



Dem@Care

Dementia Ambient Care: Multi-sensing Monitoring for Intelligent Remote Management and Decision Support

Dem@Care aspires to develop an innovative multi-parametric remote monitoring framework that will enable timely diagnosis, assessment, maintenance and promotion of self-independence of people with dementia

Objectives of the project

Clinical context

Dementia, a leading cause of disability in the elderly, currently affects nearly 10 million people in Europe and over 35 million worldwide. Rising at unprecedented rates, these figures are projected to increase to 14 and 65.7 millions respectively by 2030. The socioeconomic repercussions are equally staggering. In Europe alone, the total costs of dementia amount to over €180 billion in 2010 and are estimated to exceed €250 billion by 2030.

The aforementioned inflict a significant burden on healthcare systems, society and the economy, necessitating effective treatment means, while preserving quality of life for the people affected and for their carers.

The project

Dem@Care develops a remote care solution that will contribute to enhanced diagnosis and timely, personalised support by deepening the understanding of how the disease affects everyday life and behaviour among people with dementia.

Dem@Care's main objectives are:

- Advance clinical research, by correlating behavioural and cognitive monitoring parameters with dementia-specific patterns.
- Timely diagnosis, continuous follow-up and personalised, adaptive feedback, by enhancing clinical workflows and enabling objective assessment of health status and progress.
- Sustain self-independence, autonomy, safety and sense of security, by direct support to people with dementia and their carers.
- Raise awareness of ICT solutions for ageing well.

Project Description

Current clinical workflow for dementia involves geriatric assessment by clinicians through visits and questionnaires, where diagnosis is based on changes in cognitive functions, behaviours and activities of daily life, characteristic of the dementia syndrome and its underlying diseases.

Dem@Care aspires to enhance current practises through a closed-loop remote management solution that affords interactive feedback to the person with dementia, while at the same time including clinicians into the remote follow-up, enabling them to maintain a comprehensive view of the health status and progress of the affected person. Specifically, it implements:

- A loop for people with dementia and their informal caregivers that: i) monitors and assesses their cognitive and behavioural status by integrating a multiplicity of wearable and in-situ sensors, ii) enables time evolving context-sensitive profiling to support reactive and proactive care, iii) provides personalised and adaptive support.
- A professional loop that: i) provides objective observations regarding the health progression of the person with dementia and medication effectiveness, ii) warns about trends closely related to dementia (e.g. apathy), iii) supports preventive care decision making and adjustment of treatment recommendations.

To alleviate the subjectivity of current clinical practises, while accounting for the complexity and heterogeneity of the disease, Dem@Care follows a multi-parametric behaviour interpretation of sensors for monitoring daily activities, lifestyle patterns, speech impediments, state of mood, and vital signs.

Clinicians, people with dementia and their carers are involved throughout the analysis, design, development and testing phases in order to maximise the afforded impact. Additionally, ethical assessment ensures that the dignity and privacy of people with dementia is not affected more than is motivated by the benefits that the system will bring to them, while ways of protecting identifiable personal data in an unobtrusive manner are included.

For validation, three pilots will be carried out in Ireland, France and Sweden, in collaboration with regional clinics, residential care centres and health councils. In each pilot, system implementations of increasing functionality will be evaluated.

PRACTICAL EXAMPLE

In Dem@Care, people with dementia will be monitored by various sensors in everyday life tasks such as cooking or watching TV, cognitive activities and social interactions. At first stages this will take place in controlled environments and later in the homes of people with dementia. These observations will be automatically analyzed and interpreted allowing the correlation of specific behavioral patterns with the disease progress and also direct, personalized feedback. For example, long-term apathy detection can contribute to the understanding of how the disease affects every day life and behavior and on the same time provide feedback and stimulation towards a more active lifestyle.

Appropriate experimentation and evaluation protocols will be defined so as to robustly address clinical assessment as well as critical quality aspects including acceptability, usability, functionality, reliability and safety.

Expected Results & Impacts

Dem@Care expects to enhance current clinical practises and afford new knowledge related to the diagnosis and management of dementia. More specifically, Dem@Care is anticipated to result in:

- clinical protocols that will effectively correlate sensorial inputs related to behavioural and cognitive patterns with dementia-specific parameters.
- elicitation and validation of new clinical knowledge for improved diagnostic precision and effectiveness.

These results will allow Dem@Care to have a strong impact on the quality of life of people with dementia, with direct effects on their informal carers as well, by providing:

- Improved quality of care, through objective, comprehensive diagnosis, and customised reactive and proactive support.
- Increased safety and sense of security, through real-time adaptive feedback and alarms.
- Timely treatment of disease symptoms, afforded through early detection of health status degradation and through personalised cognitive support.
- Sustained independence and autonomy, enabling to better cope with daily life functions, while reducing the need for constant monitoring.

In parallel, Dem@Care expects to have significant socioeconomic benefits, including:

- reduced cost of clinical care
- reduced cost of monitoring
- delayed admittance to nursing facilities
- sustainable at-home care solutions



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- CHU de Nice (France)
- Vistek Isra Vision Yapay Görme ve Otomasyon Sanayi ve Ticaret Anonim Sirketi (Turkey)
- Link Care Services SA (France)

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KEYWORDS

Multi-parametric behaviour interpretation, Personalised health, Remote management of people with dementia, Continuous multi-sensor monitoring, Context-aware adaptive feedback