The French-Finnish Research Programme on Proactive Computing in its second year

Greger Lindén
University of Helsinki
Finland

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- Proactive Computing
- PROACT – programme and projects
- Upcoming PROACT-related events
- PROACT coordination and contact

Proactive scenario: Anne

Anne is an elderly woman living alone in her house PROACT. PROACT is an intelligent environment enhanced with proactive systems. In the morning, when she gets up, PROACT recognises that she follows her usual track in the kitchen. It puts on the coffee machine and also gives a warning signal when she comes to close to the hot stove.

Anne bends to pick up a spoon from the floor. As she is old she needs to use both her hands to balance herself. In this case, PROACT realises that she has not fallen down nor does she need help. But if an accident happened, PROACT would be able to tell the difference and call the hospital.

Anne reads her news on her computer every day. When she pours herself a cup of coffee, PROACT warms up her computer and finds her favorite daily newspaper site. She quickly reads through the pages controlling the computer by blinking, nodding and lifting her eyebrows. She has even agreed to try to use a new invention measuring her brain signals, but in this case she feels that the computer does not yet want to obey her.

She stops to read some interesting article. PROACT helps her with difficult words and further information, as it realises that she stares continuously at some part of the text.

Suddenly there is someone in the front yard. She is receiving a guest. PROACT detects somebody moving and is also able to tell her who it is. She is happy to have a visitor and forgets about her computer, which turns itself off. PROACT puts on more coffee…

Proactive computing

”A proactive system anticipates our needs and acts in advance”

Motivation

- ”There are hundreds of networked computers per person. It will be impossible for one person to interact with all of them. Computers need to learn the person’s habits and patterns and be proactive in providing the person with the information and service needed.” (David Tennenhouse, Director of Intel Research)

A proactive system may be very handy, e.g.,

- for the elderly and the disabled,
- for computer-challenged persons, and
- for children.

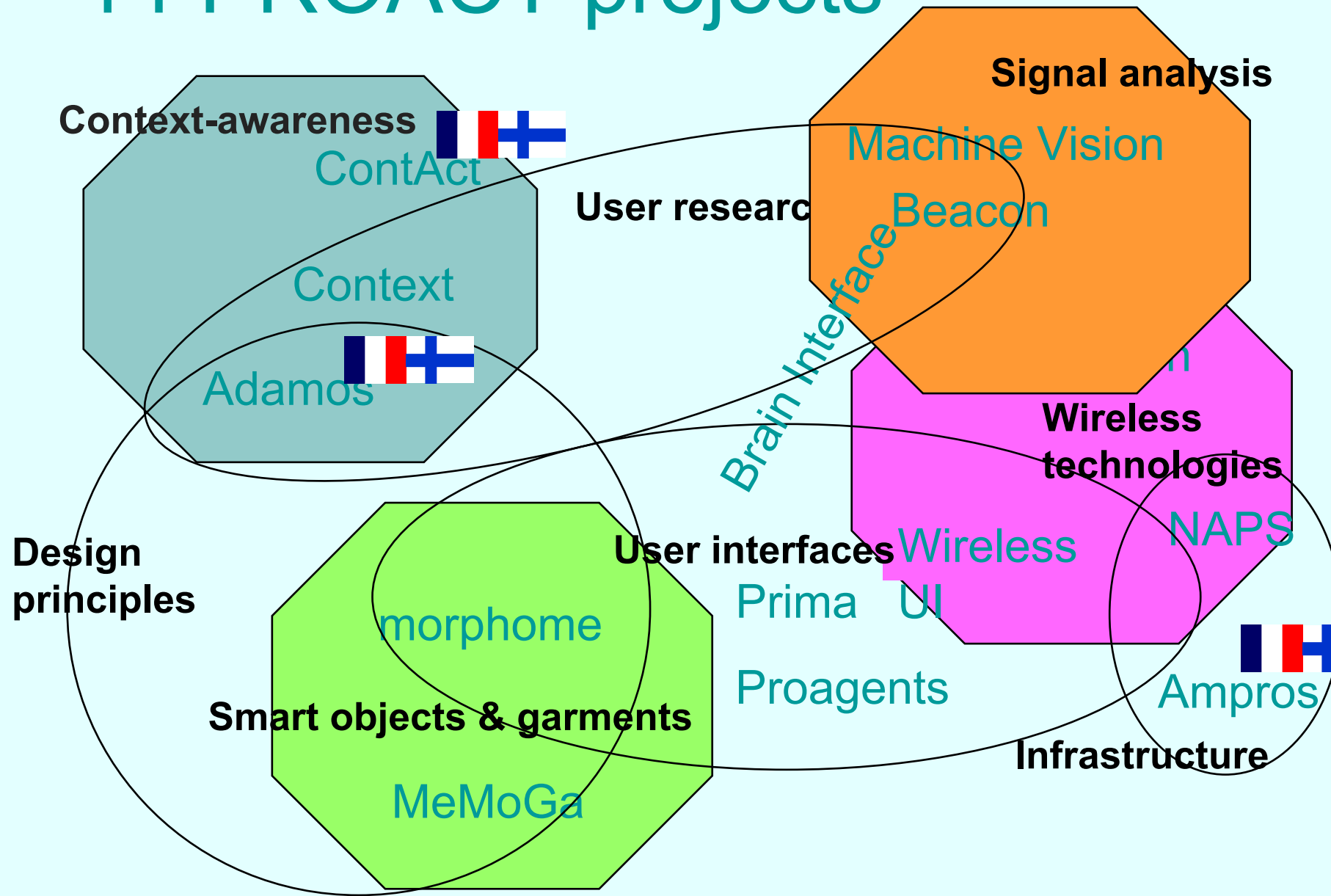
See also: David Tennenhouse: Proactive computing.

