

Goal of the project: ARTRAC aims to develop an active safety system to protect vulnerable road users (VRUs) from vehicles in motion that is economically viable in the volume vehicle market.

The safety system will consist of both actuators for controlling vehicle driving dynamics and the perception component for the vehicle's surroundings. It will be tested on two types of vehicles that pose the biggest hazard to VRUs in urban settings, namely cars and light delivery goods vehicles.

Short description of the project:

The environmental sensing used in ARTRAC project will be based on a single automotive 24 GHz narrowband radar sensor. This sensor offers the potential to overcome the hitherto price barrier that has prevented VRU protection systems from entering widespread use. To meet the challenging technical requirements for extremely short measurement time, reliable target detection, ego motion and road condition estimation that have to be met, a new transmit/receive antenna and multi-channel receiver will be developed. Existing microwave technology in the 24 GHz band is utilised as much as possible to facilitate low-cost mass production applications.



Implementation period:

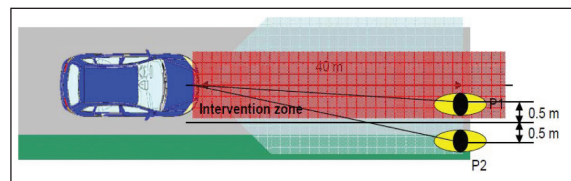
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Project implemented by: A consortium that comprises 7 partners well experienced in this sector and worldwide leaders in automotive industry and research:

- 2 car manufacturers (VOLKSWAGEN, FIAT through CRF),

- 2 research organizations (VTT - Finland, CTAG - Spain),
- 2 universities (TUHH – Technical University Hamburg-Harburg, UPT),
- one SME specialized in car sensors (SMS Germany).

Main activities: The environmental sensing will be conducted with a novel high performance but low-cost 24 GHz narrowband radar system. From an operational viewpoint, this RF frequency fits exactly into the existing ISM band from 24,000 GHz to 24,250 GHz. Due to this techno-political feature this radar has a long term perspective on European and world-wide markets.



The whole system consisting of radar sensor, sensor fusion, risk assessment and vehicle control has a high potential to be launched in serial cars because the majority of components are already standard equipment in series cars.

The additional equipment required should not be a show-stopper from a pure technical point of view.

Measures for VRU protection might be divided into passive and active systems. Because of basic physical properties, passive measures can provide limited protection potential only.

Therefore (active) actuators are necessary to achieve the desired protection for VRUs. For example, vehicle deceleration seems to be a potential approach for active VRU protection with high benefit and high potential for high volume series cars, as they are already in use in high-end limousines.

*"We must respect the past, and mistrust the present
if we wish to provide for the safety of the future."*

Joseph Joubert

Results: ARTRAC address the following six major scientific and technical objectives:

- Develop a generic detection system able to detect pedestrians, cyclists, and other vulnerable road users (VRU) as well as vehicles.
- Implement the capability to monitor road surface conditions and detect low-friction road sections caused by water, ice or snow on asphalt. This will be able to be used to warn or adapt the vehicle's electronic control systems such as electronic stability control (ESC) and collision avoidance systems (CAS) for changed friction conditions.
- Develop an electronically controllable brake and steering force system able to slow down the vehicle and provide a supported evasive manoeuvre. Drivers' reactions to hazards are too often stereotypic and slow, and their evasive manoeuvres either insufficient or incorrect.



- Provide a totally new safety function based on automatic braking and system-initiated steering recommendation to avoid accidents, or at least mitigate their impact in the event of an unavoidable crash.
- Validate and demonstrate the system functionality by means of pre-defined test scenarios. The prototype will be demonstrated within some "basic" safety applications on two vehicles types, a compact car and a light commercial vehicle.
- Promote the deployment of VRU safety technologies among relevant bodies and stakeholders, including end-users.

Research Centre for Intelligent Signal Processing- ISPRC

Fields of interest: radar, sensor, vulnerable road users, protection, road condition detection, collision avoidance, assisted brakEng.

Financed through/by: The project is part-funded by the EU 7th Framework Program.

Research team:

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Aplicability and transferability of the results:

The key result of the ARTRAC project will be a safety system that aims to protect vulnerable road users, designed to be economically viable in the volume vehicle market. The safety system will consist of both, actuators for controlling vehicle driving dynamics and the perception component for the vehicle's surroundings. The ARTRAC detection system will be small, lightweight and economical in order to enable an easy integration in the vehicle design.

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