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Greater safety on two wheels: Bosch innovations for the motorcycles of the future

May 17, 2018

PI 10645 BBM IEh/af

- ▶ Bosch is making motorcycling safer the world over
- ▶ With the help of Bosch technology, dangerous traffic situations will not even occur in the first place

Stuttgart, Germany – Safety is one of the most urgent challenges in the motorcycle market. Whether smart assistance systems or connectivity packages, Bosch offers many solutions that make roads safer for motorcyclists. And with its innovative research projects, it is already planning for the next stages of development.

Sliding mitigation research project:

Whether wet leaves, an oil spill, or gravel on the road surface, wheels begin to slip sideways if they can no longer apply sufficient lateral force in a curve. In situations such as these, motorcyclists have practically no chance of righting their bikes. Ideally, keeping them safely on course would require applying additional external lateral force. This is the idea behind the sliding mitigation Bosch is developing in a research project. Like a magic hand, it keeps the motorcycle on track and considerably reduces the risk of a fall. A sensor detects sideways wheel slip. If a certain value is exceeded, gas is released from a gas accumulator of the type used in passenger-car airbags. The gas flows into the tank adapter and is vented in a certain direction through a nozzle. This reverse thrust keeps the motorcycle on track.

Radar-based assistance systems:

Giving motorcycles radar as a sensory organ enables these new motorcycle assistance and safety functions while providing an accurate picture of the vehicle's surroundings. As a result, these assistance functions not only increase safety, they also enhance enjoyment and convenience by making life easier for riders.

- **ACC adaptive cruise control**

Riding in heavy traffic and maintaining the correct distance to the vehicle in front takes a great deal of concentration and is strenuous over longer periods. ACC adjusts the vehicle speed to the flow of traffic and maintains the necessary safe following distance. This can effectively prevent rear-end collisions caused by insufficient distance to the vehicle in front. And not only does ACC offer riders more convenience, it also allows them to concentrate more on the road, particularly in high-density traffic.

- **Forward collision warning system**

In road traffic, even the briefest lapse in concentration can have serious consequences. Bosch has developed a collision warning system for motorcycles to reduce the risk of a rear-end collision or to mitigate its consequences. The system is active as soon as the vehicle starts and it supports the rider in all relevant speed ranges. If the system detects that another vehicle is dangerously close and the rider does not react to the situation, it warns the rider by way of an acoustic or optical signal.

- **Blind-spot detection**

This system keeps a lookout in all directions to help motorcyclists change lanes safely. A radar sensor serves as the blind-spot recognition system's electronic eye, registering objects in hard-to-see areas. Whenever there is a vehicle in the rider's blind spot, the technology warns them by way of an optical signal – for example, in the rear-view mirror.

ABS:

Since 1984, Bosch has been continuously perfecting motorcycle ABS technology in order to make this important safety technology available for all vehicle classes in every market. According to Bosch accident research, roughly one in four motorcycle accidents involving fatalities and injuries could be prevented if all two-wheelers were fitted with ABS. Worldwide, more and more countries and regions, including the EU, Japan, Taiwan, and Brazil, are mandating motorcycle ABS. Since April 2018, motorcycle ABS is mandatory in India for all new two-wheeler types with an engine displacement above 125 cc. ABS 10 was designed specifically to meet the requirements for motorized two-wheelers in emerging markets.

MSC:

MSC motorcycle stability control is the world's first all-in-one safety system for two-wheelers. By monitoring two-wheeler parameters such as lean angle, the system can instantaneously adjust its electronic braking and acceleration interventions to suit the current riding status. In this way, the Bosch system can

prevent the bike from lowsiding or righting itself suddenly and uncontrollably when braking in bends, which is where the majority of motorcycle accidents occur. The new 6D sensor in the MSC system is the smallest and lightest design on the market. It significantly improves mounting flexibility, and is less prone to vibration.

Motorcycle-to-car communication:

By enabling motorcycles and cars to communicate with each other, Bosch is creating a digital shield for motorcyclists. Up to ten times a second, vehicles within a radius of several hundred meters exchange information about vehicle type, speed, position, and direction of travel. Long before a motorcycle comes into view, this technology warns drivers and the sensors in their vehicles that a motorcycle is approaching. This allows them to drive better and more defensively. The public WLAN standard (ITS G5) is used as the basis for the exchange of data between motorcycles and cars. Transmission times of just a few milliseconds between transmitter and receiver mean that participating road users can generate and transmit important information relating to the traffic situation.

