

How smartphones help find avalanche victims

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An extra piece of hardware coupled with the LawinenFon app transforms any smartphone into an avalanche transceiver. Pictured: the Galileo-LawinenFon prototype. Credit: Fraunhofer IML

Not a winter goes by without an avalanche incident. In the search for those buried beneath the snow, every second counts. Now smartphones equipped with functions of an avalanche transceiver should help locate the victims quickly.

Any enthusiast of winter sports dreads being overtaken by an avalanche, knowing that there is little chance of freeing oneself once buried beneath the mass of snow – snow that becomes hard as concrete until the buried person can no longer move as much as a finger. The chances of survival dwindle with each passing minute and death by suffocation draws near. On average, rescuers have 15 minutes to recover victims alive. That is why an avalanche transceiver is an essential piece of kit for anyone spending significant time off-piste. These transceivers don't come cheap, however, ranging in price from between 200 and over 500 euros – perhaps one reason why many walkers and skiers still don't carry one with them.

Soon there could be a new and cheaper alternative to the avalanche transceivers currently on the market. Galileo-LawinenFon, a system being developed by researchers from the Fraunhofer Institute for Material Flow and Logistics IML in Prien, incorporates the transmit and search functions of an avalanche transceiver into a smartphone. In an emergency situation, these mobile phones can locate buried avalanche transceivers using satellite navigation – and are able to draw on the combined signals of the USA's GPS, Europe's Galileo and Russia's GLONASS satellite systems to do so. The companies proTime and Volmer Informationstechnik, as well as the electrical engineering and IT department of Rosenheim University of Applied Sciences, are participating as partners in the project, which has been awarded funding of 1.7 million euros by the Federal Ministry for Economic Affairs and Technology BMWi .

Getting straight to buried victims

"Like commonly available avalanche transceivers, the Galileo-LawinenFon has a transmit and search mode. Unlike previous transceivers however, when looking for victims the system is not restricted to the electromagnetic field formed by a transmitted signal but

makes use of satellite signals as well. Since our solution draws on numerous available sensors and satellite systems, the signals transmitted by victims can be located with a great deal of precision. Magnetic field signals are processed in 3D so that we can pinpoint accident victims in a matter of seconds and improve their chances of survival," says Holger Schulz, a scientist at Fraunhofer IML. This is one of system's big advantages over currently available devices, where "send" mode involves emitting only an electromagnetic signal. The device then searches for any missing persons along the lines of this magnetic field. In the case of the most basic devices, this means that only a semicircular area is being covered at any one time, which in turn prolongs the search. The new technology, on the other hand, leads straight to the buried skier.

Galileo-LawinenFon consists of a smartphone app and an extra piece of hardware called Galileo-SmartLVS that is connected to the mobile phone via USB. This is compatible with almost all of the newer generation of smartphones. Galileo-SmartLVS includes a 3D [magnetic field](#) antenna for picking up signals, an analog-digital converter, a satellite navigation receiver, acceleration sensors and a reserve battery. The LawinenFon app serves as the interface between the extra hardware and the user. A technique already patented by Fraunhofer and proTime enables the exact position of a buried person to be calculated from the signals captured by the Galileo-SmartLVS. Rosenheim University of Applied Sciences has devised the mathematical algorithm required to put this technique into practice. The distance to the victim and direction to take is displayed on the smartphone screen. In future the user interface is also to show the depth at which the missing person is trapped. "There is also the possibility of adding other useful functions to the app such as current snow and weather conditions. These are extras that standard search devices simply don't offer," says Dipl.-Ing. Wolfgang Inninger, head of the IML project center in Prien.

Already the complete system has passed its first practical test in the

Galileo Test and Development Environment (GATE) in the Berchtesgadener Land, where researchers were able to use a prototype to locate a buried transceiver with centimeter precision using [satellite navigation](#). It is hoped the solution will win over the mass market in two to three years – which is good timing since Europe's Galileo satellite system is also expected to launch in 2016. Before then, the researchers want to further extend Galileo-LawinenFon's current reception range of around 30 meters.

Provided by Fraunhofer-Gesellschaft

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