CAPTAIN Objectives

Radically new HCI
CAPTAIN introduces new tangible interaction means, based on Projected Augmented Reality in AAL Environments.

Indoor monitoring
Collection and analysis of emotional, behavioural and physiologically data through unobtrusive means.

Personalized guidance
Motivation engine designed to engage users in healthy nutritional and exercise habits, cognitive activities and social interactions.

Physical and cognitive training
Physical and cognitive training through serious games to increase engagement levels.

CAPTAIN open API
A set of open APIs will be released to allow further extensions and adoption of CAPTAIN by third parties, including researchers and private companies.

Stakeholders community
Relying on the living labs’ power, CAPTAIN builds the “CAPTAIN Stakeholders’ community”.

Agile requirements elicitation
the “Stakeholders’ community”, will be the only official source of requirements towards continuous co-creation throughout the project.

Real world scenario
CAPTAIN will be tested in three Living Labs (Thess-AHALL, INTRAS Living Lab, 27 Delvalle and AUSILIA) as well as in real homes of volunteer older adults.

Our vision is to turn the homes of older adults into a gentle coach, providing smart assistant whenever and wherever it is needed, based on their activity.

To do so, CAPTAIN uses micro-projects and projected augmented reality to turn all surfaces into tangible interfaces for personalized information and reminders.

CAPTAIN: Coach Assistant via Projected and Tangible Interface

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Envisaged Outcome

CAPTAIN will foster a truly user-centered co-design philosophy with constant involvement of older adults in the design, development, and testing of:

- A **smart home appliance** which will embed miniature 3D scanners, cameras, pico-projectors, microphone arrays and environmental loudspeakers. It will be used to turn a room into an interactive, tangible interface. Different configurations of the appliance will be designed together with seniors to ensure the device blends with the room decor (e.g., resembling a lamp), to avoid stigmatisation and to enhance end-user acceptability.
- A **software environment** turning the home itself into a projective and very user-friendly interface, capable to capture relevant physiological, behavioural data and user actions, and to provide personalised “virtual coaching”, based on a gentle emotional computing metaphor through intelligent comprehension of the context.
- A **publicly available API** (Application Programming Interfaces), compatible with existing IoT platforms, exposing the system’s functionality to third-party systems.

Creation of a projective, tangible and emotional UI interface

Users will interact with CAPTAIN through tangible interfaces. CAPTAIN will transform the living environment into an interactive environment where the senior can interact with the home intelligence using their hands. The interactions will include simple contact interaction, contact area interaction, brightness interaction, object interaction and gesture interaction. The controllers will be very intuitive and an artificial intelligence algorithm will be applied. Also, the interface will integrate voice interaction and control of home devices, as well as, speech interaction with the virtual coach.

Non-invasive physiological and emotion data collection and analysis

CAPTAIN’s psychological and emotion data collection and analysis from video will use facial micro-expression and human body pose analysis compatible with mobile and network cameras based on deep learning to assess how patients are feeling over time. This activity will support the collection of assessment data and how computerized tools can be used to assist in the management of a person’s emotional state. CAPTAIN software will focus on deep learning based algorithms that will run on video streams from network cameras (fitted within the appliance). Data will be provided through standard open API frameworks.

Non-invasive movement and gait data analysis

Movement and gait analysis will rely on the use of range cameras which operate as a real-time 3D scanner. The system is able to extract in real time the position of the persons in the room and of their body parts (i.e., head, torso, arms, legs) through use of a 3D sensor. The camera’s work configuration on in order to detect conditions of risks. Real time execution and extraction of the senior’s position, posture and walking direction extracted from range cameras will be fed to the CAPTAIN system.

Physical and cognitive training through serious games

The CAPTAIN’s physical and cognitive training will be supported by an existing physical and cognitive serious games platform which has been tested with more than 200 elderly participants (healthy and with Mild Cognitive Impairment), exhibiting good efficacy and usability assessment as well as high adherence to a daily schedule. Designed and developed tailored to the seniors, its architecture introduces standard physical exercise protocols in exergaming software engineering, as well as, standard physical assessment tests for augmented adaptability through adjustable exercise intensity.