Communications of the ACM 43, 5 (May 2000), 43-50.

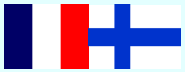
The PROACT programme

- A joint
  - Research Programme on Proactive Computing
- between
  - French Ministry of Research and New Technologies and RNTL
  - Academy of Finland
  - Tekes, the National Agency of Technology (Finland)
- **Objectives**
  - high quality research
  - bilateral research cooperation
  - funding cooperation
- funding for 14 projects with about 8 million euros for a three year period (2002-2005)

14 PROACT projects



14 PROACT projects

Adaptive Middleware Platform for Proactive and Recongifurable Systems (Ampros) 	Living in Metamorphosis: Control and Awareness in a Proactive Home Environment (morphome)	Proactive Information Retrieval by Adaptive Models of Users' Attention and Interests (PRIMA)
Adaptive Mobile Services – Design Parameters & User Experience (Adamos) 	Machine Vision for Sensing and Understanding Human Actions	Proactive Agents Supporting Children's Exploratory Learning (Proagents)
Behavioural Modelling in Context-Aware Systems (Beacon)	Methods and Models for Intelligent Garment Design: Interdisciplinary Apporach to Accessible and Usable Wearable Clothes (MeMoGa)	Proactive Health Monitoring (ProHeMon)
Context Management for Proactive Computing (ContAct) 	Networking and Architecture for Proactive Systems (NAPS) – algorithms and protocols	Wireless Technology and Psychophysiological Computing
Context Recognition by User Situation Analysis (Context)	On-line Adaptive Brain-Computer Interface	... And the Coordination of the research programme

Adaptive Middleware Platform for Proactive and Recongifurable Systems (Ampros)

- **Objectives**
  - To develop a general middleware platform that enables interoperation between mobile and stationary computers
- **Application**: emergency/crisis management
- **French partners**
  - Bernard Guy, Institut National des Télécommunication INT, Evry
  - Jean-Pierre Germain, Thales Communications, Colombes
- **Finnish partners**
  - Professor Juha Tuominen, Helsinki University of Technology:
  - Tapio Mäkinen, Nokia
- **Web page**: www-inf.int-evry.fr/AMPROS

AMPROS

Adaptative Middleware Platform for Proactive Reconfigurable Systems

OVERVIEW :

Ampros is a research project of the French-Finnish PROACT program, funded by RNTL, the Academy of Finland and TEKES, the National Agency of Technology of Finland. Ampros project aims to develop a ge middleware platform that will enable the interoperation between mobile and stationnary computers. It will be performed by two academic institutions (Helsinki University of Technology, Institut National des Télécommunications) and two companies (Nokia Private Radio Networks, Thalès Communications).
The project started in January 2003 and will finish in December 2005.

