Empowering People Living with Dementia in Smart Home

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**Motivations**
- Dementia forecasts: 1M by 2025 in UK.
- People with dementia (PWD) lose autonomy and independence. 45% living at home.
- Continued care is expensive and emotional taxing for carers.
- Social Health high expenses.

**Goals**
- Delaying placement in a care home avoiding stress of PWD.
- Supporting PWD living at home allowing their self-sufficiency.
- Reducing the caregivers’ stress due to a continuous care.
- Maintaining user’s safety derived from continuous monitoring.
- Reducing the cost in the early stages of dementia.

**State of the Art**
- Ambient Assisted Living (AAL) focus on the elderly.
- Real-time Activity Recognition(AR) using non-intrusive sensors.
- The large variety of low-cost sensors.
- Huge range of devices to interact with users.

**FuturE Work**
- Testing the system with people living with dementia.
- Incorporating more type of sensors to get more precise information and adding other ADLs and behaviours.
- Designing APP and user’s interface guided by Co-design.
- Evaluate the different ways of interacting with the user.
- Guiding the user to carry out Activities Daily Living (ADL).

**Testing & Validation**
- Deployed and tested at Middlesex University’s “Smart Spaces Lab”.
- The initial tests have provided good outcomes detecting activities as sleeping, eating or wandering, and interacting with user and caregiver.
- Currently, the research is focused on long-term testing.

**Achievements**
- Detecting user’s activities at home.
- Assessing activities and behaviours according to the user’s settings.
- Providing an interface to configure schedules and alerts.
- Coaching the user through mobile in case an unusual behaviour or activity is detected.
- Keeping the caregiver informed through mobile in case the user does not amend the behaviour.
- Storing ADL’s info in a server for doctors’ analysis and evolution.
- Differentiate the user’s activity from others dwellers.

**References**

**Future Work**
- Non-Intrusive sensors
  - Motion, pressure, energy, door/window
- Activity Recognition
  - Detecting Activities of Daily living (ADLs) such as sleeping, eating, grooming, bathing, dressing, etc. and behaviours such as wandering or elopement
- Saving data
  - The gathered data can be saved in a Hospital server for doctors access, allowing clinical analysis.
- Evaluating the activity
  - The system assesses whether the activity is unusual or unhealthy by using the user’s configurations related to the activity detected.
- User’s Customization
  - Providing an easy interface to configure user’s schedules and alerts.
- Personalized intervention
  - Notifying giving as many info as needed.
- User’s feedback
  - The user can reply to the system with meals, needs, etc. providing more useful information for the system to analyze.
- Suggesting the user
  - The system can differentiate the primary user through his/her mobile or a smart watch.
- Multi-user Home
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**Testing & Validation**
- Watch some research video demos in https://qrs.ly/x79zbq