



Ambient Assisted Living Joint Programme

Project full title:

**Development of a non-invasive CAPactive sensor
oral MOUSE interface for the disabled elderly
(CAPMOUSE, AAL-2008-1-203)**

Deliverable report:

D6.4 Four (4) articles in international magazines

AAL project number:

Project starting date: 15/06/2009

Project duration: 30 months

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Contributors: BD, HMC, LOTS, PRO





Overview

Over the project duration three articles have been published in international publications:

Public Service Review: European Union; issue 19;

Public Service Review: European Union; issue 20;

Public Service Review: European Union; issue 22.

In addition, the Capmouse project was presented in the AAL forum for 3 times (once a year), which we have counted equal to one international publication. All articles and the presentation that was the basis for the AAL Forum Award in 2011 (Lecce, Italy) can be found below.



Ambient assisted living

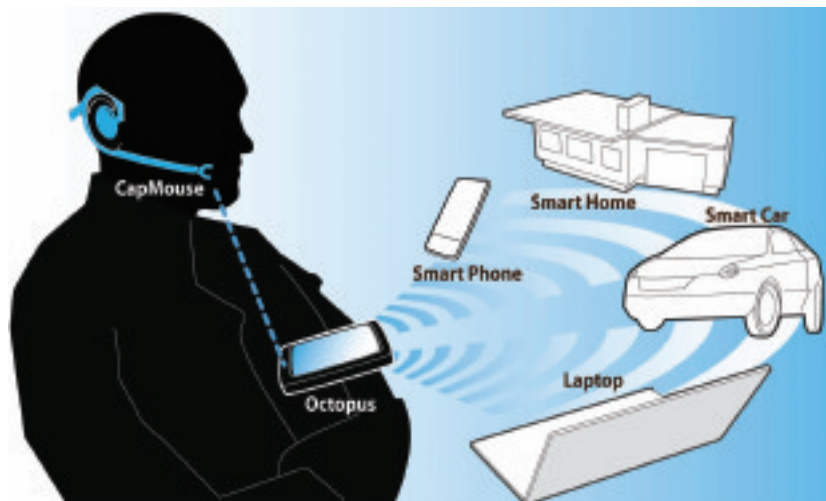
Bring the issue of 'ageing' into development agendas...

As the United Nations has declared for over a decade and is promoting via its 'Active Ageing' programme, the great challenge of the 21st Century is to improve the quality of life of people of all ages. In order to meet this challenge, it is essential to bring the issue of 'ageing' into the development agenda of all countries.

Assistive technologies and IT innovations play an increasingly greater role in everyday life, no matter whether for the able-bodied, the disabled or the elderly. The older people get, the more the activities of self-help and social involvement come to play a part in determining their life quality and the more delicately the issues have to be approached. From a multitude of available electronic devices, only a small fraction is targeted for and constructed for the special needs of the elderly, ie. ease of use, suitability, functionality, controllability, security, degree of integration with other devices (especially various modern communication and home devices), as well as accessibility, price and cost-effectiveness.

The CAP MOUSE project, granted by the EU AAL Joint Programme, aims at delivering a novel non-invasive IT solution for the disabled people (who make up a significant proportion of the elderly), to increase their mobility, ability to cope entirely by themselves and retain their 'quality of life', thereby making them independent of assistants (home care, nursing houses, etc.) or several assistive devices.

The project promotes the creation of new solutions with a holistic approach to management and support services, and the social and socioeconomic environment related



The solution under development represents an intuitive tongue-controlled interface for people with muscular disabilities


to chronic conditions. The CAP MOUSE project unquestionably has a clear European dimension with high relevance and with maximal impact on progress in furthering individuals' physical, psychological and social wellbeing, and the project is in correlation with several European Union and World Health Organization initiatives on ageing well.

‘From a multitude of available electronic devices, only a small fraction is targeted for and constructed for the special needs of the elderly...’

The non-invasive tongue controlled interface is based on a unique beyond state-of-the-art technology, which will be widely usable when integrated with several devices and will be of great help for elderly people and care institutions all over Europe and elsewhere. The beneficiaries will, in addition to the elderly persons and their families, be the healthcare

and service providers, and the states thereafter.

