

# A Mobile Approach to Ambient Assisted Living

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[www.vhi.sztaki.hu](http://www.vhi.sztaki.hu)



## Presentation Outline

- About Us
- Project Overview
- System Architecture
  - Overview
  - Core
  - Sensors
  - Effectors & Connectivity
- Integrated Functionality
  - Health Monitoring
  - Communication
  - Virtual Exercises & Motivation
  - 3<sup>rd</sup> Party Services
- MediCAST
  - Services
  - Data Flow
- 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**

## Project Overview

- Lifestyle and Health Management System
- Modular architecture, variable components
- Support for mobile platforms
- 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



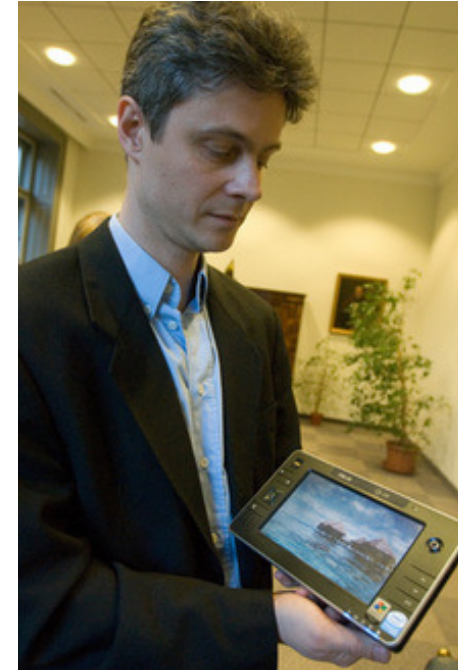
sensors

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

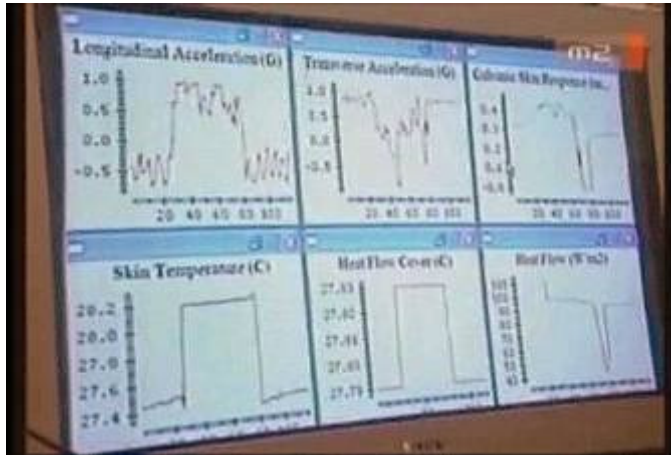
## System Architecture – Sensors

- 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

- 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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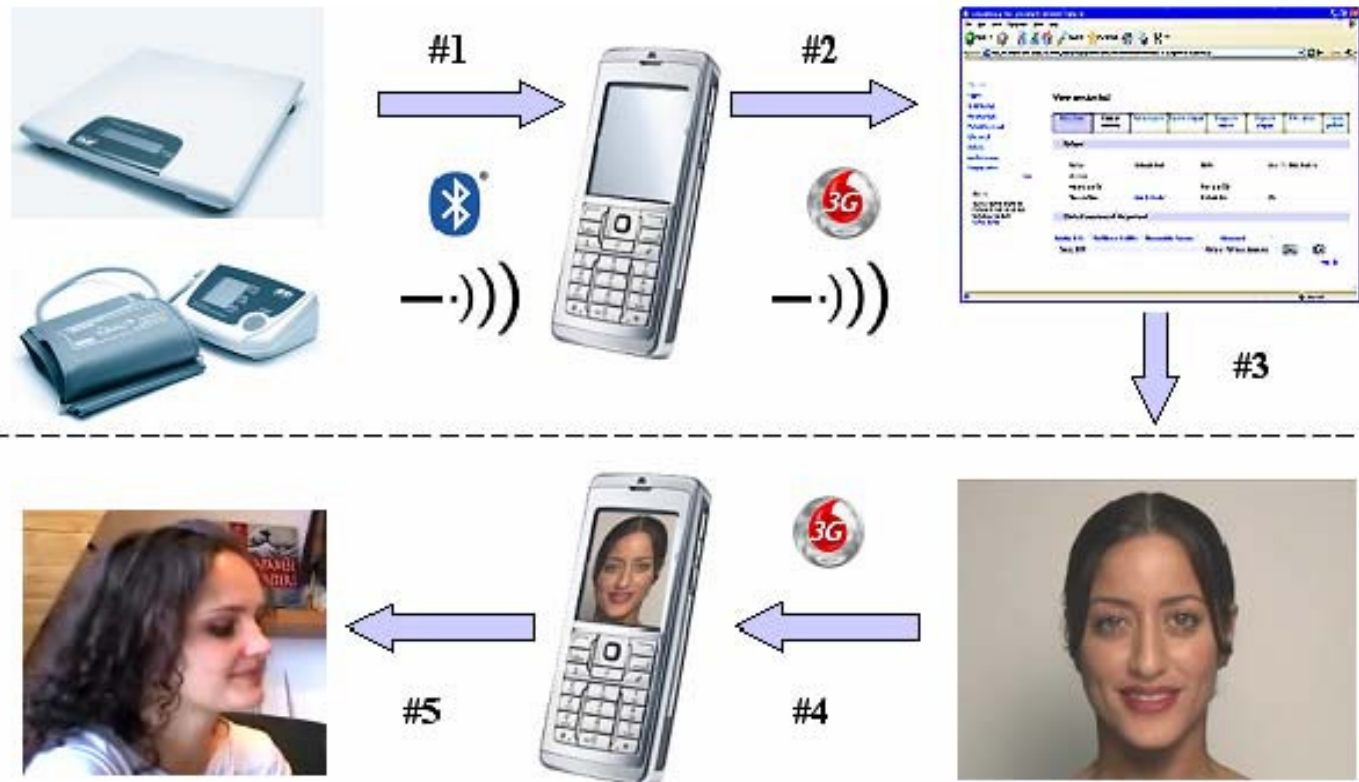
