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A personalised robot companion for older people

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A highly customisable robot companion designed by EU-funded researchers to offer support to older people is currently being presented across Europe and could find its way into people's homes within two or three years, potentially greatly enhancing quality of life for older citizens and people with memory or mobility problems.



[1]

The robot, a mobile wheeled semi-humanoid figure equipped with cameras, sensors, audio and a touch screen interface, can remind users to take their medicine, suggest they have their favourite drink or prompt them to go for a walk or visit friends if they haven't been out for a while. As part of a larger smart-home environment that can include smart clothing to monitor vital signs, the system can monitor user's health and safety, and alert emergency services if something is amiss.

'Across Europe, populations are growing older, and many people need care in some way. Care may be provided by professionals at home or in a care facility, but often the caregiver is the person's partner or another family member. What we are seeing is that carers may also need additional support themselves, especially if they are also older - our vision is that technology can provide it,' explains Mr Herjan van den Heuvel of Smart Homes, the Dutch Expertise Centre on Home Automation and Smart Living, which oversaw the robot's development.

The median age across the European Union's current 28 Member States, which was around 41.2 years in 2011, is projected to rise to 47.6 years by 2060, while the number of people aged 65 and over will almost double to make up 29.5 % of the population, according to Eurostat's latest population

projections. Meanwhile, the percentage of people aged 80 and above is expected to triple by 2060.

With age-related illnesses also set to increase in line with that trend, more and more people across Europe will need care and assistance if they are to maintain their quality of life, stay healthy and avoid social exclusion.

Developed over 33 months by a consortium of research institutes, universities and technology companies in seven European countries - Finland, France, Greece, Italy, the Netherlands, Switzerland and the United Kingdom - the companion robot helps address those issues. It is just one of several results of an EU-funded project titled 'An integrated intelligent home environment for the provision of health, nutrition and well-being services to older adults' ([MOBISERV](#) [2]), which received EUR 2.75 million in research funding from the European Commission.

Smart homes, smart clothes and smart support

'This has been a very broad project, we've worked not only on the robot but also integrating it with a smart-home system and with smart clothes,' Mr Van den Heuvel notes.

Smart fabrics - which can take the form of wearable garments or even bed sheets - include a variety of tiny light-weight wireless sensors to monitor vital signs or sleeping patterns, and can even detect if the wearer falls over. Meanwhile, the smart-home environment consist of smart sensors, optical recognition units, and home automation elements, to detect, amongst other things, eating and drinking patterns, activity patterns, and dangerous situations.

'The system can be used in its entirety for someone who needs extensive care, or only some components of it can be used to suit the needs of each individual. The technology can therefore be applied in a modular and flexible way,' Mr Van den Heuvel says.

He notes, however, that the robot is probably the most eye-catching and innovative element of the system.

Based on state-of-the-art artificial intelligence and robotics technologies, the MOBISERV robot companion is designed above all to offer cognitive support to users, offering reminders and suggestions to help them lead healthy and socially active lives.

'It lacks arms so it's not going to make you coffee but it is going to suggest that maybe you would like a coffee or some other drink if you haven't drunk anything in a while,' Mr Van den Heuvel explains.

By monitoring user's behaviour, the robot can learn to approach users at appropriate times, talk to them or provide information via a touchscreen interface. Users can respond by talking back or using the touchscreen. It can offer suggestions such as 'Are you feeling hungry?', 'Hey, don't forget to take your pills in the blue box' or 'How about calling your friend today?'

'The way the robot behaves, what it says, how it says it, even the tone of voice can be customised for each person,' Mr Van den Heuvel says.

Crucially, the MOBISERV team created an easy-to-use interface to configure the robot so a carer, partner, family member - or someone else who knows the user well - can personalise it for their individual needs and preferences, setting everything from the robot and user's name to the user's

preferred drink, their friends and the type of character the robot should have. In the future, the researchers also envision being able to customise the design and colour of the robot.

Older people and care providers were involved throughout the project, from providing advice on initial design requirements to testing out the final prototypes. In trials launched earlier this year in the Netherlands and the United Kingdom, the researchers conducted extensive user evaluation studies with the robot companion, varying from usability tests in a home lab, to full-day experience tests in a test home, to multi-day experiences in their own homes.

A robot with personality

'Older people were extremely positive about the robot. They can see the benefits of the cognitive support it provides and also, if they live alone, they like the idea of having something they can interact with. For some, it's almost like a pet with its own personality,' Mr Van den Heuvel says.

Professional care providers also saw the advantages, though they tended to be somewhat more sceptical.

'It's possible they worry that robots will replace them, but that is not our vision at all. We see technology and robots as a way to assist them and the people they are caring for, not as a replacement for human care,' Mr Van den Heuvel explains. 'Many carers, particularly family members who need to take care of someone 24/7, are suffering from burn out - this technology can assist them greatly.'

The prototype MOBISERV robots currently cost around EUR 10,000 to build, but that price should fall as technology advances - and through economies of scale if they are produced in large numbers. Mr Van den Heuvel envisions a robot companion costing around EUR 5000 within a couple of years.

The MOBISERV partners are currently seeking funding for follow up projects or a joint spin-off to further enhance and perfect their design, as well as conduct user trials on a larger scale.

MOBISERV received research funding under the European Union's Seventh Framework Programme (FP7).

Link to project on CORDIS:

- [FP7 on CORDIS](#) [3]
- [MOBISERV project factsheet on CORDIS](#) [4]

Link to project's website:

- ['An integrated intelligent home environment for the provision of health, nutrition and well-being services to older adults' project website](#) [2]

Link to related video:

- [MOBISERV project video](#) [5]

Information Source: Mr Herjan van den Heuvel of Smart Homes, Dutch Expertise Centre on Home Automation & Smart Living, Netherlands

Project coordinator
European Commission
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