White Paper “sensatorq”

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Why has a new concept for vehicle dynamics control suddenly become so necessary?

Since the introduction of electronic anti-lock braking systems, only a very simplified vehicle model has been formed from the values of the wheel speed sensors. In this, an attempt is made to "keep" the calculated wheel slip as precisely as possible within certain value ranges. Over the last 40 years, it has been possible to improve the maximum achievable acceleration and deceleration values from an initial 1 g (9.81 m/s²) up to almost 1.4 g (13.73 m/s²). At the same time, it can be seen that with individual-wheel driven electric vehicles (for example, the "Grimsel" from the Academic Motorsports Club of Zurich) an acceleration of at least 1.88 g (18,44 m/s²) can be realised. Here, the wheel slip is not used as the command variable, but the maximum controllable current. This corresponds to the force acting on the wheel. It is obvious that a control system, which uses the wheel force as a command variable, is far superior to slip control. We view this finding as a highly disruptive factor for the future of e-mobility and autonomous driving, but also for the future of the conventional operation of motor vehicles.

What are the advantages of the new "sensatorq" sensor/control concept?

By means of a "real-time" force measurement at the wheel, an end-to-end vector-oriented vehicle model can be formed for any driving situation with the assistance of the existing steering force sensors. A new benchmark in terms of driving safety, dynamics, driving comfort and, in particular, an enormous increase in efficiency represents a previously undreamt-of, new product portfolio for the automotive supply industry and not least for the automotive industry itself. A vehicle optimised in this respect would mathematically be able to undershoot a braking distance of 21 m from 100km/h. This insight would be more than beneficial to the development of safe, autonomous car traffic – but also, for example, for the autonomous convoy driving sought after in the heavy goods vehicle sector.

What additional benefits might “sensatorq” deliver?

By constantly measuring the road conditions, information might also be made available to other road users in the course of digitised networking. A continuous "real-time" comparison of the wheel force with the values of the previous sensor technology and the engine control system will create the necessary redundancy for future drive concepts. The "sensatorq" vision: possible friction value-controlled wheel or tyre concepts deployed in the future will also require the wheel force as a command variable. The vector-oriented "sensatorq" system will render obsolete future efficiency losses due to components such as differentials.

What is "sensatorq" or what will "sensatorq" be in the future?

... "sensatorq" will be the key technology behind the drive and braking systems of the coming decades, which will be accompanied by a new design of the force-transmitting parts and the modification of existing sensors and software.

...with low part weights and at reasonable costs for any vehicle in both the car and goods vehicle sectors, it will be possible to apply "sensatorq" to increase the native ability to "feel" the road ("sense-a-torque").

... "sensatorq" will be the much-needed data partner to the existing digital control sensor technology.

We would love to discuss the benefits and the disruptive capabilities of this automotive invention with you personally.

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