Collision avoidance

Advances in active vehicle safety testing systems are enabling continued development of radar-based ADAS technology

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4activeSystems' battery-powered platform was introduced to the market in 2014

Since car manufacturers started to introduce collision avoidance systems to commercially available vehicles in the early 2000s, sensor systems have grown increasingly sophisticated. With autonomous driving in mind, the systems will need to be able to handle an almost infinite number of complex scenarios to make people's journeys safe and comfortable.

4activeSystems began development of its first dummy objects and propulsion systems to test AEB systems in real-word scenarios in 2006. First to be introduced were portal rigs and belt-driven devices, which have a high accuracy and good usability but are limited to straight line paths. In the same way that sensor systems and algorithms evolved, development of advanced test utilities had to follow to address increased complexity of test scenarios.

Car-to-car tests

For this reason, the company introduced battery-powered self-driving platforms in 2014. The system it developed for car-to-car tests is the large Freeboard. Capable of reaching 100km/h (62mph), the Freeboard is equipped with a dual antenna GPS/GLONASS system in combination with a highly precise IMU (RTK L2 accuracy). It can also be fully synchronized with every available driving robot on the market. Thanks to smart design and special plastic materials, the Freeboard is nearly invisible to radar-based systems. In addition, it can be driven over by trucks up to 40 tons and is waterproof up to a level of IP67.

The large Freeboard, for car-to-car crash tests, can reach speeds of 100km/h

A low-profile design and use of special plastics ensures that radar-based systems cannot detect the Freeboard platform

For tests related to vulnerable road users such as pedestrians, cyclists and motorcyclists, different prerequisites to the underlying propulsion come into play. The system must not affect the sensor response, meaning only the dummy object should be detected. Therefore the platform beneath the dummy must have an extremely low profile, taking into account correct distance estimations for camera-based systems. For this scenario specifically, 4activeSystems developed the Freeboard small platform. Due to the shape and use of damping plastic materials, radar response is very low from all directions. The Freeboard small can reach speeds of 80km/h (50mph).

For both platforms, user-defined trajectories can be planned via an easy-to-use software interface and displayed on an online satellite map. The system can communicate to any major automotive dynamic motion analyzer (ADMA) supplier, so absolute and relative position data between platforms and test vehicles is available for monitoring and synchronizing movement triggers and speed control. Up to five of the self-driving platforms can be used in parallel for complex test scenarios. Protocols are now being developed to control complete infrastructure on test tracks via central control units.

Both the Freeboard large and Freeboard small conform to official Euro NCAP and ISO AEB C2C and AEB VRU testing specifications. ❮