

## ABSTRACT FOR A CONTRIBUTION OF A PAPER TO FISITA 2008

*Title:* EVITA – The Testing Method for Collision Warning and Collision Avoidance Systems

*Objective:* Simulation & Testing, Vehicle Safety

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### Scope and State of the Art

This paper presents a new concept for the testing and assessment of the potential of Advanced Driver Assistance Systems (ADAS), in particular Collision Avoidance and Driver Alert Systems. The evolution of systems like the Honda Collision Mitigation Brake System (CMBS) [1], the Mercedes BAS PLUS [2], the Audi Braking Guard [3] or the Lexus PCS [4] becomes obvious in the last months, but also their diversity. The development of those systems has to consider on the one hand the expressiveness and the transferability of the testing method, on the other hand the security of the concerned objects and persons. Tools for this scope are known and established in different automotive companies, such as the Dummy Target of Continental-Teves [5] or of DaimlerChrysler [6]. To exceed these solutions, a tool with a new testing method which fulfills the mentioned requirements was developed at the Automotive Engineering Department in Darmstadt. This testing method was used in a research project with Honda R&D Europe and in a research project with AKTIV in the subproject “Aktive Gefahrenbremsung” (autonomous braking).

### Approach, Method and Tool

The aim of the Darmstaedter Dummy Target EVITA (Experimental Vehicle for Unexpected Target Approach) was to realize test trials with test persons under real driving conditions. It can constitute braking manoeuvres in the following situations:

- car to car following at constant speed
- following car with higher absolute speed
- cut-in manoeuvres

An uninformed test person shall have the same driving style like in normal traffic when following the Dummy Target. Thus, a maximum of transferability from the tests is warranted. EVITA fulfils the following requirements:

- test speed: up to 130 km/h
- differential speed one second before a collision between EVITA and following vehicle: up to 50 km/h
- deceleration: up to 9 m/s<sup>2</sup>
- rear view: original Mercedes A-class end

These aspects can be realized by a self-driving trailer in light construction with the dimensions of a normal car. This trailer is connected with a towing vehicle through a metal cable. The cable is situated on winch in the back of the towing vehicle. A first computer in the towing vehicle and a second computer on the trailer perform the controlling of the test equipment. The brakes of the trailer are driven by an electric actor. A laser sensor at the rear of the trailer measures the distance between trailer and following car and calculates the time-to-collision (TTC). In a collision manoeuvre, the brake of the winch first opens together with the closing of the brakes of the trailer. The towing vehicle remains at a constant speed, whereas the trailer decelerates and minimizes the absolute distance between EVITA and the following car. If a time-to-collision of two second is reached, the brake of the winch is applied and the trailer is acceleration until the initial speed is achieved. The process is self-controlling. As a conclusion, EVITA does not need a driver reaction to avoid a collision. In this created situation, an anti-collision-system will act like on public roads. The figure 1 shows EVITA in the modus with a short row.



Figure 1: EVITA

### **Results, Conclusions and their Significance**

The Darmstaedter Dummy Target EVITA gives the possibility of the investigation, the comparison and the development of ADAS for anti-collision-systems. This tool performs momentum of cars in normal and emergency traffic situations. The chosen concept exceeds known tools referring to appearance of the tool and its performance. Thus, the testing of Collision Warning and Collision Avoidance Systems with uninformed test drivers is possible without danger.

### **Previous Papers**

The former publication under the title “Das Darmstädter Dummy Target EVITA – Ein Werkzeug zur Beurteilung von Antikollisionssystemen” on the VDI-Conference “Testing and Simulation”, June 2007 in Würzburg won the price for the best contribution of young engineers.

### **References**

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