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***Abstract*—Ambient assisted living is become an essential concept to design suited solutions to keep people at home with safety conditions. In this way, many innovative technologies based on information communication technologies (ICT) have been proposed recently. An interesting and promising research way would be to explore a new design of interaction in connection with ambient wireless sensors. In this article we describe how a Wizard of Oz platform (called MIOZ) works with a wireless sensors network to acquire data from the behavior of the user. The principle is illustrated through a real scenario.**

Index terms list: Disability, E-health, Medical Informatics

I. INTRODUCTION

Ambient assisted living aims to provide assistive solutions for older persons with a wide range of physical and cognitive challenges. Platforms are essential to well understand how information communication technologies (ICT) can enable to help people in daily activities and to maintain them in their environment as long as possible. There is a strong need to offer an intuitive and suitable access to information and services for disabled and frail people. However several challenges of the ambient intelligence [1] are to be overcome. Although some innovative technologies have been developed there is still strong need to conduct research exploring novel design of interaction as well as wireless network tools [2]. A significant challenge when studying technologies within the True Life Lab concept [3] is the context living where the research is carried out to inform about the acceptability of future innovative technologies or services. Designing these future technologies can be difficult as it is possible to draw on current use and interaction with the user. Methods and tools are needed to explore and analyse behaviour of users with these innovative technologies to design, adapt them based on related ICT experiences. This is why it is important to investigate how a novel domestic technology could fit the profile of the user. New modalities of interaction suited to the home are also a challenge in connection with home automation and ambient technologies. Several studies demonstrated that the vocal command is well suitable for people with impaired mobility and/or with impaired vision. [4] explored the potential for Voice User Interface (VUI) to interact with home-based services. Unlike other interfaces the design of VUI mainly depends of domain specific natural interaction data (for instance variance of spoken input and dialogue model). [5] reported in the framework of the Sweet-Home project that the "*keyword command*" is more suitable than the sentence command for an old people. The speech recognition rate is subject to further constraints: noisy environment, headphone, fixed grammar, one speaker, one room, etc. These constraints are inacceptable to design intuitive VUI. One research area focuses on designing more robust understanding system of the vocal interaction based on the use of ambient data. For this purpose, speech corpora and ambient data are needed. This paper describes the MIOZ platform designed for smart-home and True Life Lab environment.

II. MIOZ PLATFORM

The plurisdisciplinary team of the ECAMI project [6] has designed the interoperability of the MIOZ platform to collect behavior data of persons using the ICT inside a real smart home [7]. The aim of the platform is to acquire spoken dialog corpora and data from sensors and actuators placed in the smart home. The MIOZ platform consists of several components connected by heterogeneous networking technologies. The smart home considered has two types of equipments: some are fixedly connected to the structure while others are ephemeral because easy to install or to move.
Figure 1 presents the architecture of the MIOZ platform.

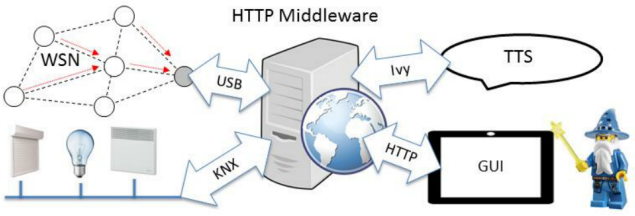

Figure 1: MIOZ platform.

The MIOZ platform consists of:
- A **Wizard of Oz platform** to simulate the processing chain (speech recognition system, understanding system, dialog controller and vocal message); The

VUI component will record the spoken corpora between the person and the home environment. The wizard will simulate the speech recognition, understanding system and the dialog controller. He will also input the text message of the home played by a text-to-speech system through an Ivy agent connected to a middleware. The Wizard of Oz platform includes a configurable graphical user interface (GUI), available in a web browser. The interface buttons are associated with: i) sound messages informing about a state of the dialog controller, a reactive or informative message to the person; ii) actuators of the home. Each scenario is linked to a dedicated GUI. The scenario describes the different actors involved: *user* (spoken and gesture interaction, moving); *automation system* (feedback of the actuator press); *dialog controller* (information about the automation system / request to the user, etc.); sensors involved.

- A **wired home automation bus based** on the standard and widely used KNX technology. Conventional electrical equipments in the smart house (lamps, stores, sensors) are driven by this bus.
- A **wireless sensor network** based on the OpenWiNo wireless technology [2]. This network consists of 8 sensor nodes, including Infrared (IR)-motion sensors, sensors on door and piece of furniture (fridge, cupboard) and pressure sensor integrated in a carpet at bed end. The wireless sensor network is an important part of the platform since it can be deployed directly at home, in a *True Life Lab approach*.
- A **common middleware**, based on the Hyper Text Transfer Protocol (HTTP). The role of the middleware is to interoperate the various communication technologies (Ivy, WiNo and KNX) used within the MIOZ. A set of URLs have been developed to implement a simple communication with all sensors and actuators of the smart-house, based on a classical request/response scheme with a common web server. For example, the middleware enables:
  1. To get the state of a door or if there is a motion of the person on a given area via the wireless sensor network;
  2. To power up a given lamp via the KNX network,
  3. To say: "hello! Did-you sleep well?" to the user, via the Ivy Text-To-Speech agent;
  4. To obtain the output string of the Ivy speech recognition system;
  5. To send a command to the corresponding actuator after the interpretation of the string produced by the speech recognition system, etc.

All the devices on the platform can be requested via the middleware.

III. DISCUSSION – CONCLUSION

The MIOZ feasibility was tested with success through the scenario “get out bed” as proof of concept. All the actors (user, automation system, dialog controller, sensors) were involved and tested. New formulations of messages have been proposed to increase the understanding by the end user. Other scenarios will be designed to simulate situations where the user may be in danger (fall, looking for objects, faintness). These scenarios aim to confirm the availability of the results of the voice interaction for an older population with a normal aging. This platform will be used to constitute behavior corpora including ambient data to design innovative technologies for frail people.

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