


Faculty of Automation and Computer Science



Social robots and ontologies for personalized care of elders H2020 / AAL Remind


Author: Conf. Dr. Ing. Viorica R. Chifu

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Presentation Outline




- Context and Motivation
- Remind Project presentation
- Remind goals and objectives
- Remind Architecture Overview
- Remind Modules Description
- Relevant publications

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Context and Motivation




- Dementia has impact not only on the patients, but on their families, their relatives and friends
- Most researchers agree that, in addition to the standard pharmacological treatment, in the case of people with dementia is important to apply:
 - Person-centred care
 - Psychosocial interventions
 - Other non-pharmacological interventions
- One promising technology in care people with dementia is robots because they could:
 - Help in cognitive decline by providing an enriched environment, reminding patients to drink, take medicine or an appointment
 - Assist in social activities, cognitive and physical rehabilitation programmes by demonstrating exercises and providing feedback
 - Reduce the need for cares and the demand for care homes

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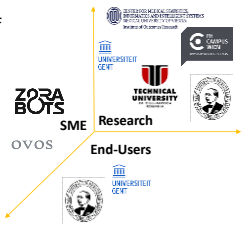


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Remind project presentation



- **ID:** AAL-2017-026 (AAL162/2020)
- **Title:** Robotic ePartner for Multitarget INnovative activation of people with Dementia (ReMind)
- **Duration:** 01.10.2018-30.09.2021
- **Program:** ACTIVE AND ASSISTED LIVING 2017 (AAL 2017) - H2020
- **Budget:**
 - 218.750 Euro (UTCN-DSRL)
 - 2.049.464 Euro (Total)
- **Addresses the following types of end users:**
 - Older adults with dementia
 - Formal / informal caregivers
 - Healthcare providers



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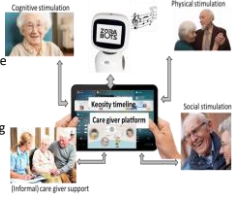
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Remind goals and objectives

ReMIND

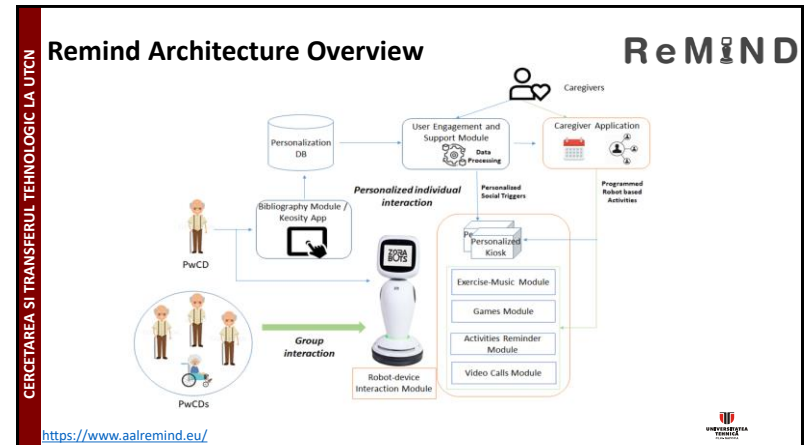
- **Main objective:**
 - Remind will develop a **robotic/tablet platform** that supports social interaction, connects people with dementia with their informal caregivers and stimulates memory and improves quality of life
- **Key aspects:**
 - Remind is based on the integration of existing solutions resulted from previous research with a new one:
 - Existing solutions:
 - **Keosity application** – allows older adults to create their biographies (e.g. create memories with descriptions, upload photos, connect memories with familiar persons, etc.)
 - **James robot** – enables older adults to engage in various activities (e.g. playing games, performing physical activities by following step-by-step videos, listening to music, making video calls); can remind older adults to take medication etc.
 - New solution:
 - **User Engagement and Support Module** – analyzed the biography created by older adults in the **Keosity** to infer social triggers that will allow the personalization of the James (i.e. personalized kiosks, personalized activities)



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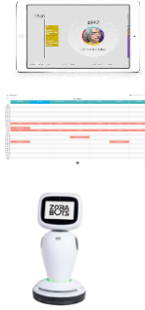
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Remind Modules Description

