

Smart sock alerts older people to risk of falling

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PhD candidate Zahra Rahemtulla with the prototype over sock Credit: Nottingham Trent University

Older people will be alerted to the increased risk of falls thanks to a new smart sock created by electronic textiles (e-textiles) experts at

Nottingham Trent University.

Researchers created a prototype over-sock which detects near-falls with more than 94% accuracy which can inform caregivers and professionals so that action can be taken to prevent an actual fall happening.

Near-falls—which include slips, trips or stumbles—are an independent predictor of substantial falls and research shows that they may help clinicians assess the [fall risk](#) in [older adults](#).

"Falls can be devastating to the quality of life of older people," said Dr. Theodore Hughes-Riley, of the Advanced Textiles Research Group (ATRG) at Nottingham School of Art & Design, who is an associate professor in electronic textiles.

"And with a rise in the aging population, falls will only continue to have a significant impact on older people, causing loss of confidence and increased frailty.

"Only an estimated third of older people return to [independent living](#) following a hip fracture, for instance, which is a common injury to occur after a fall.

"So being able to detect near-falls will allow older people and their caregivers to take action before a potentially life-changing fall happens."



The motion sensor embedded in yarn. Credit: Nottingham Trent University

The over-sock—which features a tiny motion sensor embedded at the ankle—can be connected to an internet enabled device, like a phone, via a detachable microcontroller using Bluetooth. The electronic circuitry it contains is so tiny that it cannot be felt by the wearer, and the motion sensor is encapsulated in a resin so it is fully washable like an ordinary item of clothing.

An algorithm can process the data and spot any unusual motion and differentiates between a fall or a near-fall. The aspiration is that once the over-sock detects an actual fall, then the technology alerts emergency care workers so that life-saving action can be taken if necessary.

Human trials show that the technology can detect falls with 99.4% accuracy, and near-falls with 94.2% accuracy. The research has been published in *Materials*.

The research results are the cumulation of Researcher Zahra Rahemtulla's Ph.D. studies, who said, "As well as detecting near-falls, it is important that the technology can raise the alarm when somebody has had an actual fall and badly injured themselves.

"When an older person experiences a fall, they can be left unconscious or immobile on the floor for a long period of time and unable to call for help.

"So by alerting caregivers and [medical professionals](#) to falls in real time, [older people](#) will be able to receive the treatment that they may badly need, which could help save lives."

More information: Zahra Rahemtulla et al, The Design and Engineering of a Fall and Near-Fall Detection Electronic Textile, *Materials* (2023). [DOI: 10.3390/ma16051920](https://doi.org/10.3390/ma16051920)

Provided by Nottingham Trent University

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