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Author(s)	Merilahti, Juho; Similä, Heidi; Perälä, Jukka; Kivikunnas, Sauli; Kyllönen, Vesa; Kaartinen, Jouni; Ylimaula, A.; Hegerstrøm, F.; Ritterfeld, U.
Citation	AAIANCE Conference, Malaga, Spain, 11 - 12 March 2010
Date	2010
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Adaptive Ambient Empowerment of the Elderly (a2e2): Technical viewpoint and challenges

Juho Merilahti, Heidi Similä, Jukka Perälä,
Sauli Kivikunnas, Vesa Kyllönen, Jouni Kaartinen,
VTT Technical Research Centre of Finland

Anssi Ylimaula
Mawell, Finland

Flemming Hegerstrøm
Hospitality, Norway

Ute Ritterfeld
Center for Advanced Media Research,
VU University, Amsterdam

Motivation

Support older adults to be physically more active; focus on people who have sedentary or inactive life-style, or have or are at risk for having diabetes type II or cardiovascular disease.

Goals in the project

- Determine user requirements for "fun to use" application to enable physically more active life-style
- **Realize the solution supported by different technologies**
- Include the solution as a part of the company partners' current supply of services
- Finally piloting and evaluation

Technology perspective

- 1. Novel user-computer interaction concepts**
e.g. Touch screen, intelligent virtual agent (coach) and avatar for self presentation
- 2. Different personalized sensors enrich the interaction**
e.g. offline and online activity monitoring and vital sign measuring
- 3. Interoperability and expandable infrastructure**
e.g. guidelines provided by Continua Health Alliance are followed when feasible

Commercial sensors

Sensors that measure person's activity behaviour and vital signs are included to support developed concepts. Bluetooth and USB are used for communication. Currently in use:

Heart rate:

- Intensity of the activity
- Nonin Onyx® II 9560 Pulse oximeter*, Zephyr™ HxM

Activity/movement:

- Duration and type of activities, intensity
- GCDC X6-2, Omron HJ-721IT*

Blood pressure:

- Wellbeing, activity can lower, risk factor for heart disease
- A&D BPM UA-767PBT-C*

Weight:

- Wellbeing, motivator in when losing weight, possible indicator of health problems
- A&D UC-321PBT-C*

*=Continua Certified

Virtual agent (coach) and avatar

Consumes tasks the logics is providing through animated coach by utilizing touch screen computer.
Provides motivating and "fun to use" environments for the user through animated self presentation i.e. avatar.
User feedback and questionnaire information are sent to the server database.

System logics

According to automatically determined or Care management system's given events the logics is giving tasks to the Virtual agent to communicate with the user.
Follows that the tasks are fulfilled according to user interactions via Virtual agent or sensors' data.
E.g. physical activity amount recommendations for older adult can be followed.

Care management system

Provides an interface to maintain users information and view collected user data such as activity behaviour.
Can be used to set events which the logics handle such as exercise session or daily activity task.
Includes different roles to maintain and view the information. E.g. nurse, clinician or relative.

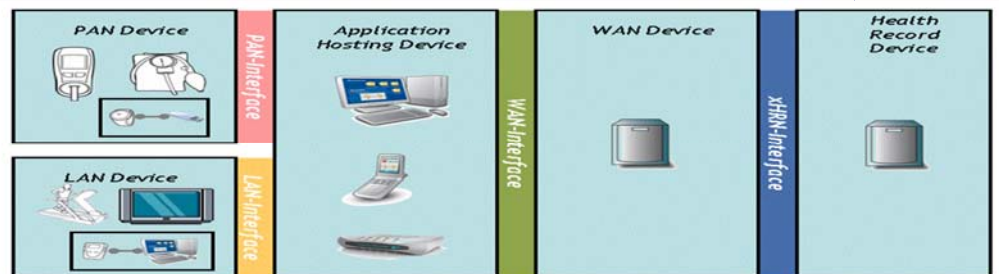


Fig: Continua topology (from Design Guidelines 1.0)

Sensor data Manager

Receives data from the sensors and determines actions performed with the data e.g. set to data processor.
Follows Continua Guidelines for PAN-Interface and IEEE 11073 standard family in communications and data models.
Forwards processed or unprocessed data to the server database with user related information following Continua's WAN-Interface.

Sensor data Processor

Processes sensor data to guideline compatible form to be sent to the server database over WAN-Interface e.g. intensity of the activity session.
Non-Continua certified sensors' data are processed to satisfy the Guidelines for WAN-Interface.

Server data Manager

Receives data from the user's home, checks the data and forwards the data to the server database.
Follows Continua Guidelines in communication utilizing HL7 V2.6 messaging as framework.
Aggregates user data and forwards this to Health Record following Continua Guidelines for xHRN-Interface.

Server data processor

Server data are processed to provide meaningful information to system's logics. E.g. activity plan based recommendations or professional's decisions can be followed up via the data.
Aggregates data to determine user's health status according to collected data from questionnaires and sensors.