

Appendix D: Claim Chart for U.S. Patent 8,265,353

Based on information presently available, Longhorn Automotive Group LLC (“LAG”) contends that Volkswagen AG (“Volkswagen”) infringe at least claims 1-18 (the “Asserted Claims”) of U.S. Patent 8,265,353 (the “353 Patent”) through the Accused Products which are manufactured, sold, offered for sale, and/or used by Volkswagen.

For example, the Accused Products include, but are not limited to, all Volkswagen cars in all configurations, which include, but are not limited to, the following: VW ID.4, the VW Atlas, the VW Atlas Cross Sport, the VW Taos, the VW Jetta, the VW Jetta GLI, the VW Arteon, the VW Golf R, and the VW Golf GTI; Audi models including, but not limited to, the e-tron GT models, the Q4 e-tron models, the Q8, e-tron models, the Q3 models, the Q5 models, the Q7 models, the Q8 models, the A3 models, the A4 models, the A5 models, the A6 models, the A7 models, the TT models, and the R8 models, among other vehicles, and other infringing technology Volkswagen sold, imported, or used in the United States since 2018, and vehicles sold, imported, or used by Volkswagen customer and end-users in the United States since 2018 (“Volkswagen Accused Product(s)” or “Accused Product(s)”).

Volkswagen directly infringes each of the Asserted Claims by making, importing, using, selling, and/or offering to sell the Accused Products in violation of 35 U.S.C. § 271(a). Additionally, Volkswagen directly infringes the Asserted Claims through its use, testing, troubleshooting, and demonstration of use of the Volkswagen Accused Products to its customers and end-users in the United States.

Volkswagen indirectly infringes the Asserted Claims in violation of 35 U.S.C. § 271(b) by inducing third parties, including Volkswagen customers and end-users, to directly infringe through their operation and use of the Accused Products. Volkswagen has knowingly and intentionally induced this direct infringement by, *inter alia*, (i) making, selling, importing, or otherwise providing the Accused Products to third parties with the intent that the Accused Products will operate and be used in a manner that practices the Asserted Claims; and (ii) marketing and advertising the Accused Products. Volkswagen’s marketing and promotional materials for the Accused Products are found, for example, on Volkswagen’s website. For example, Volkswagen’s website offers customers downloadable User Manuals and customer support for the Accused Products that instruct customers to, among other things, set up and use the Accused Products. On information and belief, Volkswagen knows that its actions will result in infringement of the Asserted Claims or subjectively believes that there is a high probability that its actions will result in infringement of the Asserted Claims but has taken deliberate actions to avoid learning these facts.

Volkswagen also contributorily infringed each of the Asserted Claims in violation of 35 U.S.C. § 271(c) by making, selling, importing, and offering for sale the Accused Products, which were used to directly infringe the Asserted Claims. The Accused Products constitute a material part of the Asserted Claims. The accused components within the Accused Products are material to the invention of the ’353 Patent, are not staple articles or commodities of commerce, have no substantial non-infringing uses, and are known by Volkswagen to be especially made or adapted for use in the infringement of the ’353 Patent.

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The contentions below list certain features of the Audi A8 that LAG contends are representative of features of all Accused Products. The Audi A8 is representative of all accused products which include, but are not limited to, Audi A8 with advanced safety and driver support systems, alone or in combination with certain other driver assistance systems having Audi's Pre-Sense. Based on publicly available information, LAG believes each Accused Product shares substantially the same structure and functionality with respect to the components which are relevant to infringement given that, among other things, the listed products all purport to support or embody Audi's Pre-Sense other Advances Driver Assistance Systems, and similar systems and/or functionalities.

LAG does not concede that any claims of the '353 Patent that are not listed below are not infringed by the identified Accused Products. Moreover, the citations to certain documents and other information below are intended to be exemplary only and in no way foreclose LAG from citing or relying on additional documents, source code, information, and/or testimony at a later time. These contentions are preliminary in nature, and an analysis of the Accused Products, internal documentation, source code, and/or testimony from relevant witnesses may be necessary to more fully and accurately describe the infringing features of the Accused Products. Accordingly, LAG reserves the right to supplement, correct, modify, and/or amend these contentions once such additional information is made available to LAG. Furthermore, LAG reserves the right to supplement, correct, modify, and/or amend these contentions as discovery in this case progresses; in view of the Court's claim construction order(s); in view of any positions taken by Volkswagen including, but not limited to, positions on claim construction, invalidity, and/or non-infringement; and in connection with the preparation and exchange of expert reports.

