# MARIO: Managing active and healthy ageing with use of caring service robots

**Title:** MARIO: Managing active and healthy ageing with use of caring service robots

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MARIO
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MARIO: Managing active and healthy aging with use of caring service robots

• Aims to address the difficult challenges of loneliness, isolation and dementia in older persons through companion/service robots.

• 10 partners from 6 Countries- France, Italy, Greece, Germany, Uk, Ireland

• 3 pilot sites for the introduction of MARIO robot –
  – Italy (Acute Hospital) , UK (Community) & Ireland (Nursing Homes)

• Duration 3 years February 2015- February 2018
Who is Mario?

• A companion robot aiming to help People With Dementia (PWD) battle isolation and loneliness
Why a companion robot?

- No cure yet but
- Psychosocial interventions (PSI’s) - non-pharmacological interventions include behavioural therapies, educational programmes, psychotherapy and social support interventions.
- (PSI) can optimise functioning, promote social connectedness and autonomy; enhance QOL and slow down deterioration

The companion robot MARIO via the use of enabling technologies, provides PSI which focus on promoting social connectedness and reducing isolation

Why MARIO?

- An iPad and other smart phone technology could offer some of the applications but often may be too complex for most older people with dementia to access and use.
- An iPad is disembodied.
- MARIO is specifically developed and designed with PWD and their carers for use with PWD
- MARIO has
  - An embodied voice which will make it more acceptable
  - an easy-to-use interface so a carer, or family member can personalise it to the PWD’s individual needs and preferences
3 pilot sites

United Kingdom: Stockport - community

Ireland: Galway-Long stay residential care

Italy: San Giovanni - Hospital
Mario’s iterative design process

• Consulted key stakeholders including PWD across all sites
• Identified what PWD need Mario to do for them
• Identified what design elements they felt would make MARIO’s appearance more friendly
Evidence from the literature

Touchscreen technology
• Programs and apps presented on touchscreen devices can be customised to the needs of the users (Astell et al 2014),
• increase socialization, providing memory prompts, facilitate activities, and deliver educative tools (Lim et al 2013; Astell et al 2014)
• Support using the technology is common - person with dementia interacts with the technology in the presence of a clinician/ carer allowing input to be encouraged or shared (Weir et al 2014)
• More use could be made to deliver independent activities for meaningful occupation, entertainment, and fun (Joddrell & Astell 2016)
Evidence from the literature contd.

- Paro (Zoomorphic - Seal)
  - used to facilitate therapeutic work with people with dementia

Aibo (Zoomorphic – Dog)
  - found to stimulate more social interaction than a real dog

Babyloid (Humanoid)
  - less acceptability than Paro

- Giraff (Telepresence robot)
  - facilitated people with dementia to interact with their family
  - People with dementias' emotional response, communication and engagement improved as a result of its use
Influence on MARIO

• The creation of a group of applications including- My Music, My Hobbies, My Memories, and My Family and Friends activated by touch screen or verbal instruction.

• A central UI component developed to provide developers with specific UI patterns in developing their applications
  – Limiting freedom of design to developers
  – Keeping consistent user experience across apps
Change in MARIO’s appearance

Before

After
Challenges considered

• A number of potential challenges with people with more moderate to severe dementia in residential care considered
• Would the person with dementia understand MARIO when he spoke?
• Would MARIO understand the person with dementia when they spoke?
• How would the person react to the presence of a companion robot?
• Would the person interact with MARIO using simple apps to accomplish tasks? (listening to music, playing games reading news headlines)
• Would the person with dementia be able to use the touch screen?
Early acceptability and application testing

• Ethical approval obtained from
  – University Research Ethics Committee (Ireland)
• Informed consent obtained from people with dementia in the first instance and also next of kin
• Process consent also utilized continually checking if participants were happy to continue
Early Results

• Testing conducted over 4 weeks and on average, two interactions, per person, were carried out each week
• 5 people with dementia
• M=3; F=2; all in 80+ age bracket
• Moderate to severe dementia
• Most had dementia for previous 3 years
Data collection

- Bespoke questionnaires developed based on expertise of the team, literature and input from the MARIO Ethics and data privacy board & Advisory boards
  - One questionnaire for people with dementia to complete
    - Do you like how MARIO looks?
    - Can you hear MARIO?
    - Which application is your favorite?
  - One observational tool completed by the researcher facilitating the test
    - How involved the participant was in the interactions
    - How they seemed during the interaction experience
    - How long the participant spent with MARIO
Results (Participants)

- Liked Mario for the company
- Liked his appearance
- They would like to use Mario again
- No problem reading text on the screen
- Especially liked music and playing Simon game
- Some difficulties with using the touch screen
Results (Researcher’s observation)

- Timing of repeat prompts to make a choice was too soon for users who were still reading the text on the screen
- Multimodal interaction – screen and verbal instruction- in some cases challenging so tendency to focus on just the touch screen
- Robot voice was accepted
- However limited speech recognition software capacity (especially with long pauses, words mixing, accents etc.)
- Touch screen problems like multi finger touch, holding finger on screen, etc.
Resultant changes to MARIO

- Default timing adjusted to longer period
- Touch only mode added as an option for configuring MARIO
- Devote more time to training and working with people with dementia showing them how to use MARIO
- Change MARIO’s instruction wording from “Touch my screen” to “Tap my screen”
- Multimodal interaction must be carefully adjusted and customised based on stage of dementia
- Speech recognition software needs work
Limitations

• Small sample size
• Presence of researcher may have influenced people with dementias reaction to MARIO
THANK YOU!

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Find out more at http://www.mario-project.eu