FALLRISK

Improving (the reliability of) existing fall detection systems – while developing an intelligent framework to assess the risk of older adults falling.

For older adults, falling accidents can be life-changing events. They may lead to loss of autonomy (necessitating people to move to a nursing home, for instance) – but psychological side effects are not to be neglected either (fear of falling might lead to avoidance behavior).

Accurate fall detection is a hot topic. FallRisk therefore investigated how to improve existing fall detection systems and develop an intelligent framework to assess the fall risk of older adults.

Falling is the second leading cause of accidental death worldwide. Research has shown that more than half of the older adults living in a nursing home – and about one third of the older adults living at home – fall at least once a year, resulting in severe injuries in 10 to 15% of all cases.

The FallRisk team aimed at limiting the personal and societal burden of falling accidents to an absolute minimum, while balancing the involvement of (scarce) formal and informal caregivers.

THE OUTCOMES

1. Sensor fusion as the optimal way to detect falling accidents and risks

Several fall detection systems are being tested and used already. They have two important limitations, though: they are typically very complex (and thus expensive) and come with high numbers of false-positives and false-negatives.

As part of the FallRisk project, the team investigated how the reliability of the underlying sensor networks can be increased, even if cheaper sensors are installed. The concept of sensor fusion proved to be the ideal solution, i.e. combining data from disparate (acoustic, camera, smartphone, etc.) sources to get more accurate and complete information about the likelihood of falling accidents.

2. Developing an intelligent backbone that captures and interprets all data from the sensor network, and that intelligently distributes information to formal and informal caregivers

At the heart of the solution proposed by the FallRisk team sits an intelligent cloud-based backbone that captures and interprets all data, and that relies on unique algorithms to dynamically forward fall events or alarms to the (in)formal caregiver network.

Concretely, messages will be forwarded to that specific caregiver who is best placed to respond – taking into account event context (e.g. day or night; bathroom or kitchen; event classification) and older adults' social networks (proximity and availability of formal and informal caregivers, circle of trust, etc.).

As such, the solution responds to the government's goal to use scarce medical staff as efficiently as possible, in view of the changing demographics (growing number of older adults, fewer caregivers).

3. Conducting user research is key to securing user buy-in and generating useful feedback

User research has been a substantial part of the FallRisk project. Relevant stakeholders (older adults, formal and informal caregivers) were involved to gain a better understanding of future users and the context in which the technology will be used.

With a few exceptions, most older adults did not perceive the need of fall detection or estimation technology. Others were more open to it, as it made them feel safer. Informal and formal caregivers expressed more privacy concerns than older adults, while the latter judged the proposed technology to provide features that underestimated their own abilities.

By doing user tests with these stakeholders, it was possible to iteratively improve the interfaces for different stakeholders and provide relevant functions.

> 'Each partner in the FallRisk project consortium has its strengths, but thanks to iMinds' ICON program we have been able to turn all individual building blocks into a single, working solution; across company borders, and building on the expertise of four iMinds research groups. None of this would have been possible without the ICON program.'
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> **Pieter Crombez**   Televic Healthcare

NEXT STEPS

The final step in the FallRisk project is currently ongoing. It includes proof-of-concept testing in a real-life setting (nursing homes and home care environments) for a three-month period – with a unique reality check provided by caregivers from Wit-Gele Kruis Limburg.

The FallRisk project was co-funded by iMinds, with project support from IWT.

FallRisk project partners

VERHAERT   televic healthcare

WIT-GELE KRUIS LIMBURG   COMmeto   TPVISION

FACTS

NAME	FallRisk
OBJECTIVE	Improving (the reliability of) existing fall detection systems – while developing an intelligent framework to assess the risk of older adults falling.
TECHNOLOGIES USED	camera, smartphone, accelerometers, Wi-Fi, 3G, PIR sensors, door / window contacts, pressure sensors, cloud technology and communication, embedded software, low power, RF communication
TYPE	ICON project
DURATION	01/01/2013 - 31/12/2014
PROJECT LEAD	Pieter Crombez, Televic Healthcare
RESEARCH LEAD	Prof. Dr. Bart Vanrumste, iMinds – STADIUS – KU Leuven
BUDGET	2,246,000 euro
PROJECT PARTNERS	COMmeto, Wit-Gele Kruis Limburg, Verhaert, Televic Healthcare, TP Vision
USER COMMISSION	Belgacom, Expertisecentrum val- en fractuurpreventie Vlaanderen, Landsbond der Christelijke Mutualiteiten
IMINDS RESEARCH GROUPS	EDM - UHasselt IBCN - Ghent University SMIT - VUB STADIUS - KU Leuven

WHAT IS AN ICON PROJECT?

iMinds is the digital research center and business incubator for Flanders, Belgium. Its ICON research projects are agile and demand-driven, combining academia and industry partners. ICON projects typically have a duration of two years, yet quickly adapt to the rapidly-evolving digital landscape. ICON partners intend to use the project results in their products or services.