



# Fraunhofer

## PORTUGAL



Fig1. Sensor casing in two different positions.

## WESEJ

### DESIGN OF WEARABLE SENSING DEVICES

#### Motivation

New technologies are ever more present in people's lives and their power can be harnessed to promote safety, independence and well-being amongst user groups prone to frailty, such as older adults. Wearable sensors, in particular, may play an important role in crucial matters, such as fall prevention or chronic disease management.

The aesthetics of new electronic devices to be worn or carried by the person, along with the quest for miniaturization, have been calling for major efforts from design to approach these challenges. Mobile phone producers, and the more recent wearable tech producers, have invested in creating appealing devices to be part of fashion apparel one is wearing.

This project studied and proposed new designs for wearable sensors, based on a set of physical, ergonomics and usability constraints.

#### Designing for usability

The design process followed a human-centred approach by involving older adults from onset and establishing the bridge with the team working on the development of the sensor itself.

We created characters and user scenarios to guide the development and promote discussions amongst the team (designers and hardware developers). We conducted usability tests with commercially available wearable devices to understand older adults' interaction with such devices and opportunities for improvement. During the generation of prototypes, users were called to provide feedback.

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## Human-centred approach

During our development process we got as much information as possible from older adults. As we are design with and for older adults, we try to understand this user group's needs, difficulties and expectations.



Fig2. Usability tests made with older adults.

## Requirements

The device was designed to be worn at the waist level, as this was the place on the body achieving the best performance from the sensor side. The device was designed in order to be attached to users' clothes.

The human-centred design process allowed us to consider scenarios in which such a use at waist level could not be viable in particular situations, such as during the bath. The sensor shall be able to detect falls and trigger alarms. Because many falls take place precisely in older adults' bathrooms, the device also allows the user to wear it around the wrist.

The manipulation of the device for placement on the waist or around the wrist followed the guidelines generated during the first phase of the project. Furthermore, due to wireless charging through induction, older adult users need not struggle with cables or small plugs.

The final prototype was tested with older adults from Fraunhofer AICOS's user network COLABORAR.

## Outcome

The final prototype consists on an easy-to-wear, non-stigmatising device with a careful configuration which, nevertheless, allows the user to hide it by clipping it to a pocket, for instance, or to an internal clothing layer.



Fig3. Prototype made during the development process.