

Side View Assist - The World's First Rider Assistance System for Two-Wheelers

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ABSTRACT

The Side View Assist is the World's first rider assistance system for two-wheelers. This is a Blind Spot Warning system, which uses four ultrasonic sensors to monitor the surrounding of the rider. Whenever there is a vehicle (i.e. a car, truck, or another motorbike) in the rider's blind spot, the technology warns the rider with an optical signal close to the mirror. This will allow the rider to avoid a collision when changing lanes.

In the current vehicle application, Side View Assist is active at speeds ranging from 25 to 80 kilometers per hour and supports riders whenever the difference in relative speed to other road users is small. The system helps to improve safety especially in cities, where heavy traffic makes it necessary to change lanes more often.

Originally such systems have been developed for cars and different system solutions for cars have been in serial production for several years. The challenge was to adapt these systems so they would work for two-wheelers as well.

Using the system components of car solutions is highly beneficial, because the hardware as well as the corresponding software already exists. However, adapting car components to motorcycles generated new problems for the developer:

- lean angle;
- ultrasonic noise generated by the motorcycle itself;
- installation of the ultrasonic sensors; and
- high vibration at the fixation of the ECU (Electronic Control Unit) compared to cars.

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INTRODUCTION

According to the latest WHO report [1] in 2015, 23% of all fatalities are users of powered 2- or 3-wheeled vehicles. These are more than 288.000 fatalities annually worldwide. Hence there is some action needed in order to improve traffic safety especially for powered two-wheeler.

Compared to cars, riders of two-wheelers face higher risks in traffic due to a missing vehicle body surrounding the rider, the lack of additional safety features like seat belts and airbags, and the fact that they can be overlooked easier than larger vehicles. Those factors play an important role especially in cities and complex traffic situations. Therefore increasing the safety of two-wheeler riders is a fundamental requirement when introducing new technologies in the market. The Side View Assist addresses this requirement by warning the rider in critical situation, thus making lane changes safer.

A Bosch accident analysis [2] of data from the GIDAS database showed that every 5th accident with casualties involving motorcyclists happened with vehicles travelling in longitudinal direction. Among these accidents, lane changes are the 3rd most common collision cause. It is furthermore assumed that in other scenarios such systems could support the rider such as on the acceleration lane on highways. Hence an overall safety benefit and assistance is provided by such a system.

The technology itself already exists for cars and other four-wheelers. Blind Spot Warning systems for cars have already been in the market for several years now. The function principal is known and accepted in the four-wheeler sector.

Through Side View Assist the technology of a Blind Spot Warning system was transferred and adapted from cars to motorcycles. Motorcyclists are often overlooked in traffic, which creates risky and

dangerous situations for the riders. With the implementation of the Side View Assist, riders will be able to notice approaching vehicles they could otherwise not or only hardly see while changing lanes. The Side View Assist is easy to understand. The system only issues a warning and does not actively interact with the rider's actions.



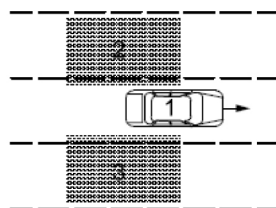
Figure 1. Visualization of the Side View Assist functionality

DEFINITION OF BLIND SPOT WARNING SYSTEM

For cars, an international standard definition exists (ISO 17387 [3]) for Lane Change Decision Aid Systems (LCDAS) which includes a Blind Spot Warning system. Though this document is only applicable to cars and not to motorcycles, it provides the information needed to understand the purpose of these systems.

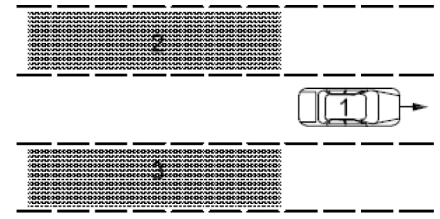
In this document [3] it is mentioned: "LCDAS are intended to supplement the vehicle's interior and exterior rear-view mirrors, not eliminate the need for such mirrors. LCDAS are intended to detect vehicles to the rear and sides of the subject vehicle."

It is important to understand that there are different levels of LCDAS. For example, a Blind Spot Warning system is useful for small relative velocities between the subject vehicle and other vehicles. A Closing Vehicle Warning system also informs the driver about a vehicle closing fast from behind. A Lane Change Warning system includes the Blind Spot Warning and the Closing Vehicle Warning (see Figure 2 and 3 and Table 1).



Key
1 subject vehicle
2 left adjacent zone
3 right adjacent zone

Figure 2. Visualization in the ISO 17387 [3]: Description of the adjacent zones, which are corresponding to the warning area of the Blind Spot Warning system of cars.



Key
1 subject vehicle
2 left rear zone
3 right rear zone

Figure 3. Visualization in the ISO 17387 [3]: Description of the zones, which are corresponding to the warning area of Closing Vehicle Warning system of cars.

Table 1. Coverage zone classification. Defined in the ISO 17387 [3]. The Lane Change Warning systems includes the Blind Spot Warning and the Closing Vehicle Warning.

Type	Left adjacent zone coverage	Right adjacent zone coverage	Left rear zone coverage	Right rear zone coverage	Function
I	X	X			Blind spot warning
II			X	X	Closing vehicle warning
III	X	X	X	X	Lane change warning

GOAL OF THE SIDE VIEW ASSIST

The goal of the Side View Assist was to realize a Blind Spot Warning system for motorcycles mainly for urban scenarios (see Figure 4), based on existing systems for cars.

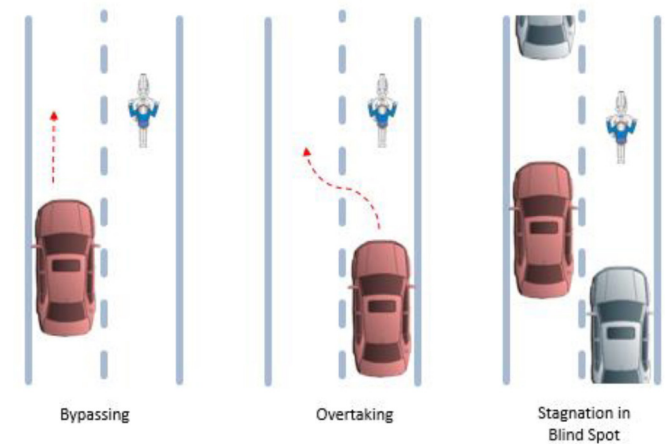


Figure 4. Example of the different scenarios, which shall be supported by the system.

TECHNICAL ASPECTS

Components of the Side View Assist

The Side View Assist includes:

- the surround sensing;
- an Electronic Control Unit (ECU);
- the Human Machine Interface (HMI); and
- the harness: connection between sensors, ECU, vehicle and HMI.