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## MediCAST – Services

- Uses mobile phones instead of UMPC
- Bidirectional video connection
- May be triggered centrally or started by user
- Designed to help increase compliance by
  - delivering video reminders;
  - returning measurement results;
  - submitting completed questionnaires.



# MediCAST – Data Flow



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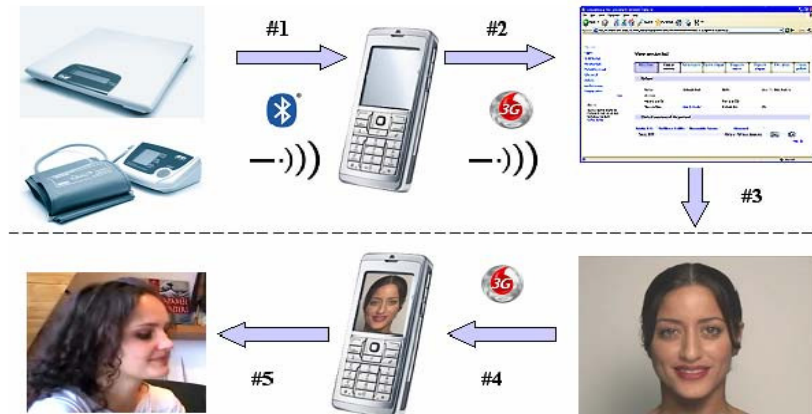
## Central Medical Database

- 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, working „proof of concept” system
- Main features:
  - Noninvasive health monitoring
  - Health maintenance via exercising
  - Redundant, wireless comm. using mobile devices
- Future work:
  - Clinical validation for drug compliance monitoring
  - Case study will start mid 2008 with 50 patients
  - Support integration of robots for home-care

Thank you!



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