



## Safe-Home

Project ID: C2019/2-4

Start Date: 1 April 2021

Closure date: 31 March 2024

### Partners:

Altice Labs, S.A., Portugal

Clynx.io, Portugal

Code Creator, Czech Republic

Instituto de Telecomunicações, Portugal

IRM Inc., South Korea

LVS Universal,Lda, Portugal

medCV.eu sp. z o.o., Poland

Mediatrade, Czech Republic

MINDsLab, South Korea

Poznan Supercomputing and Networking Center, Poland

The Catholic University of Korea, South Korea

Universidade de Aveiro, Portugal

University of Ulsan, South Korea

### Co-ordinator:

Ayman Radwan

Instituto de Telecomunicações and Universidade de Aveiro, Portugal

E-mail: aradwan@av.it.pt

### Project Websites

[www.celticnext.eu/project-safe-home](http://www.celticnext.eu/project-safe-home)

<https://safe-home.care/>

## Security-aware fog-based efficient Home monitoring for elders

SAFE-HOME is an innovative international multi-disciplinary project, which aims at designing a monitoring system for elders to understand their activity level and with the ability to identify emergency situations. SAFE-HOME targets a non-wearable non-invasive and not dependent on users monitoring system, while preserving the privacy of its users. SAFE-HOME targets one of the 2030 sustainable development goals of the UN, namely “Good Health and Well-being”.

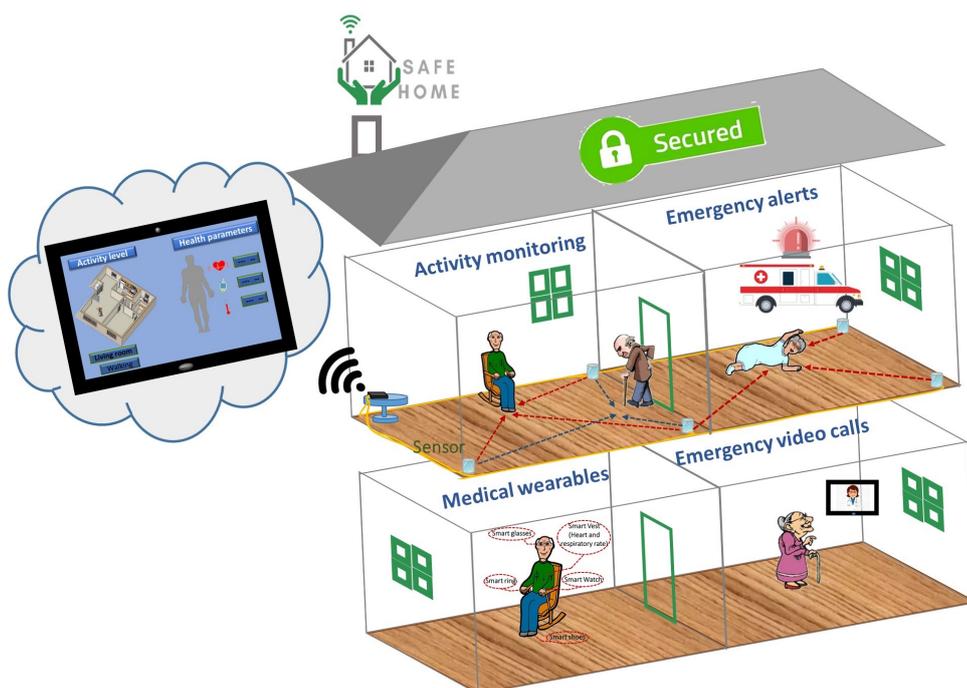
### Main focus

Our population is ageing, which is increasing the burdens on our already exhausted health care systems. Understanding this challenge, governments are pushing towards enabling seniors to live at home, saving on the expenses of elders’ homes and at-home nurses, which should not come at the expense of the safety of citizens. SAFE-HOME targets the design of a

non-invasive home monitoring system, specifically dedicated for elderly citizens, to enable them to an independent life at the comfort of their home.

SAFE-HOME aims to build a solution, which does not depend on wearables as its main tools and overcomes the identified limitations in current solutions. SAFE-HOME will design a network of high-sensitive sensors, along with the required networking and intelligence, to comprehend the movement and activity of seniors, for the general assessment of their health conditions, in addition to alerting in case of emergency.

SAFE-HOME targets an innovative solution expected to enrich the lives of elderly, by enabling them to live a fulfilling life at the comfort of their home, with complete autonomy and independence, but under continuous, non-invasive and GDPR-compliant close monitoring, for their safety and health condition.