Emergency call, breakdown call, and information call:

On the basis of intelligent crash algorithms, eCall detects when a motorcyclist is involved in a crash, automatically transmits an emergency call, and informs the emergency services about the type of vehicle and its position. In the event that the two-wheeler breaks down, the bCall independently contacts the repair shop and sends the necessary data. The iCall is a helpful assistant on any road. This makes accessing service information – such as the location of the nearest gas station – simple and straightforward.

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Mobility Solutions is the largest Bosch Group business sector. In 2017, its sales came to 47.4 billion euros, or 61 percent of total group sales. This makes the Bosch Group one of the leading automotive suppliers. The Mobility Solutions business sector pursues a vision of mobility that is accident-free, emissions-free, and stress-free, and combines the group's expertise in the domains of automation, electrification, and connectivity. For its customers, the outcome is integrated mobility solutions. The business sector's main areas of activity are injection technology and powertrain peripherals for internal-combustion engines, diverse solutions for powertrain electrification, vehicle safety systems, driver-assistance and automated functions, technology for user-friendly infotainment as well as vehicle-to-vehicle and vehicle-to-infrastructure communication, repair-shop concepts, and technology and services for the automotive aftermarket. Bosch is synonymous with important automotive innovations, such as electronic engine management, the ESP anti-skid system, and common-rail diesel technology.

The Bosch Group is a leading global supplier of technology and services. It employs roughly 402,000 associates worldwide (as of December 31, 2017). The company generated sales of 78.1 billion euros in 2017. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected manufacturing. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to deliver innovations for a connected life. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. At 125 locations across the globe, Bosch employs some 64,500 associates in research and development.

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Fewer accidents: Bosch is teaching motorcycles how to see and feel

Automated driving technologies are making their way from car to motorcycle

May 17, 2018

PI 10646 BBM IEh/af

- ▶ Bosch board of management member Hoheisel: “Bosch is taking motorcycling safety to a whole new level”
- ▶ One in seven motorcycle accidents could be prevented using radar-based assistance systems
- ▶ Improved safety and enjoyment: radar is becoming a sensory organ for motorcycles
- ▶ New Bosch technology to feature in production models from KTM and Ducati

Stuttgart, Germany – Cars can be made safer through the addition of crumple zones, airbags, and seat belts. Motorcyclists, on the other hand, face considerably more danger when riding: the risk of dying in an accident is up to 20 times higher for them than for car drivers. In fact, the number of fatal motorcycle accidents in Germany went up by 9 percent last year (source: German Federal Statistics Office). Bosch has a clear vision: no more fatalities for motorcyclists in road traffic. That is why the company has developed a new safety package for motorcycles, comprising adaptive cruise control, forward collision warning, and blind-spot detection. This package is built on technologies that also enable automated driving in cars. The motorcycle manufacturers KTM and Ducati will include the new rider assistance systems in production models as soon as 2020. For Bosch, this is the next step along the path toward accident-free riding – one that doesn't reduce enjoyment and doesn't take away motorcyclists' responsibility. “Bosch is taking motorcycling safety to a whole new level,” says Dr. Dirk Hoheisel, member of the board of management of Robert Bosch GmbH.

More safety, more enjoyment

Studies show that motorcycle accidents have two main causes: riders losing control, and collisions with other vehicles (source: Bosch accident research). In the future, with the help of Bosch technology, these dangerous traffic situations won't even occur in the first place. Another reason to equip vehicles with more

intelligent safety technology is that nine out of ten accidents are due to human error. As the world's leading supplier of motorcycle safety technology, Bosch has already made riding on two wheels considerably safer with assistance systems such as ABS and MSC motorcycle stability control. Now the company is going one step further. According to Bosch accident research estimates, radar-based assistance systems could prevent one in seven motorcycle accidents. These electronic assistants are always vigilant and, in emergencies, they respond more quickly than people can. The technology underpinning these systems is a combination of radar sensor, brake system, engine management, and HMI (Human Machine Interface). Giving motorcycles radar as a sensory organ enables these new motorcycle assistance and safety functions while providing an accurate picture of the vehicle's surroundings. As a result, these assistance functions not only increase safety, they also enhance enjoyment and convenience by making life easier for riders. "The motorcycle of the future must be able to see and feel," says Geoff Liersch, head of the Bosch Two-Wheeler and Powersports business unit.

