Public safety increased with the ability to remotely disable vehicles

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Credit: AI-generated image (disclaimer)

To increase public security, the EU SAVELEC project has demonstrated a prototype device that can stop non-cooperative vehicles, both safely and at distance.

In its endeavour to keep the public safe, one of the key challenges facing

European security services is the ability to control and stop, at distance, non-cooperative vehicles posing a threat. However, this ability presents more than a technical challenge. To comply with EU legislation, as well as adhere to ethical concerns, the technology would also have to be safe for the user, the driver (and passengers), as well as members of the public and the material infrastructure of the surrounding environment.

The SAVELEC (Safe control of non cooperative vehicles through electromagnetic means) project developed a prototype device, after testing signals (magnetic pulses and microwave), which interfered with key car components, forcing it to slow down and stop. With the contribution of security forces as the ultimate end users, the researchers were able to simulate the technology's use in realistic scenarios.

Prototype device for a variety of security scenarios

SAVELEC first set up an end-user advisory panel comprising of law enforcement agencies and associated security organisations from different European countries, to better understand the likely operating environment for any technology developed. Scenarios were identified in terms of operational distance, target speed, distance to nearby persons and any immediate environmental considerations. As the project's coordinator, Dr. Marta Martínez Vázquez points out, 'This analysis included land and maritime missions, with the device implemented on a ground, seaborne or airborne platform.'

Developing the technology itself first required a review and cost analysis of what was currently available on the market, as well as establishing the car components best targeted for remote interference. In lab bench testing SAVELEC evaluated signal frequency, waveform and duration - principally of electromagnetic pulses (EMP) and high power microwaves (HPM) - to determine which could best disrupt the functioning of a vehicle's electronic components.

Assessing the project's success, Dr. Martínez Vázquez asserts that, 'An EMP/HPM car-stopping device prototype at a breadboard level was designed, fabricated and tested. Its performance was successfully demonstrated in an open field controlled track, in of the presence of SAVELEC affiliated end-users'. The capacity of the prototype also surpassed expectations. 'It demonstrated the functionality of the whole device, with a car moving on an open air track,' she comments. 'Conservative expectations had been to only demonstrate a sub-system of the device, or the whole system, but with a stationary car.'

The project also used the simulated environment to investigate the wider impact of the technology on humans and materials. For example, it looked at driver reactions to loss of vehicle control under six different scenarios including high speed, dense traffic and narrow roads, involving over 70 volunteers. A literature review of previous results allowed the assessment of the likelihood of petrol tank explosions from electromagnetic exposure or damage to airbags. Additionally, it assessed three different electromagnetic exposure scenarios for the pedestrian/bystander, car driver and device operator to ascertain safety limits.

Beyond proof-of-concept

A core outcome of the project, with the help of the European security forces and an Independent Ethics Advisory Board, was a regulatory framework proposal within which this technology could function. The framework included compatibility with European legislation which ensures the safety of all those exposed to electromagnetism.

For the prototype device to progress beyond the successful proof-of-concept stage, there are two principal challenges which would have to be overcome. 'Further investigation should concentrate on the miniaturisation of the different components, and in extending its

operational range (by increasing the power that can be generated),' Dr. Martínez Vázquez says. She also recommends that different car models should be tested, as SAVELEC concentrated on only one. There should also be further investigation on human health and safety implications.

Whilst SAVELEC specifically tested the technology on cars, it could easily be adapted to other vehicles such as fast vessels, trucks or motorbikes. The project's results have also contributed to improvements in other fields, such as the study of human exposure to electromagnetic fields and the development of better driving simulators.

More information: Project website: savelec-project.eu/

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