Exercises & Motivation
  - 3<sup>rd</sup> Party Services
- Central Medical Database
- 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

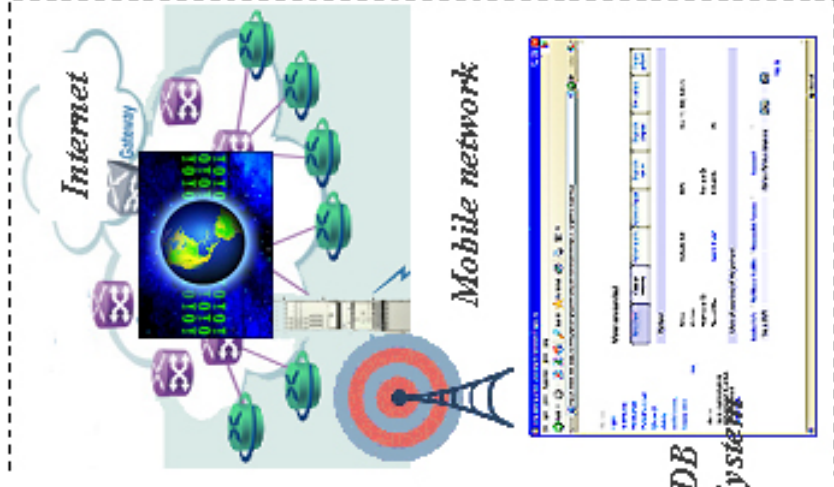


sensors



*Medical DB  
& Expert System*

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



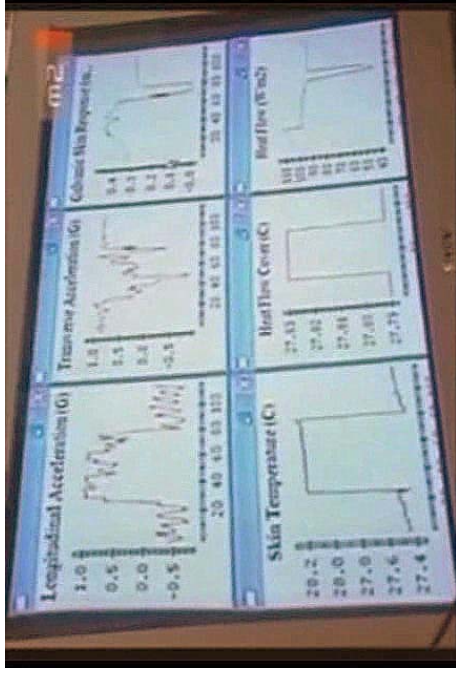
## System Architecture – Sensors

- 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.



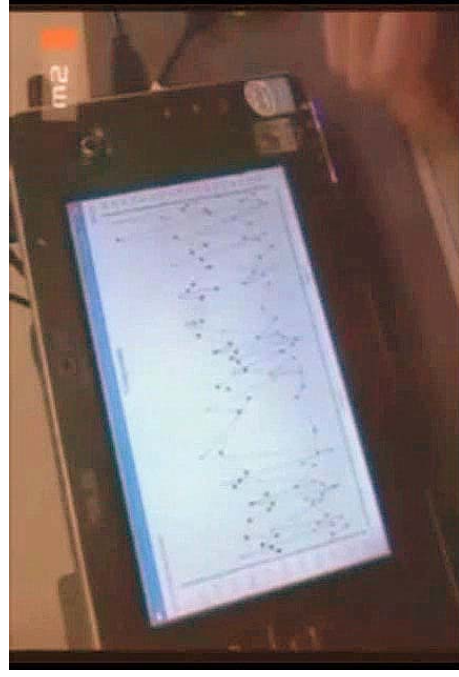
- Connectivity
  - WiFi, Bluetooth, ZigBee, 3G
  - Connect:
    - System with sensors
    - System with central database
    - Patient with doctor & family

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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

- Communication via Skype with
  - the doctor
  - members of the family
- Convenient
- Video and phone calls



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



## Functionality – Virtual Exercises & Motivation

- Monitoring vs. maintenance
- Exercising:  
opportunity & motivation



- Cognitive exercises
- Mood assessment: Beck scale
- Physical exercises
- Relaxation exercises

## Integrated Functionality – 3<sup>rd</sup> Party Services

- Auxiliary services by 3<sup>rd</sup> party providers
- User forwarded to web pages
  - Showing local weather maps
  - Offering home delivery of medicine
  - Providing dietary advice
  - Etc.



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- **Conclusion**

## Central Medical Database

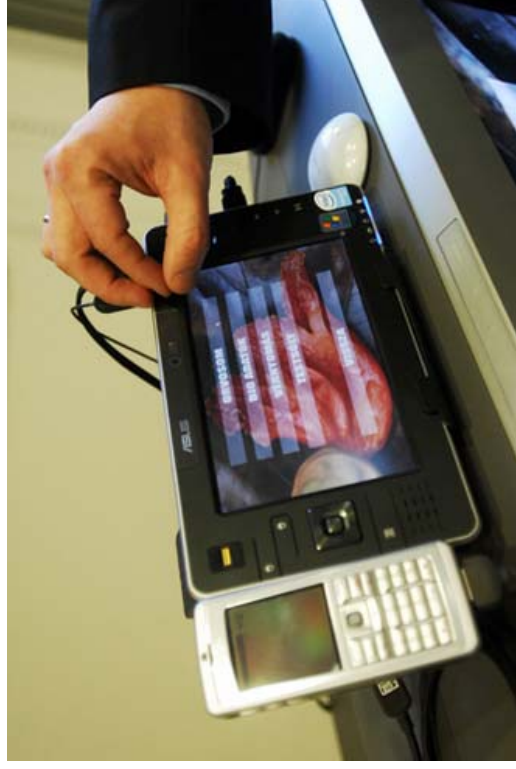
- Medical database called *INes*
- Web based interface
- Centralized recording & archival
- Rule based diagnostic system offers semi-automatic data analysis
- Doctors can:
  - Review patient's medical data & history
  - Create questionnaires & treatment protocols
  - Attach and view additional documents,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