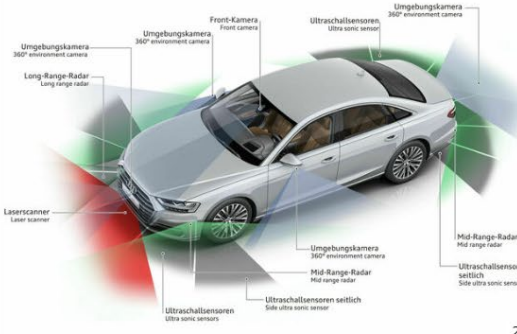
The contents of every below claim cell on which another claim cell depends are expressly incorporated by reference in that dependent cell, as if set forth in their entirety therein. To the extent Volkswagen produces additional source code over the course of this litigation, LAG expressly reserves the right to further amend these contentions to include the later produced source code, pursuant to P.R. 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i).

To the extent these contentions include references to entities or persons outside the Accused Products, or to the extent Volkswagen contends that any element of the Accused Products is attributable to a third party, LAG contends that they are attributable to Volkswagen such that they constitute direct infringement by Volkswagen under 271(a). The acts may be attributable to Volkswagen because Volkswagen either directs or controls the others' performance, or Volkswagen and the other entity form a joint enterprise. *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 797 F.3d 1020, 1022 (Fed. Cir. 2015). Additionally, Mazda may be vicariously liable for the activities of these other entities. *Centillion Data Sys., LLC v. Qwest Commc'ns Int'l, Inc.*, 631 F.3d 1279, 1286 (Fed. Cir. 2011). Further, the activities of these entities (including consumers or end-users), may be attributable to Mazda because Mazda (1) conditions participation in an activity or receipt of a benefit upon others' performance of one or more steps of a patented method, and (2) establishes the manner or timing of that performance. *Eli Lilly & Co. v. Teva Parenteral Medicines, Inc.*, 845 F.3d 1357, 1365 (Fed. Cir. 2017). These acts also may be attributed

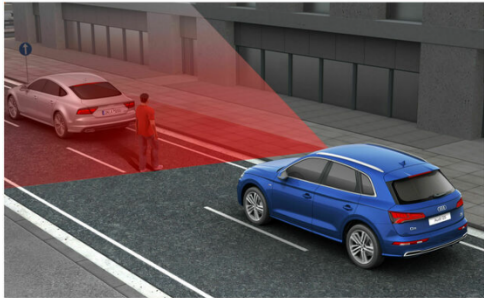
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to Mazda because it initiated the activities of its end-users. *SiRF Tech., Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1330 (Fed. Cir. 1997). Further, LAG contends that Mazda is also liable under 271(b) for inducing the acts of third parties.

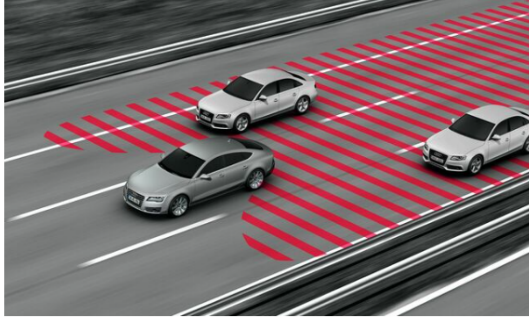
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Claim	Support
1[Pre]. A method of forming an image of a mobile object, comprising:	The Volkswagen Accused Product infringes directly and/or indirectly by performing, inducing others to perform, and/or contributing to the performance of a method of forming an image of a mobile object. This is a non-limiting preamble. This element is infringed literally, or in the alternative, under the doctrine of equivalents. For example, the Audi A8 equipped with Audi's Pre Sense system is a driver assist system with a network of advanced safety and driver support features, such as but not limited to Seatbelt Pretension, Window and Sunroof closure, Hazard Warning Lights, Breaking Assistance, Rear-end Collision Alert Signal (RECAS), Optimizing seating position, Parking system plus, Turn assist, Adaptive cruise control with Stop & Go function, Adaptive cruise assist, Hold assist, Active lane assist, Exit warning, Collision Avoidance assist, Curb warning, Multi collision brake assist, Parking System – Rear, Parking system plus, Cruise control, Crossing assist, Park assist, laser scanner, 360 environment cameras, Front camera, Radar sensors, and Ultrasonic sensors. For example, Audi Pre Sense can utilize the Central Driver Assistance Controller that processes data from sensors and cameras on the vehicle, which allows the Audi A8 to form an image of a mobile object (e.g., vehicle on road). Audi pre sense 360°  The Audi pre sense 360° detects collision hazards all around the car and initiates specific safety measures. It includes the following driver assistant systems: • Audi pre sense front • Audi pre sense rear • Audi pre sense basic • Audi pre sense side

