

Autonomous drive technologies and data management

by Antonio Di Bernardo - Italian and European Patent, Trademark and Design Attorney

When talking about autonomous drive, everyone knows that the vehicle must collect and process data from the surrounding environment and then take decisions such as to stop, to turn, to accelerate, and so on. But not everyone knows the problem connected with the management of these data.

Autonomous drive (or self-drive) technology will be an important step towards drivers' safety, that's why engineers worldwide are busily working towards introducing fully autonomous cars in the next future.

Polytechnic of Milan, one of the leading universities developing autonomous drive solutions and winner in January 2022 of the Las Vegas Indy Challenge, has appointed THINX to draft and prosecute several patents related to autonomous drive.

At the beginning of autonomous drive, roughly 15 years ago, I remember I met a group of researchers from University of Parma showing me an autonomous drive provided with a huge number of cameras. Nowadays manufacturers still equip their cars with tens of cameras, sensors and lidars. Rimac, a Croatian startup developing electric hypercars, has recently tested its AI system on a fleet of Kia Stinger sedans provided with nine cameras, six radars, one solid-state lidar sensor, 12 ultrasonic sensors, and an Nvidia Pegasus supercomputer with the power of 22 high-end consumer computers¹.

While the use of such a big number of sensors and cameras can be reasonable for testing the autonomous-drive software, the solution does not appear to be adequate for a standard car, as the cost for a single LIDAR can easily range up to 75.000 \$.

Lately technicians are considering cooperative perception, a mechanism for sharing data between vehicles and other equipment distributed on the road, like traffic lights and access network equipment. Nevertheless, if we consider that LIDARs and radars can generate a data rate of 10 Gbps, we understand that exchanging such a huge amount of data could be a problem for a self-driving car supposed to take extremely fast decisions.

5G at high frequency bands (above 24 GHz and up to THz) has been indicated by most as the technical solution for V2X (Vehicle to Everything) communication. While 5G provides huge transmission speed, processing such an amount of data can still be a problem, hence some authors have suggested cooperative perception to transmit to the self-driving car only selected useful data. This solution, however, might rise a legal issue: in case an accident occurs, who has legal liability on it? The equipment transmitting the data to the self-driving car or the self-driving car processing the data and taking the decision?

As attorneys at law can probably find an answer to this question, technicians have thought of alternative solutions to solve this issue. For instance, in 2020 we presented for Polytechnic of Milan an application for a new communication system allowing a self-driving car to query sensors of another equipment.

The route to autonomous drive is not so short as one could imagine, with different problems to be solved and new inventions to be made relating to AI, sensors and V2X communications.

THINX has acquired good knowledge in this field of technology and is on the edge of protecting autonomous drive connected solutions.

¹ <https://www.gearbrain.com/autonomous-car-technology-situation-2020-2646374487.html>