GOALS :

Technical Objective :

The technical objective of AMPROS is to design, develop and prototype a middleware-based platform in wireless networks with the generalizations that can be used for such services as emergency aid, crisis managements *etc*. The platform must address the challenges of interoperability, scalability, dynamicity and mobility in proactive environments.

Scientific Objective :

The scientific objective of AMPROS is to provide means to facilitate the development and integration of distributed dynamic proactive systems. This aim will be achieved by designing and implementing an open middleware platform which will be based on software components.

PARTNERS :

HUT, Finland

Juha Tuominen
Juha.Tuominen@hut.fi

INT, France. (INT is part of **GET**).

Guy Bernard
Guy.Bernard@int-evry.fr

NOKIA, Finland

Tapio Mäkinen
Tapio.J.Makinen@nokia.com

THALES, France

Jean-Pierre Germain
Jean-Pierre.Germain@fr.thalesgroup.com

CONTACTS :

- Project coordinator : Juha Tuominen
- Web mistresses : Dhouha AYED and Lydialle CHATEIGNER

www-inf.int-evry.fr/AMPROS

Adaptive Mobile Services – Design Parameters & User Experience (Adamos)

- **Objectives**
  - To explore and identify design parameters and develop design guidelines for future proactive services
  - To identify an experience model and how adaptation effects human experience
  - To define an adaptation architecture for proactive services
- **Finnish partners**
  - Professor Kari Kuutti, University of Oulu
  - Research Professor Heikki Ailisto, VTT Technical Research Centre of Finland
- **French partners**
  - Michel Ida, Commissariat à l'Energie Atomique CEA, Grenoble
  - Patrice Senn, France Telecom R&D, Grenoble
  - Jamet Laurent, ST Microelectronics, Grenoble
  - Jean Caelen, Université J. Fourier, Grenoble
  - Philippe Mallein, Centre National de la Recherche Scientifique CNRS, Grenoble
- **Web page**: http://www.vtt.fi/adamos/

ADAMOS
project

Adaptive Mobile Service

Design Parameters and User Experience Factor

The ADAMOS project website

he aim of the research in ADAMOS project is to design parameters for proactive services both from a theoretical and experiment
oint of view. The research will identify an experience model - what factors of adaptability have effects on the human experience
roactive environments, explore to which extent these factors are dependent on the cultural context and identify how to measu
em.

hese results will be used in deriving design guidelines and evaluation principles for future proactive services. In studying bo
xperience factors and the adaptation architecture it is necessary to construct an experimental proactive environment based on th
artner's existing facilities and platforms.

DAMOS is a joint project including partners from Finnish and French universities, research institutes and industry.

Continue

www.vtt.fi/adamos/

ADAMOS
project

Adaptive Mobile Services

Design Parameters and User Experience Factors

The Project

stract

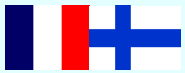
aim of the research is to design parameters for proactive services both from a theoretical and experimental point of view. The earch will identify an experience model - what factors of adaptability have effects on the human experience in proactive environments, lore to which extent these factors are dependent on the cultural context and identify how to measure them. These results will be used in iving design guidelines and evaluation principles for future proactive services. In studying both experience factors and the adaptation nitecture it is necessary to construct an experimental proactive environment based on the partner's existing facilities and platforms.

ywords: *intelligent environments, user-centered design, user experience*

e aims of the project

- Explore and identify the design parameters for proactive services both from a theoretical and experimental point of view
- Identify an experience model; what factors of adaptability have effects on the human experience in proactive environments, explore to which extent these factors are dependent on the cultural context and identify how to measure them
- Develop design guidelines and methods and evaluation principles for future proactive services
- Define an adaptation architecture; the system of technological components necessary to manage the experience in proactive services

Context Management for Proactive Computing (ContAct)