The CAP MOUSE project is a European collaborative project including: Brusell Dental, Norway, the project coordinator and provider of the Cap Mouse technology, HMC International, Belgium, provider of the Octopus ICT, PRO, the biggest Swedish organisation for retired people, LOTS Design and Stinct, Sweden, industrial design. End-user involvement is crucial in the AAL project and extensive testing is beginning in the second quarter of 2010.



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User involvement...

...for successful product development...

The goal of the CAP MOUSE project, funded within the European AAL framework, is to enable the elderly with disabilities to be active in social life by using modern communications technology. To meet this need, the CAP MOUSE was developed.

The industrial design is crucial

The industrial designer's role is to understand user needs, the industrialisation process and market requirements, and combine these into successful products that attract the end-user.

The degree of handicap/mental capacity, the amount of time spent using the device, the frequency of putting on or taking off the device and the variety of user situations decide what kind of design configuration (mechanical platform) is needed to satisfy different users' needs. This may result in different products for different user groups. In the process, these platforms are materialised as design concepts.

The main focus of the five concept prototypes developed was to evaluate user response regarding stigma, comfort, ease of use, willingness to use, ability to use, preferences and ergonomics. The concept evaluation will 'boil' the results down to two concepts for further development.

The goal of our work is to develop a product that the user comprehends, is able and, most importantly, willing to use. Active communication and close relationship with the user throughout development is a requirement to meet these goals.

Ability, understanding and willingness to use a product are often the main concern in bringing a product to market. For these reasons, user



studies and feedback play an important role in product design and development. The interaction between product developers and users brings innovation to a product, as well as targeting the right user group for the right product.


For this reason, the National Organization of Elderly (PRO) was involved at an early stage and a group of users showed interest in participating. These users have been our main source of information and feedback on user situations and industrial design concepts. Their input has been translated into innovative design solutions that will be further developed in upcoming development phases.

To define adjustability needs, plotting of facial reference points resulted in a visualised definition on how users vary physically in critical areas. The material will be used to develop product adjustability requirements.

The CAP MOUSE is a patented innovation that the elderly find very easy to understand and use. The development in the area of ICT is extremely fast and many elderly persons find it difficult to adapt to this fast development.

Brusell Dental wants to make it easier for this user group to reach out to the possibilities of the modern computer.

The input device has been a bottleneck in the access to computer power but with the CAP MOUSE even disabled elderly will be able to participate in web activities. Thus, user involvement is crucial for reaching the goals of the AAL Project - funded by the Norwegian Council of Research and the AAL member states of EU. HMC International, Lots Design, Stinct, PRO and Brusell Dental are cooperating in the project.



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In the loop

As the digital environment evolves, Brusell Dental AS Coordinator Tomas Brusell considers how the elderly can successfully harness ICT to sustain social interactivity...

There is no reason for older people in Europe to miss out on the benefits of new technologies. The solutions and services resulting from this programme will help them to remain active in society as well as staying socially connected and independent for a longer time," said EU Justice Commissioner Viviane Reding, former EU Commissioner for the Information Society and Media.

This quote contains the very essence of a humane philosophy in a world that has changed as much since the personal computer was introduced on the consumer market as the world did after Gutenberg.

With the book, and now the computer, the elderly can remain active in society as well as socially connected. When people can stay informed without leaving their home and are able to communicate conveniently and almost free of charge with other human beings – online and in real life – they still belong to civilization.

The elderly are, in fact, needed for the salvation of civilization itself. Wisdom and life experience are essential, and these valuable assets cannot be stored away in low tech homes if European civilization is to survive at all.

In Europe the ageing population has the most developed and advanced healthcare system in the world to rely on. When the geographical scope is shrinking, if elderly people don't miss out on ICT, they will have a say in the democratic system.

And as they retire, they will also have plenty of time to participate in political and economic decision-making. With new technologies the elderly will not only be able to demand their welfare rights, which they have paid for during a long, active professional life, but they will also be able to contribute to society. Interactivity is the keyword here.

