



ALZSENSE

ENVIRONMENT-AWARE SYSTEM FOR ALZHEIMER'S PATIENTS

Introduction

The population of Europe has been aging in these past few decades and Portugal is not an exception. Alzheimer's disease (AD) affects about 90.000 people in Portugal, which makes it a public health problem.

Alzheimer's is a type of dementia that causes problems with memory, thinking, discernment and behavior. It has no current cure and symptoms cannot be stopped yet from developing, they can only be provisionally decelerated to improve the quality of life of patients and caregivers.

Alzheimer's disease is a neurological disorder caused by the death of brain cells which origins memory loss and cognitive decline. It represents more than 60% of all dementia cases.

Problem

After researching the disease and the technological state of the art in the related patient care, several issues were identified, like the lack of location and monitoring solutions adapted to this type of patient, bearing in mind their tendency for memory loss, disorientation and risk of falling.

Contact

Rua Alfredo Allen, 455
4200-135 Porto, Portugal

+351 220 430 300
info@fraunhofer.pt
www.fraunhofer.pt

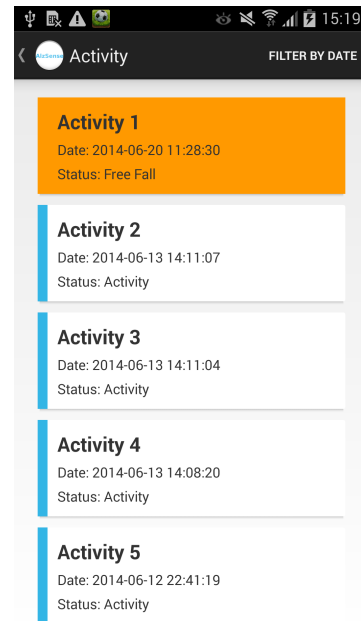


Fig1. Activity history as seen on the mobile application.

Objectives:

Create a device that can solve the identified problems by making use of current technologies. This device:

- Minimally impacts the patient's life;
- Allows remote monitoring;
- Tracks location;
- Tracks activity;
- Tracks environmental conditions;
- Is easy to carry;
- Requires minimal interaction from the patient.

The device autonomously sends all the data retrieved to the caregiver's phone

Main functionalities

- 1) Measures environmental temperature and humidity;
- 2) Detects activity and falls;
- 3) Outdoor location of the patient;
- 4) Sends an SMS to the caregiver's phone;
- 5) Sends data to a server.



Fig2. Left: device inside waist belt; right: device's positioning on patient.

Dimensions (cm)

- Length = 11,5
- Width = 7,6
- Height = 5,4

Components

- Arduino Uno
- Accelerometer
- Temperature and humidity sensor
- GPS location system
- Communication module

if desired and to a server where data is safely stored for further use.

Caregivers can monitor the AD-affected people they care for, by using a simple and intuitive Android application which retrieves the patient's data from the server where it is stored.

Results

Five subjects performed a usability test with the device. The test had the duration of one hour and did not require any interaction from the subjects.

Results obtained indicate that most of the patients did not feel disturbed by the device. Only one subject said it was uncomfortable and for that reason only wore it for half an hour.

The results were also consistent with the subject's movements and environment measures.

This was positive as the technical approach revealed to be useful and serves as a good starting point for a system with the same purpose.

The results indicate that a device like this, capable of detecting physical

activity, falls, measuring the patient's environment parameters, and transmitting information wirelessly, from anywhere, could be a useful tool to monitor AD patients and support caregivers.

Future Work

For future work the authors propose:

- Decreasing the device size;
- Extending the mobile application for caregivers;
- Including an emergency button on the device;
- Performing additional tests, both with AD-affected people and their caregivers;
- Increasing the device autonomy.



Fig3. Final appearance of the product.