## Approach

SAFE-HOME addresses a very timely and hot challenge, facing the population of the world and specifically Europe nowadays: the increase of elder population. With such increases, more burdens are added to a suffering health-care system, where more ageing homes and more nurses would be required, which also increase the burdens on the finances of elder citizens. SAFE-HOME will work on the intersection of multiple disciplines towards designing and implementing a non-invasive and security-aware home monitoring system for elder citizens. The project will investigate how an advanced design of sensors, intelligent self-optimizing fog-cloud networking, and artificial intelligence can be collaboratively exploited towards providing the envisioned product. SAFE-HOME is foreseen as a first of its kind solution for monitoring users at the comfort of their home, alerting in case of emergency, with a main use-case, which does not use wearables, cameras, or recording devices.

SAFE-HOME is investigating innovative sensor design techniques, providing high-sensitive, reliable, cost-effective, and compact sensors, specifically targeting optical fiber-based sensors, capable of detecting users' indoor location and activity level. Additionally, the project will design reliable delay-dependent security-level based networking, built using fog and cloud layers, to provide the required timely and efficient connectivity between different blocks of the solution. SAFE-HOME investi-

gates innovative learning algorithms, which can detect the user's different types of activities to learn and understand the users' activity levels, and build their profile. Finally, a user-friendly app will be developed to interface all those developed solutions, and provide the users, who are mainly elders, with an easy-to-use application.

## Main results

SAFE-HOME is foreseen to deliver innovative solutions for providing a non-invasive privacy/security-aware system for home-monitoring of elders, without jeopardizing their independence, autonomy, and without putting too much dependence on the users themselves. Some of SAFE-HOME main innovations can be listed as follows:

- ◆ A new line of low-cost high-durability optical fiber sensors for measuring pressure and vibration on the floor, which can be used for monitoring users' motion in enclosed areas;
- ◆ An efficient privacy/security-aware delay-sensitive high-computational fog-cloud network enabling smart-home and eHealth application within buildings;
- ◆ A security aware architecture, where the solution works on the security of the transmitted data, while preserving the privacy and identity of the users. The fog-cloud solution targets processing sensitive private data on user's own fog, while sending anonymous data to the cloud, for privacy reasons;

- ◆ The integration of highly non-invasive wearables to help with the monitoring of elderly with low dependence on the user, using advanced technologies, such as wireless charging to avoid the frequent need to charge;

- ◆ A suite of artificial intelligence and learning algorithms, capable of classifying variations in perceived regular patterns, e.g., to identify different gait patterns, and different individuals, which can be used in home-security applications;

- ◆ A full non-invasive home-monitoring system, tailored for elderly and vulnerable citizens, enabling them to live a fulfilling life, without jeopardizing their autonomy or lifestyle.

## Impact

SAFE-HOME is expected to have a powerful impact on multiple levels. First of all, on the socio-economic level, SAFE-HOME enables seniors to live a fulfilling life, with full autonomy and independence. Moreover, SAFE-HOME will have an economic impact by reducing health care systems' expenses, through avoiding unnecessary hospital visits and lowering the number of at-home carers. Furthermore, SAFE-HOME would give Europe (specifically the participating countries) a competitive market edge with a new product targeting a very vital topic, which has been named as one of the 2030 sustainable development goals of the UN, and addressing one of the most important 5G verticals, i.e., eHealth. SAFE-HOME is foreseen to create new collaboration between different international partners, which will be exploited in the future for further collaboration and building new collaborative projects and innovative products. As a result of project activities, the project partners will generate an intellectual property portfolio on this topic.

## About CELTIC-NEXT

CELTIC-NEXT is the EUREKA Cluster for next-generation communications enabling the digital society. CELTIC-NEXT stimulates and orchestrates international collaborative projects in the Information and Communications Technology (ICT) domain. The CELTIC-NEXT programme includes a wide scope of ICT topics based on new high-performance communications networks supporting data-rich applications and advanced services, both in the ICT sector and across all vertical sectors. CELTIC-NEXT is an industry-driven initiative, involving all the major ICT industry players as well as many SMEs, service providers, and research institutions. The CELTIC-NEXT activities are open to all organisations that share

the CELTIC-NEXT vision of an inclusive digital society and are willing to collaborate to their own benefit, aligned with their national priorities, to advance the development and uptake of advanced ICT solutions.

## CELTIC Office

c/o Eurescom, Wieblinger Weg 19/4  
69123 Heidelberg, Germany  
Phone: +49 6221 989 0  
E-mail: [office@celticnext.eu](mailto:office@celticnext.eu)  
[www.celticnext.eu](http://www.celticnext.eu)