The sphere of professional helpers circulating an elderly person in the European healthcare system represents a manifold of knowledge and skills. But can the person in the middle rely on all of these professional helpers and in that case, will it be possible to get help just when it's needed? Again, it is a question of interactivity.

Due to the success of the general welfare system, more people are reaching old age, being healthier and more active.

Professor Wolfgang Lutz, one of the world's leading demographers, said: "Our newest statistics show that the



worldwide process of ageing is rapidly occurring. Politicians and economists therefore have to contribute long-term strategies. Otherwise we will be overrun and unprepared by the potential developments."

‘What is crucial for getting the research and development of geriatric ICT on the right track is to ask the elderly what they themselves really want...’

Funded by the EU AAL Joint Programme, the Ambient Assisted Living (AAL) CapMouse Project aims to enhance the interactive possibilities that come with ICT.

"The products of the future are increasingly being designed to allow people to achieve everything that they would like to at anytime and anywhere," says Professor Markku Wilenius, trend researcher at Allianz Group. "You do not need a crystal ball to describe the next generation of notebooks and mobile phones: their operation will be simpler and at the same time more user-friendly."

Elderly persons are often home alone and there are many barriers to overcome to reach out for ambient assistance when it's most needed in a simple and user-friendly way, but smart home research is making rapid progress and many EU financed projects will result in devices for intelligent alarm systems.

There is, however, a tendency in this development for the communication to be one-way: a technological signal may come from the home of the elderly person that something has happened, as the behaviour of

the monitored person is unusual. The person with responsibilities for following up the alarm signal, as a first step, contacts the person in question by phone. If there is no answer, the health team goes to the home of the elderly person to check out the problem, and hopefully solve it before it's too late.

What is crucial for getting the research and development of geriatric ICT on the right track is to ask the elderly what they themselves really want – do they feel that they are surveyed and looked after like prisoners in a cold technological system, or do they feel safety and the goodwill of relatives and society as a whole?

‘Buttons and screens are so small and detailed that many elderly individuals are excluded from using them, and with rheumatic diseases and other functional disturbances, the tools for ICT are often unfit for elderly persons.’

An important factor for the wellbeing of an elderly person is the degree of interaction. Does the elderly person have the right to decide when to communicate and on what level?

An important ethical issue, which is seldom discussed in technological terms of the modern R&D, is how to defend the integrity of growing old and the interactive right to decide when to be approached by helpers.

End-user studies are more important than ever when it comes to providing technological solutions to the problems in geriatric healthcare and safety systems.

The Swedish organisation for the elderly, PRO, has for many years arranged courses on how to use modern computers; an educational system with up to 50 ‘cirkelledare’ (circle leaders) in every one of the 26 member districts, arranges courses for up to 10 people at a time, and since its inception in 2000, tens of thousands of elderly people have been able to learn how to use Word, how to send an e-mail and how to go online.

The driving force behind this pedagogic endeavour is personal interest in the technology and the ability to use it in a plain muscular sense.

Elderly persons often suffer from muscular disabilities and have difficulties activating a PC/Mac/iPad or the remote control, for example. The input technology for interactivity is more difficult to control with the further miniaturisation of computer technology advances. Buttons and screens are so small and detailed that many elderly individuals are excluded from using them, and with rheumatic diseases and other functional disturbances, the tools for ICT are often unfit for elderly persons.

The AAL CapMouse Project provides alternatives to manual input devices, like voice recognition and eye



The sphere of professional helpers circulating an elderly person in the European healthcare system represents a manifold of knowledge and skills

recognition, taking into account the oral muscles of the tongue and the lips for controlling the digital environment. An intuitive technology, it is based on geriatric research stating that oral activities are the last ones to deteriorate with age.

To be able to change the way we think about controlling computers and electronic devices, the people being assisted have to be asked what they think. The end-users must be invited into R&D, which is exactly what the AAL project aims to achieve, and interactivity and freedom from control are the pillars of the project.

