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## **IGENDA – A MEMORY COGNITIVE IMPAIRMENT HELPER**

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### **KEYWORDS**

Memory Cognitive Impairment, Memory Assistant, Multi-Agent System, Mobile Devices, Sensoring

### **ABSTRACT**

The social problems that advent with the elderly population are far from being resolved. Population is suffering a shifting transition in the population pyramid, being for the first time, in modern ages, that the elderly population surpasses the younger population, children and teenagers. These two facts combined expose even more the common problems people have. The procedure should be towards the resolution of common problems, those who affect the general population, thus having a large group of people aided by the solution provided. In this work we present a project that provides technological solutions to help a fairly common problem that affects elderly people: memory cognitive disabilities. This project embraces several solutions, such as event managing so the user knows what it has to do, playful time enabling to provide social leisure time with other persons, sensing and profiling systems to keep information about the user always updated and integration with medical solution such as clinical guidelines. The combination of all these fields will result in a multi-areas system that gathers all the information possible to provide a safe and independent life every day, using Multi-Agent Systems as base architecture to provide fast and flexible agents capable of interconnecting all the different modules.

### **SOCIAL FITNESS TOWARDS ELDERLY POPULATION**

A current trend is showing is the most developed countries, seniors are the fastest growing population, and this tendency is starting to be displayed worldwide. Factors such as better medical assistance and lower deaths by disease and the exponential decrease of births, due to increasing of quality of life combined with financial situation and spending, contribute to an inversion of the population pyramid.

Solely in the United States there will be 86.7 million persons, 65 or older by the year 2050, which means that is roughly a 147% increase in 50 years (HHS 2011).

It is from common knowledge that health problems are more frequent when a person gets older and because the body is more fragile a disease has more impact and is more debilitating. Cognitive problems are diverse in terms of incidence and area affected, our interest goes to the memory problems, the Memory Cognitive Impairment (MCI).

In Portugal the expected MCI progression in 2050 will be 2.5 times greater than what it is registered today, following the growth of the population (UN 2009). Our project is aimed to persons who present already impairments but are still able to operate computer devices.

The goal is to produce system that monitor and assist the user to help him to become more independent and less dependable of other persons, enabling an important theme that is the socialization with friends and pairs also in terms of overall there is the potentiating of memory conservation in terms of implicit exercise and remembering events, which can contribute to a more active brain and prevent from losing more cerebral capacities and memory.

### **IGENDA – AN MEMORY COGNITIVE IMPAIRMENT HELPER**

It is our belief that technology should be used towards human help and aid, making life of those who need the most, more easy. Artificial Intelligence, in form of Ambient Assisted Living has evolved much in recent years, providing solutions in terms of home monitoring, using discrete devices and automation, controlled by intelligent software. However it seems that these systems are far from the user, not in direct contact with him, providing help but in a distant form, not applying directly on what the user is doing (Costa et al. 2010).

Our project interacts directly with the user and changes the way he perceives the day. With providence of intelligent computer systems that provide greater



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independence, security and well-being of cognitive disabled people, through the use of:

- Memory enablers, such as reminders of activities and suggestion systems.
- Warning systems that warn and advise accordingly to the current situation and user profile.
- Sensory systems that capture data to understand the user behavior and help him by providing just-in-time solutions and suggestions.

The architecture is based upon the concept of multi-agent systems. It has separate agents for the different functions and actions the system makes. The actions are based in logic methods to provide better conflict resolution. Priorities values are differentiated by user and service, per user configuration this helps to verify the type of activity is being scheduled. In terms of storage it is used lightweight portable encrypted databases. In terms of the data the system supports Google Calendar and local calendar files (Costa and Novais 2011).

The system has two types of platforms, the desktop and the mobile. It has full integration with Android services, using the maximum of Android's native apps. GPS, cell network and WiFi, serve for indoor and outdoor user localization to manage distance between the activities and for immediate localization in case of emergency.

The profile module assures the system is always in sync with user, keeping the general preferences updated, through the use of CBR, Bayesian Networks a learning system and statistical methods.

The medication remainder assures that the user always takes the medication according to the information present in the profile.

The sensing system measures data collected from discrete sensors placed on the user body, collecting ECG, Oximetry, sugar levels among others, and processing the data collected and taking actions if certain scenarios are presented. The actions are derived from the Clinical Guidelines and the actions are based in logical functions and learning procedures.

Computerized digital clinical guidelines that help the medical decision and provide insightful suggestions to diagnose the disease and administer the appropriate treatment. Quality of Information is used to aid and complement the decision when the data is incomplete.

### CONCLUSIONS AND FUTURE WORK

The work developed so far resulted in a Cognitive Impairment Assistant platform based on agents that is able to adapt to new events, profile changes and vital

sensor warnings in real-time. In terms of future work we are planning and projecting new systems such as fall detection and further development of the remaining modules in terms of functionalities and reliability.

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