ReMIND

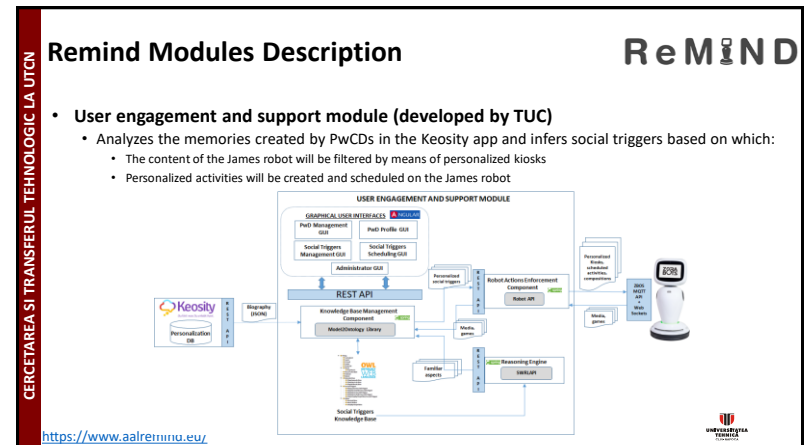
- **Biography module + Keosity app**
 - Ask the elderly person biographical questions about their interests (e.g. favorite music, musicians, movies) and store the collected data in a cloud database
- **Caregiver app**
 - Provides a calendar feature and a contact person lists allowing the CG to book and filter activities or events coming up during the day for PwCDs
- **Robot-Device interaction module**
 - Allows the PwCD to interact with the robot by giving voice commands to James and for James to speak to the PwCD
- **Exercise-Music module, Games module, Activities Reminder module, Video Calls module**
 - Modules for engaging PwCDs in various activities (e.g. performing physical activities by viewing tailored video exercises giving instructions and encouragements, playing games, making video calls, listening to music, etc.)



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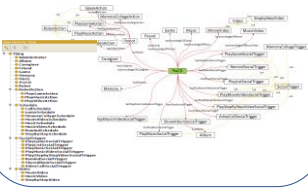


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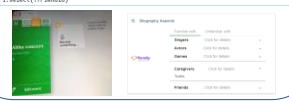
Remind Modules Description

ReMIND


- User engagement and support module – main components
 - Social Triggers Knowledge Base**
 - Data model implemented as an ontology
 - Contains relevant information about PwCD stored as ontology concepts and properties
 - Reasoning Engine**
 - Incorporates the Drools SWRLAPI-based rule engine which runs a set of SQLWR queries for extracting the familiar aspects based on which the personalized triggers will be created

```
Query for retrieving familiar music:
Parameters (p) = hasId(p, Id) = userMatches[Id, V] + partition Id = V | hasMemory(p, M)
+ hasDescription(M, D) = hasRobot(p, robot) = hasPlayMusicAction(robot, action)
+ hasMusicAction(Music) = has Singer(Music, Singer) = has(Genre, MusicId) =
+ has(containsIgnoreCase(M, Singer) -> superSelect(MusicId)

Query for retrieving familiar friends:
Parameters (p) = hasId(p, Id) = userMatches[Id, V] + partition Id = V | hasMemory(p, M)
+ hasDescription(M, D) = hasFriend(p, friend) = has(Friend, friendId) =
+ hasName(friend, Name) = user(containsIgnoreCase(M, Name)
-> superSelect(FriendId)
```



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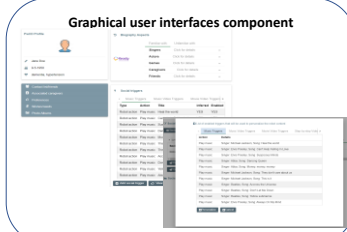


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Remind Modules Description

ReMIND

- User engagement and support module – main components
 - Robot Actions Enforcement Component**
 - Based on the social triggers it creates and enforces on the James robot:
 - Personalized kiosks
 - Personalized scheduled activities/compositions
 - Communicates with the robot by means of the web sockets and ZBOS MQTT API
 - Graphical user interfaces component**


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Published materials

- Papers
 - D. Moldovan, I. Anghel, T. Cioara, I. Salomie, V. Chifu and C. Pop, "Kangaroo Mob Heuristic for Optimizing Features Selection in Learning the Daily Living Activities of People with Alzheimer's", 2019 22nd International Conference on Control Systems and Computer Science (CSCS), Bucharest, Romania, 2019, pp. 236-243. doi: 10.1109/CSCS.2019.00046
 - Anghel, I.; Cioara, T.; Moldovan, D.; Antal, M.; Pop, C.D.; Salomie, I.; Pop, C.B.; Chifu, V.R. Smart Environments and Social Robots for Age-Friendly Integrated Care Services. Int. J. Environ. Res. Public Health 2020, 17, 3801. IF: 2.849 Q1 DOI
 - Moldovan, D.; Anghel, I.; Cioara, T.; Salomie, I. Adapted Binary Particle Swarm Optimization for Efficient Features Selection in the Case of Imbalanced Sensor Data. Appl. Sci. 2020, 10, 1496., IF: 2.474 Q2 DOI

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