A selection of Drive Me system solution components

Sensor technologies
Volvo Cars is developing a holistic solution that generates exact positioning and a complete 360° view of the car's surroundings. This is achieved by a combination of multiple radars, cameras and laser sensors. A redundant network of computers processes the information, generating a real-time map of moving and stationary objects in the environment.
Precise positioning is based on this surround information together with GPS and a high definition 3D digital map that is continuously updated with real-time data.
The system is reliable enough to work without requiring driver supervision.

Combined radar and camera
The combined 76 GHz frequency-modulated continuous wave radar and camera placed in the windscreen is the same as that in the all-new XC90. This system reads traffic signs and the road's curvature and can detect objects on the road such as other road users.

Surround radars
Four radars behind the front and rear bumpers (one on each corner of the car) are able to locate objects in all directions. By sweeping both left and right, transmitting waves that bounce off signs, poles, and tunnels, they monitor a full 360° around the car.

360° surround vision
Four cameras monitor objects in close proximity to the vehicle. Two are under the outer rear-view mirrors, one is in the rear bumper and one is in the grille. Besides detecting objects at close range, these cameras monitor lane markings.
The cameras have a high dynamic range and can handle very quick changes in lightning conditions, e.g. when entering a tunnel.

Multiple beam laser scanner
This sensor system is placed in the front of the vehicle, below the air intake. The scanner can identify objects in front of the car and ensures very high angle resolution. It can also distinguish between objects. The unique laser sensor has a range of 150 metres for vehicles and covers a 140° field of view.

Trifocal camera
In addition, a trifocal camera placed behind the upper part of the windscreen is three cameras in one, providing a broad 140° view, a 45° view and a long-range, yet narrow, 34° view for improved depth perception and distant-object detection. The camera can spot suddenly appearing pedestrians and other unexpected road hazards.

Long-range radars
Two long-range radars placed in the rear bumper of the car ensure a good rearward field of view. This technology is particularly useful when changing lanes because it can detect fast-moving vehicles approaching from far behind.

Ultrasonic sensors
Twelve ultrasonic sensors around the car are used to identify objects close to the vehicle and support autonomous drive at low speeds.
The sensors are based on the technology used for current park assist functions enhanced with advanced signal processing.
A typical example of when this technology is useful is for detecting unexpected situations, such as pedestrians or hazards on the road close to the car.

High definition 3D digital map

A high definition 3D digital map is the tool used to provide the vehicle with information about the surroundings, e.g. altitude, road curvature, number of lanes, geometry of tunnels, guard rails, signs, exits, etc. The position geometry is in many cases at centimetre level.

High performance positioning

The high performance GPS is one part of the positioning control that is enhanced by a combination of an advanced GPS, a 3-degrees of freedom accelerometer and a 3-degrees of freedom gyro. By matching the 360° image created by the multitude of sensors with the map image, the car will get the information about its position in relation to the surroundings.

By combining the information from the sensors and the map, the Drive Me car is able to choose the best course in real time, factoring in variables such as the curvature of the road, speed limit, temporary signs and other traffic.

Cloud services

The cloud service is connected to the traffic authorities' control centre. This ensures that the most up-to-date traffic information is always available. The control centre operators also have the ability to tell the drivers to turn off the autonomous drive mode if necessary.