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Monitoring Elderly People at Home: Results and Lessons Learned

Abstract

Introduction

Elderly people may be affected by a decline in functioning that usually involves the reduction and discontinuity in daily routines and a worsening in the quality of life. Recently, solutions have been proposed to unobtrusively monitor activities of elderly people [1]. Tele-assistance systems that rely on a conjunction of sensors –each one devoted to monitor a specific status or activity– are normally used [2].

In this paper, we present our experience in monitoring 9 elderly people for 5 months through eKauri, a tele-assistance system.

The solution

eKauri is composed of a set of sensors: presence-illumination-temperature sensors (i.e., TSP01 Z-Wave PIR), to identify the room where the user is and the movement from a room to another (one sensor for each room); and a presence-door-illumination-temperature sensor (i.e., TSM02 Z-Wave PIR), to detect when the user enters/exits the premises. They send the retrieved data to a gateway (based on Raspberry-pi) that collects and securely redirects them to the cloud to be stored, processed, mined, and analyzed by an intelligent system.

Therapists and caregivers receive notifications, summaries, statistics, and general information belonging to the monitored users through a Web application.

From a microscopic perspective, the system is able to recognize if the user is at home or away and if s/he is alone. It is also able to detect the following events: leaving home; going back to home; receiving a visit; remaining alone after a visit; going to the bathroom; going to sleep; and awaking from sleep. From a macroscopic perspective, therapists and caregivers become aware about habits and may detect unusual situations.

Results

eKauri has been installed in Barcelona in 9 elderly people' homes (7 women) over 65 years old. To test eKauri, we asked monitored users to daily answer to a questionnaire composed of 20 questions (12 optional). Moreover, they daily received a phone-call by a caregiver who manually verifies the data. This information has been used as baseline to evaluate the performance of the system. We calculated the accuracy in recognizing if: the user is at home (98%), s/he is alone (68%), and s/he is sleeping (78%).

All detected events are shown in the Web applications and revised by therapists and caregivers. Feedback from them has been used to improve the interface and add functionality.

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Lessons learned

Although, at least at the beginning, users were a little bit reticent, during the monitored period they felt comfortable with the services provided by eKauri. They really appreciate, on the one hand, the fact that it is not-intrusive and that it allows them to follow their normal lives; and, on the other hand, to be called by phone. In other words, it is important to provide a system that may become part of the home without losing social interactions. Thus, a tele-assistance system does not substitute the role of caregivers.

Therapists/caregivers recognize eKauri as a support to detect users' habits helping in diagnosing user's conditions and her/his decline, if any.

Finally, let us mentions two real cases.
-Case-1. A user, woman with Alzheimer and heart problems needs continuously assistance and, thus, a caregiver visits her daily. One day, eKauri detected that no visits were received, an alarm was generated and the caregiver called. The caregiver confirmed that she did not go to visit the user that day.

- Case-2. During the afternoon, a user is accustomed to go out for a walk. One day, she stayed in the bedroom. eKauri detected the change in her habit and a caregiver called her. Actually, she had a problem with a knee and she cannot walk. A physiotherapist was asked to go to visit her.

Conclusion

The goal of eKauri is twofold: helping and supporting elderly people that live alone at home; and constantly providing a feedback to therapists/caregivers about the evolution of the status of each monitored user.

The experience obtained in Barcelona progressed knowledge about methods, interventions, tools and devices and pave the path to scale-up model and solutions to the rest of Europe and the world.

Location

Barcelona

Year

2016

Related Integrated Care keywords

- DIGITAL HEALTH: ICT (INFORMATION AND COMMUNICATION TECHNOLOGY) SOLUTIONS, DEVICES, MONITORING

Pervasiveness

Small scale in a jurisdiction

Status

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Links