We are, in this respect, not only thinking of control of ICT but control of the person. Elderly people in Europe tend to look upon themselves as free individuals, allowed to come and go as they like, and when the physical restrictions appear with old age, the feeling of imprisonment might be projected on those persons helping them to make it through the day.

The real prison – the old body – might be out of focus in the psychological state of growing old.

Geriatric research shows that the final questions of life and death have a tendency to be placed away in the ‘subconscious’ while the questions of strictly material things, like food and water, the lavatory, medication to avoid pain and suffering is fully ‘conscious’.

The oral activities are especially conscious, so an intuitive and straightforward method to control the digital environment will give the elderly and disabled a new tool for interactivity.



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AAL Joint Programme *The **CapMouse** Project*

The Truly Hands Free Human Interface



AAL Joint Programme
The CapMouse Project

When you think you have seen it all:
Learn about a IT mouse system the world
has never seen



Imagine:

Most of same functionality
No touch
No cords
A world of new applications

AAL Joint Programme
The CapMouse Project

A mobile C-arm X-ray machine is shown in a clinical setting. The machine consists of a large, black, articulated arm that can rotate around a patient. A control console is attached to the base of the machine, featuring a joystick and several buttons. A mobile device, possibly a tablet or a specialized control unit, is mounted on the side of the machine. The device has a screen displaying some information and a small antenna. The background shows a white wall and a green vertical stripe.

*The patented **CapMouse** technology –
better than the competition*



AAL Joint Programme
The **CapMouse** Project

The **CapMouse** technology – a new,
non-stigmatizing option for digital
access and remote control

AAL Joint Programme **The CapMouse Project**

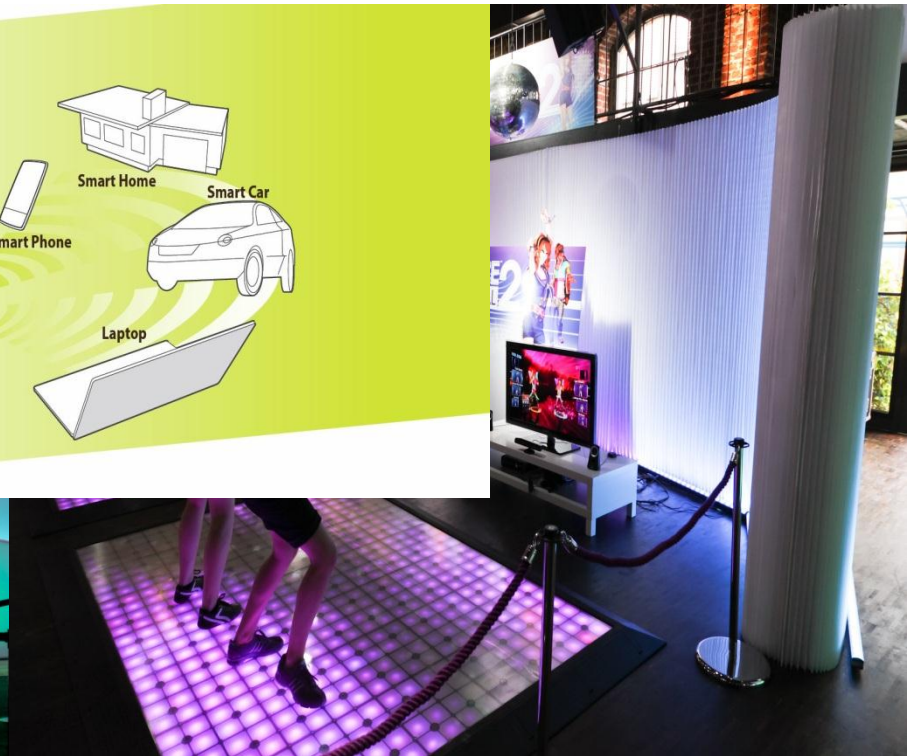
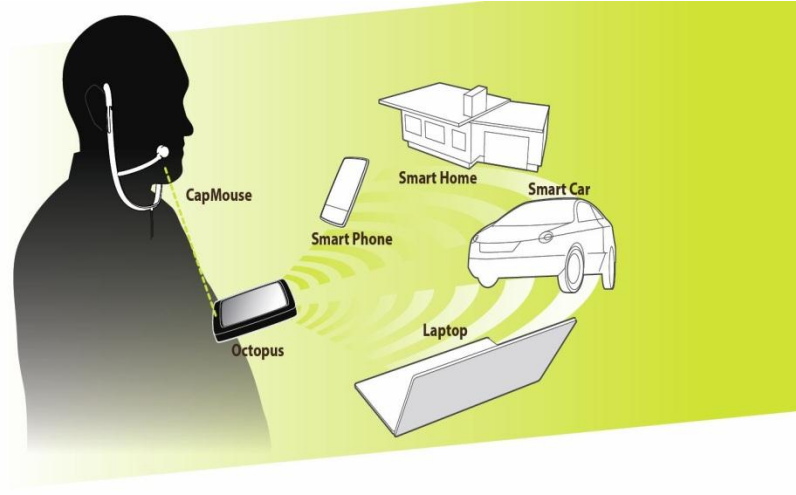
CapMouse opens up a simple way for elderly with muscle illnesses, people of all ages with high spinal injuries or Carpal Tunnel Syndrome to control and communicate with the environment around them. This has not been done in the same way before.