- **Objectives**
  - To explore novel approaches, based on neural nets, to the detection and manipulation of contextual information
- **French partners**
  - Dave Snowdon, Xerox Research Centre Grenoble, Meylan
  - L'Institut National Polytechnique de Grenoble INPG
- **Finnish partners**
  - Research Director Petri Vasara, Jaakko Pöyry
  - Professor Olli Simula, Helsinki University of Technology
  - Markus Siponen, Ellipse Oy
- Web page: www.xrce.xerox.com/competencies/contextual-computing/projects/contact/home.html

› Research – *Contextual Computing*

Content Analysis ›
Document Structures ›
Image Processing ›
Home ›
Activities ›
Publications ›
People ›
Work Practice Technology ›
Past Projects ›
Demos ›

www.xrce.xerox.com/competencies/contextual-computing/projects/contact/home.html

CONTACT

› Goals

The goal of the Contact project is create a dramatic advance in the capabilties of contextual systems. By context we mean information that is not explicitly given to the computer by the user. For example, contextual information could include: the location of a mobile device carried by the user, whether speech is detected in the room, who or what a person is looking at, the level of keyboard and mouse activity on a PC, laptop or PDA and what computing applications (word processor, email, web browser) someone is using at a given moment.

Most current context senstive-systems use a single contextual variable - location - those that handle richer contextual information typically do so using user written rules that specify what action to take when a set of contextual variables have specified values. There are several problems with this approach

- Very few people want to have to write explicit rules to manage their context.
- Such rules soon become unmanageable for all but the simplest situations due to the complex nature of the sensed information and the fact that the behaviour that it is useful to recognise (eg meeting, chat) is often not precisely defined.
- Even subtle changes of behaviour may be enough to break these rules - they are likely to be brittle and hard to maintain.

Contact takes a different approach that will allow the user to benefit from computing services that react to their user's context and yet do not require complex programming from their users. A component-based approach will be used to build robust recognisers for specific activities (eg meetings). Machine learning techniques will be used both to build the specialised recognisers and also to combine their output to suit a given application. Users will be able to give feedback to the system to correct it in cases where it wrongly identifies their situation.

Behavioural Modelling in Context-Aware Systems (Beacon)

- **Objectives**
  - To develop methods for learning behaviour models
- Application: User tracking in a Smart Living Room based on a pressure-sensitive floor (EMFi sensors)
  - prediction of user's movements
- **Researchers**
  - Professor Juha Röning, University of Oulu
- **Web page**: www.ee.oulu.fi/complab/

Context Recognition by User Situation Analysis (Context)

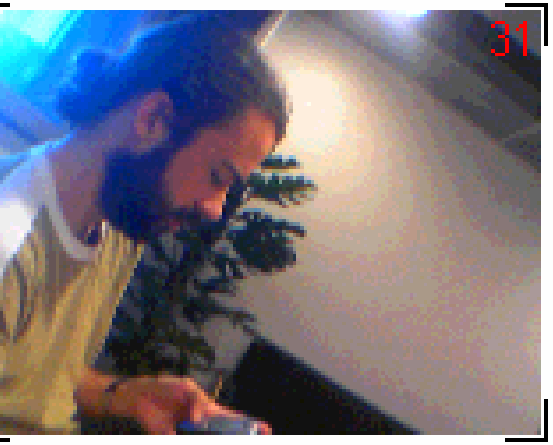
- **Objectives**
  - To study characterization and analysis of information about the user's context and its use in proactive adaptivity
- Application: instant mobile messaging
- **Finnish partners**
  - Professor Hannu Toivonen, University of Helsinki
  - Director Martti Mäntylä, Helsinki Institute for Information Technology HIIT (HUT&UH)
- **Web pages**: http://www.hiit.fi/fuego/context/ and http://www.cs.helsinki.fi/group/context/

On Mika's phone

On Renaud's phone

Camera

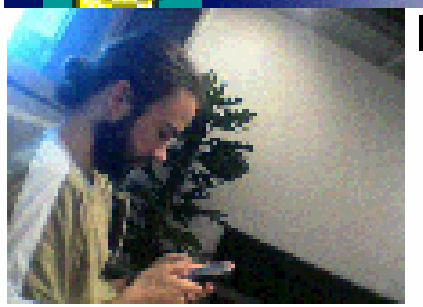
Standard



otions

Ex

Browser

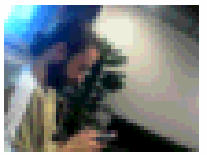


Location: Exactum Time: Mon Aug 9 09:21:24 2004 We tend to be seen walking around, looking stupidly at the phones