Capabilities of the new Bosch technologies for motorcycles:

ACC adaptive cruise control

Riding in heavy traffic and maintaining the correct distance to the vehicle in front takes a great deal of concentration and is strenuous over longer periods. ACC adjusts the vehicle speed to the flow of traffic and maintains the necessary safe following distance. This can effectively prevent rear-end collisions caused by insufficient distance to the vehicle in front. And not only does ACC offer riders more convenience, it also allows them to concentrate more on the road, particularly in high-density traffic.

Forward collision warning system

In road traffic, even the briefest lapse in concentration can have serious consequences. Bosch has developed a collision warning system for motorcycles to reduce the risk of a rear-end collision or to mitigate its consequences. The system is active as soon as the vehicle starts and it supports the rider in all relevant speed ranges. If the system detects that another vehicle is dangerously close and the rider does not react to the situation, it warns the rider by way of an acoustic or optical signal.

Blind-spot detection

This system keeps a lookout in all directions to help motorcyclists change lanes safely. A radar sensor serves as the blind-spot recognition system's electronic eye, registering objects in hard-to-see areas. Whenever there is a vehicle in the

rider's blind spot, the technology warns them by way of an optical signal, for example in the rear-view mirror.

For Bosch, motorcycle assistance systems are another stepping stone toward making the vision of emissions-free, accident-free, and stress-free mobility a reality.

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Digital protection shield: when motorcycles and cars talk to each other

May 23, 2017

PI 9688 BBM IEh/af

New Bosch technology could prevent nearly one-third of all motorcycle accidents

- ▶ Connecting bikes and cars ensures motorcycles' digital visibility
- ▶ Dirk Hoheisel, member of the board management of Bosch: "We are creating a digital protection shield for riders."
- ▶ Riders are 18 times more at risk of being killed in an accident than drivers
- ▶ Bosch development project with partners Autotalks, Cohda Wireless and Ducati

Stuttgart, Germany – The first warm days of the year mark the start of motorcycle season – and, unfortunately, a rise in the number of road accidents. Motorcyclists are among the most at-risk road users, 18 times more at risk of being killed in an accident than drivers. Last year, there were approximately 30,000 motorcycle accidents in Germany alone, roughly 600 of which were fatal. One of the main reasons is that riders of two-wheelers are often overlooked in road traffic, both at intersections and during passing. Bosch wants to change that. With its partners Autotalks, Cohda Wireless, and Ducati, it has developed a prototype smart solution. "We let motorcycles and cars talk to each other, creating a digital protection shield for riders," says Dr. Dirk Hoheisel, a member of the Bosch board of management. The goal is to prevent dangerous situations from occurring in the first place.

Connectivity could prevent nearly one-third of motorcycle accidents

According to estimates by Bosch accident research, motorcycle-to-car-communication could prevent nearly one-third of motorcycle accidents. "Through safety systems such as ABS and motorcycle stability control, Bosch has already made riding a two-wheeler significantly safer. By connecting motorcycles, we are taking safety to the next level," Hoheisel says. Here is how it works: up to ten times a second, vehicles within a radius of several hundred meters exchange information about vehicle types, speed, position, and direction of travel. Long before drivers or their vehicles' sensors catch sight of a motorcycle, this

technology informs them that a motorcycle is approaching, allowing them to adopt a more defensive driving strategy. For example, typical dangerous situations arise when a motorcycle approaches a car from behind on a multi-lane road, ends up in a car's blind spot, or changes lanes to pass. If the system identifies a potentially dangerous situation, it can warn the rider or driver by sounding an alarm and flashing a warning notice on the dashboard. In this way, all road users receive essential information that actively helps avoid accidents.

Vehicles exchange information within just a few milliseconds

The public WLAN standard (ITS G5) is used as the basis for the exchange of data between motorcycles and cars. Transmission times of just a few milliseconds between transmitter and receiver mean that participating road users can generate and transmit important information relating to the traffic situation. Parked or idling vehicles also transmit data to any surrounding receivers. To allow riders and drivers who are farther away to reliably receive the necessary information, the technology makes use of multi-hopping, which forwards the information automatically from vehicle to vehicle. In critical situations, therefore, all road users know what is happening and are able to take appropriate action in advance.

Video on motorcycle-to-car-communication:

<https://www.youtube.com/watch?v=Cfn5sbUqHig>

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