AAL Joint Programme The **CapMouse** Project

Gaming industry have been innovative in finding ways to interact with digital interfaces through

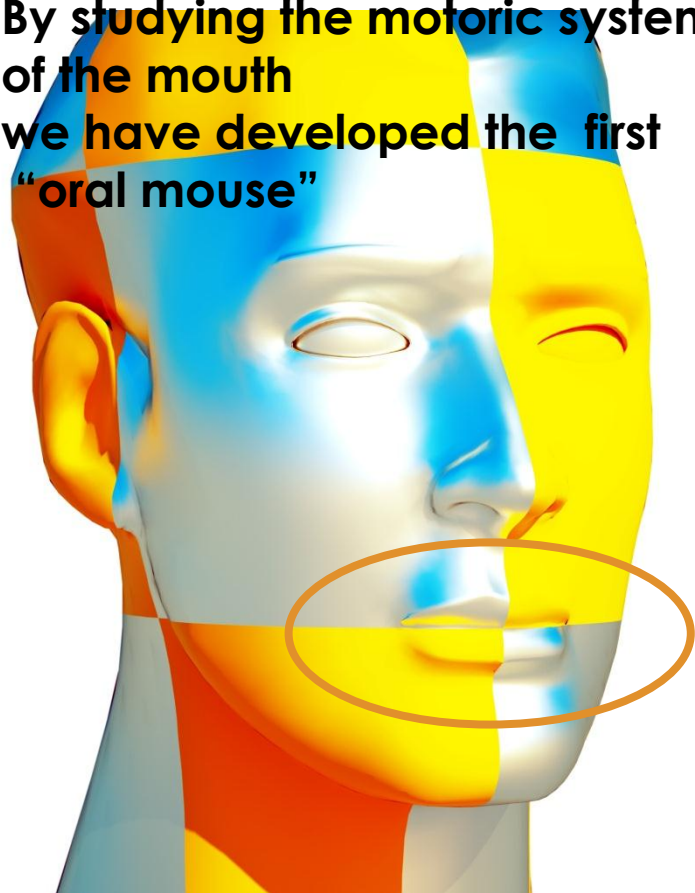
- ✓ Moving hands and arms
- ✓ Moving head
- ✓ Moving feet
- ✓ But never the using your mouth



AAL Joint Programme The **CapMouse** Project



By studying the motoric system of the mouth we have developed the first "oral mouse"



AAL Joint Programme **The CapMouse Project**

Financing of the CapMouse Project
by the 23 member states funding
the EU AAL Joint Programme



And by

The Research Council of Norway



The Belgian/Flanders Innovation Agency



Sweden's Innovation Agency





AAL Joint Programme **The CapMouse Project**

The Truly Hands Free Human Interface