Options

Top

Context Log



Tag: Developing

Description:

We tend to be seen walking around, looking

Unload

Cancel

Living in Metamorphosis: Control and Awareness in a Proactive Home Environment (morphome)

- **Objectives**
  - To develop design principles of proactive home applications
  - To develop guidelines for creating proactive interior elements and other objects for future homes
  - To study combinations of new materials and technologies to meet the demands of the two previous research dimensions
- **Finnish partners**
  - Professor Frans Mäyrä, University of Tampere
  - Professor Jukka Vanhala, Tampere University of Technology
  - Professor Ilpo Koskinen, University of Industrial Arts Helsinki
- **Web page**: http://www.uta.fi/hyper/projektit/morphome/

main page | project | research consortium | contact

ct focus:
esearch project examines the interface,
neering, design and acceptance issues related
oactive applications in a social and material,
yday environment. New solutions are needed
ontrolling intelligent objects and services, and
ediating awareness of their capabilities and
nal state to the users.

st year activity overview (PDF presentation,
27, 2003)
working diary, 2003 (in Finnish)
me probes study report, 2003 (in English)

Living in Metamorphosis –
Control and Awareness in
Proactive Home Environ

morphome

http://www.uta.fi/hyper/projektit/morphome/


http://www.uta.fi/byper/projektit/morphom


http://www.uta.fi/hyper/projektit/morphom

Machine Vision for Sensing and Understanding Human Actions

- **Objectives**
  - To detect human skin
  - To detect and recognize human faces
  - To track humans and other moving objects
  - To develop an embedded vision module for sensing and identifying humans and their actions
- **Researchers**
  - Professor Matti Pietikäinen ja Olli Silvén, University of Oulu
- **Web page**: http://www.ee.oulu.fi/research/imag/proact/

Methods and Models for Intelligent Garment Design: Interdisciplinary Approach to Accessible and Usable Wearable Clothes (MeMoGa)

- **Objectives**
  - To determine how clothing and dress fit into ubiquituous environments
  - To define usability and social acceptability of wearable intelligence using 3D simulations and animations
  - To develop design methods for intelligent garments
- **Finnish partners**
  - Professor Minna Uotila, University of Lapland
  - Professor Heikki Mattila, Tampere University of Technology
  - Professor Osmo Hänninen, University of Kuopio
- **Web page**: www.ulapland.fi/?deptid=13080

Networking and Architecture for Proactive Systems (NAPS) – algorithms and protocols

- **Objectives**
  - To study dynamically organized wireless ad hoc networks
  - To extend the optimization of routing algorithms to the dynamic setting
  - To study the capacity of ad hoc networks
  - To develop new algorithms and analyses for topology control, clustering and routing problems in ad hoc networks
- **Finnish partners**
  - Research Coordinator Patrik Floréen, Helsinki Institute for Information Technology HIIT (HUT&UH)
  - Professor Jorma Virtamo, Helsinki University of Technology
  - Professor Pekka Orponen, Helsinki University of Technology
- **Web page**: http://www.cs.helsinki.fi/u/floreen/naps.html

