Fig1.   Demonstration prototype.

BlueWarnAAL

BLUETOOTH BASED WARNING SYSTEM FOR AMBIENT ASSISTED LIVING

The main objective of this project is to build a small, intelligent, inexpensive system that can help prevent household accidents.

Motivation

The elderly are the fastest growing age group in developed countries. Population trends also lead to these people living alone in single households, which constitutes a health hazard since elderly people usually have memory and physical impairments as a side effect of the ageing process. Healthcare costs with elderly people are highest in their final two years of life, since they require further attention by caregivers and healthcare professionals, including Emergency Medical Services (EMS). These factors combined will lead to increased costs. If alternative solutions aren't developed the increased costs will be unsustainable.

This will lead to either reduced Quality of Service (QoS) for healthcare or to increased costs for the elders. An integrated Ambient Assisted Living (AAL) solution would allow for the elderly to live largely unassisted in their preferred environment, increasing their autonomy and proactively decreasing healthcare costs by preventing possible problems before they even happen.

Description

We aim to build an, essentially, Bluetooth based system that can perform tasks akin to warning systems and home automation that can be deployed without further cost but can also be expanded, extended, and scaled.

Contact

Rua Alfredo Allen, 455
4200-135 Porto, Portugal

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

Testbed

The companion testbed allows anyone to see the system in action in a simulated real world scenario.

The platform

Our system is based around the Nordic nRF51822, a low cost, highly integrated, Bluetooth 4.0 capable, System on a Chip (SoC). This hardware provides some processing capacity, Bluetooth connectivity to exchange information with mobile phones and the ability to interact with the environment (especially when extended with the Fraunhofer Pandlet) while keeping costs down and being able to work for months if not years on a single battery.

Context awareness

This system is able to estimate distance from a connected smartphone using solely the Bluetooth connection. This allows us to add a further new dimension to the ways in which the system interacts with the environment, using distance to the user as an input to infer context from.

It isn't limited to smartphones though. Any device that is capable of initiating a Bluetooth connection will do.

Rules engine

A small, but powerful rule engine lays at the heart of this system. Being fully user configurable, almost any expression can be used as a rule, as long as the final result is either true or false. If someone is cooking dinner and for some reason forgets about the stove being on, a simple rule can make the difference between a day like any other, or a fiery disaster.

Even smarter companion

Relying on the Fraunhofer Smart Companion library to provide for its graphical, elder-friendly look, the Android companion application to our system provides for an easy, graphical way of configuring the system. Since the intelligence is in the sensor we can save the smartphone energy.

Scaling up

Taking advantage of Nordic's Internet of Thongs (IoT) Software Development Kit (SDK), this system is fully 6LoWPAN compliant and is capable of supporting IPv6 connectivity. This means it can talk to the cloud and the whole Internet, using only a Bluetooth link as long as a capable router is around.

Further applications

Being potentially scalable and processing rules, are the major selling points of this system. This makes it ideal not only to be applied in households, but potentially in larger scenarios such as hospitals. It isn't also limited to AAL applications, anything that benefits from a rule engine applies.
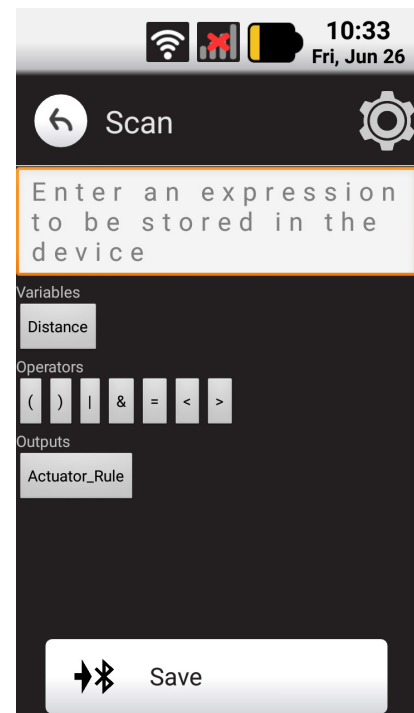

Fig2. The Android application's UI.