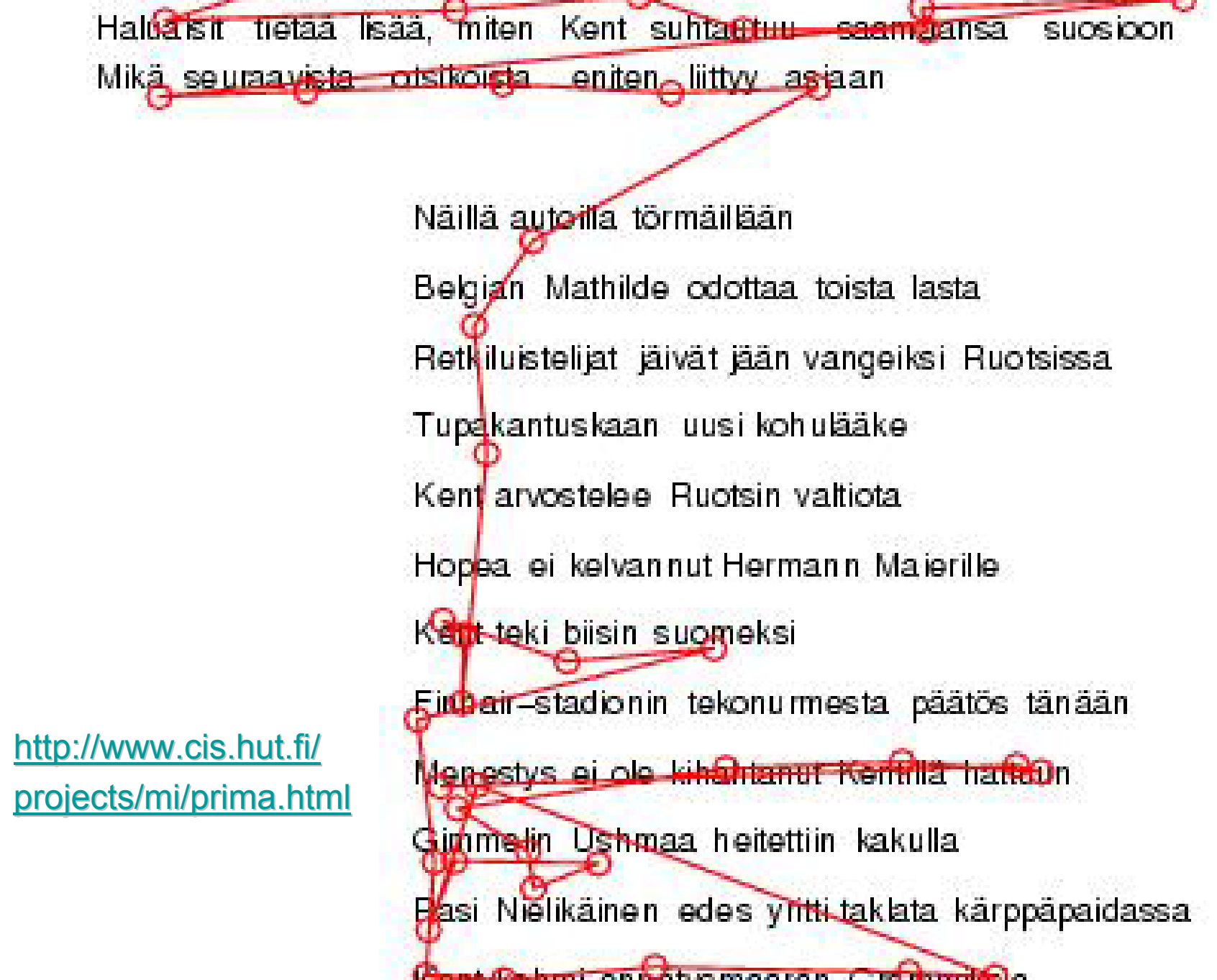
On-line Adaptive Brain-Computer Interface

- **Objectives**
  - To use physiological signals (EEG and MEG) of the brain for communication and operation by associating the signals to single commands
  - To study how the human part behaves in the mutual learning process
  - To determine how the brain interface is kept constantly tuned to its user
  - To detect classification errors automatically
- **Researchers**
  - Academy Professor Mikko Sams, Helsinki University of Technology
- **Web page**: www.lce.hut.fi/research/bci/


www.lce.hut.fi/research/bci/

Proactive Information Retrieval by Adaptive Models of Users' Attention and Interests (PRIMA)

- **Objectives**
  - To develop models underlying true personal assistants
    - models that learn from the actions of people to model their intentions and actions
  - To use the models for disambiguating the users' vague commands and anticipating their actions
- Application: eye movements, document content, interest history and collaborative filtering as a basis for inferring relevant or interesting
- **Finnish partners**
  - Academy Research Fellow Samuel Kaski, Helsinki University of Technology
  - Academy Research Fellow Petri Myllymäki, Helsinki Institute for Information Technology HIIT (HUT&UH)
  - Team leader Ilpo Kojo, Helsinki School of Economics
- **Web page**: http://www.cis.hut.fi/projects/mi/prima.html



http://www.cis.hut.fi/projects/mi/prima.html

Proactive Agents Supporting Children's Exploratory Learning

- **Objectives**
  - To develop a proactive tutoring system to help with children's conceptual learning and develop their thinking
  - Focus on both normal and visually impaired children
- **Application**: exploratory learning about natural phenomena (the globe, the solar system)
- **Finnish partners**
  - Professor Marjatta Kangassalo, University of Tampere
  - Professor Roope Raisamo, University of Tampere
- **Web page**: www.uta.f/proact/

Proactive Health Monitoring (ProHeMon)

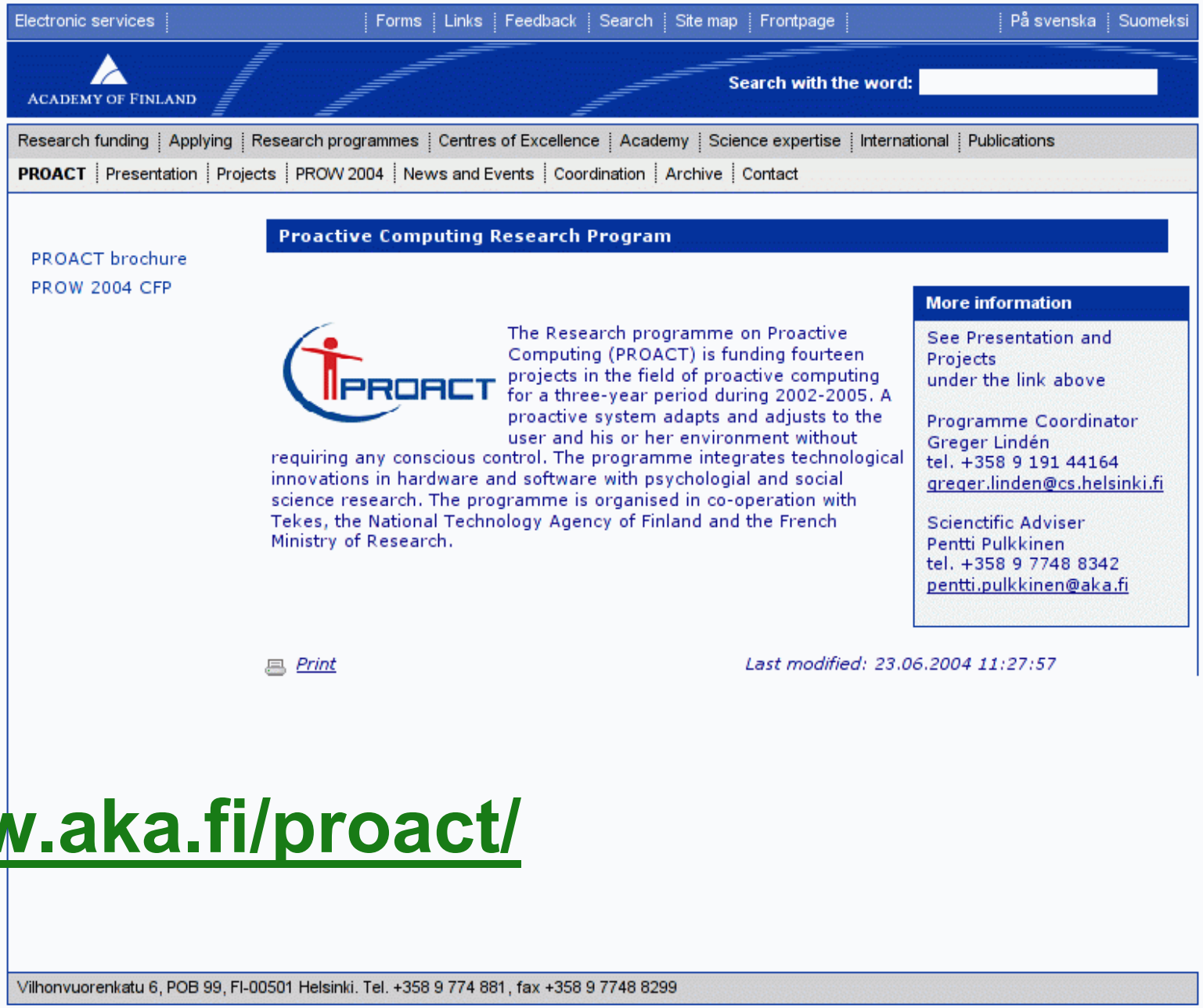
- **Objectives**
  - To develop methods that imperceptibly monitors the blood circulation and breathing of patients
    - EMFi sensors measure BCG and EMG signals
    - wireless communication to a personal computer
- **Application**: a medical chair performing the monitoring
- **Finnish partners**
  - Senior researcher Alpo Värri, Tampere University of Technology
  - Professor Väinö Turjanmaa, University of Tampere
- **Web page**: www.cs.tut.fi/~varri/prohemon.htm

Wireless Technology and Psychophysiological Computing

- **Objectives**:
  - To study and test new lightweight wireless sensor technology that can be used for monitoring of behaviours that are related to human physiological and psychophysiological responses
- **Application**: Wireless monitoring of eye movements and facial activity will be utilized to control a graphical user interface with the use of wireless electrodes
- **Finnish partners**
  - Assistant Professor Veikko Surakka, University of Tampere
  - Professor Martti Juhola, University of Tampere
  - Professor Jari Hyttinen, Tampere University of Technology
  - Professor Jukka Lekkala, Tampere University of Technology
- **Web page**: www.cs.uta.fi/hci/wtpc/

PROACT projects

- Devices and interfaces
  - Multimodal interfaces (3 projects)
    - Eye gaze tracking, facial and eye signal tracking, brain-computer interface
  - Intelligent devices (2 projects)
    - Intelligent garments, intelligent home appliances
  - Health monitoring, learning support (2 projects)
    - Heart monitoring, Children's cognitive learning
- Modelling
  - Context-awareness and adaptivity (3 projects)
    - Context-aware communication, context management, Design guidelines for proactive systems
  - User tracking and recognition (2 projects)
    - Pressure-sensitive floor, machine vision for user recognition
- Infrastructure
  - System integration and development (1 project)
    - Emergency/crisis system management
  - Network management (1 project)
    - Ad hoc networks & energy control



www.aka.fi/proact/

PROACT events

- **Mobile Computing Systems in Dynamic Environments**, special session at Software Engineering conference, 15-17 February 2005, Innsbruck, Austria, organised by Ampros
- **Human-computer interaction issues in proactive computing**, workshop at nordiCHI 2005, 24 October 2005, Tampere, Finland; organised by Context
- **PROW 2004** – PhD student workshop on proactive computing, 25-26 November 2004, Helsinki; organised by coordination
- Colloquium on Proactive Computing – lecture series in Finnish, Tuesdays 18 Jan – 3 May, 2005, Helsinki
- **Ambience 2005** – International Scientific Conference with Focus on Intelligent Textiles, Smart Clothing, Intelligent Ambience and their impact on our well-being, 19-20 September 2005, Tampere, Finland; organised by MeMoGa

- Thematic seminars during 2005 (under planning)
  - Context-awareness
  - Demonstration seminar targeted at companies
  - Final seminar (Paris?)

PROACT Coordination

- Objective
  - To support and advance the objectives of the research programme
- Internal communication
  - Communication with and assisting in co-operation between projects
  - Follow-up and site visits of projects
  - Arranging seminars, info days and meetings
- External communication
  - Publicity relations
  - Cooperation with similar programmes
- Administrative tasks
  - Programme preparation and launching, applications
  - Progress reports
  - Programme evaluation
- Programme Coordinators:
  - Greger Lindén (HIIT/UH/FIN),
  - Martine Comberousse, Ilarion Pavel (MRNT/F)

Conclusion

- In proactive computing the system predicts the user ’s needs and acts in advance to help the user.
- It may be especially handy for
  - the elderly,
  - the disabled,
  - children, and
  - computer-challenged persons
- in their everyday life.
- The PROACT programme is a joint research programme between Finland and France on proactive computing
  - Funding: ~8 million euro
  - Extension: 14 projects (41 research teams)
  - Duration: 2002-2005 (3 years)
  - www.aka.fi/proact
- More information:
  - Programme Coordinator Greger.Linden@helsinki.fi