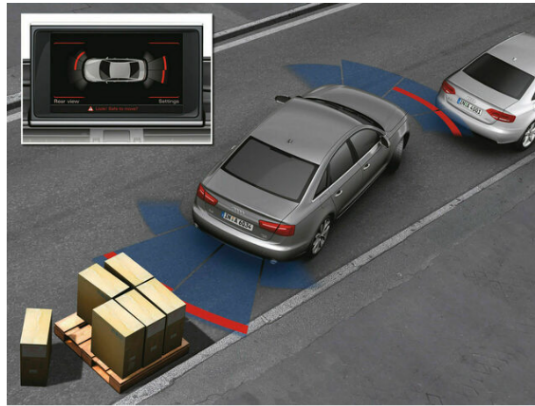
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Claim	Support
	Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184  Audi pre sense basic Audi pre sense basic initiates preventive safety measures for occupants as soon as it recognizes a critical driving state. It utilizes information from various vehicle systems to determine this. For instance, it intervenes if the Electronic Stabilization Control (ESC) sensors detect skidding or hard braking. Then the system pretensions the seat belts of the driver and front passenger electrically to reduce their forward or lateral movements. The side windows and sliding sunroof are automatically closed. In addition, the hazard warning lights are activated to alert following traffic.  Audi pre sense front / Audi pre sense city Audi pre sense front and Audi pre sense city utilize the data of radar sensors and/or the front camera, depending on the car model, to compute the probability of a collision. Within the limitations of the system, it warns of collision threats and initiates braking at specific vehicle speeds. Vehicles are detected in the driving speed range of up to 250 km/h (155.3 mph), pedestrians up to around 65 km/h (40.4 mph) or 85 km/h (52.8 mph) depending on the model, as well as cyclists, depending on the system. If a collision is imminent, the system warns the driver with visual, acoustic and haptic warnings based on a multistage warning concept. If necessary, the system provides braking assistance to reduce vehicle speed or initiates a full brake application to avoid the collision under certain circumstances. Actions are also taken to protect occupants. The hazard warning lights are activated, the seat belts are reversibly pretensioned, the seat position is optimized, and the windows and optional panoramic glass sunroof are closed.

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Claim	Support
	 Audi pre sense rear Audi pre sense rear uses radar sensors in the rear bumper to detect an impending rear-end collision, and it initiates preventive safety measures. These include pretensioning the front seat belts by electric power and closing the windows and sliding sunroof. In addition, the system activates the hazard warning lights to alert following traffic to the critical situation. In this process, the Rear-end collision alert signal (RECAS) is triggered, which flashes the hazard warning lights at a high frequency. Audi pre sense rear is active in background over the car's entire driving speed range with the exception of trailer towing situations.  Audi pre sense side Audi pre sense side reacts in the event of a collision from the side. Amongst others it uses the radar sensors of the crossing assist to calculate the probability of an accident involving traffic approaching from the side. The system can detect the threat of side collisions at speeds of up to approx. 60 km/h (37.3 mph) and apply preventative measures to help protect occupants. These include: activating the hazard lights, tensioning the safety belts, optimizing the seating position, and closing windows as well as the optional panoramic glass roof. ² In an impending lateral collision at more than 25 km/h (15.5 mph), the suspension actuators of the optional Audi AI active suspension raise the body on the side exposed to the danger by up to 80 millimeters (3.1 in) within half a second. The other vehicle therefore hits the car in an even more impact-resistant zone. The side sills and floor structure accommodate a large portion of the impact forces. Deformation of the cabin and the loads acting on the occupants, above all to the chest and abdomen areas, are reduced by up to 50 percent compared with a lateral collision with no raising of the suspension. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

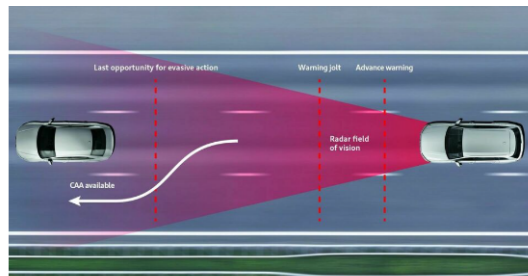
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Parking system plus

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



Collision avoidance assist

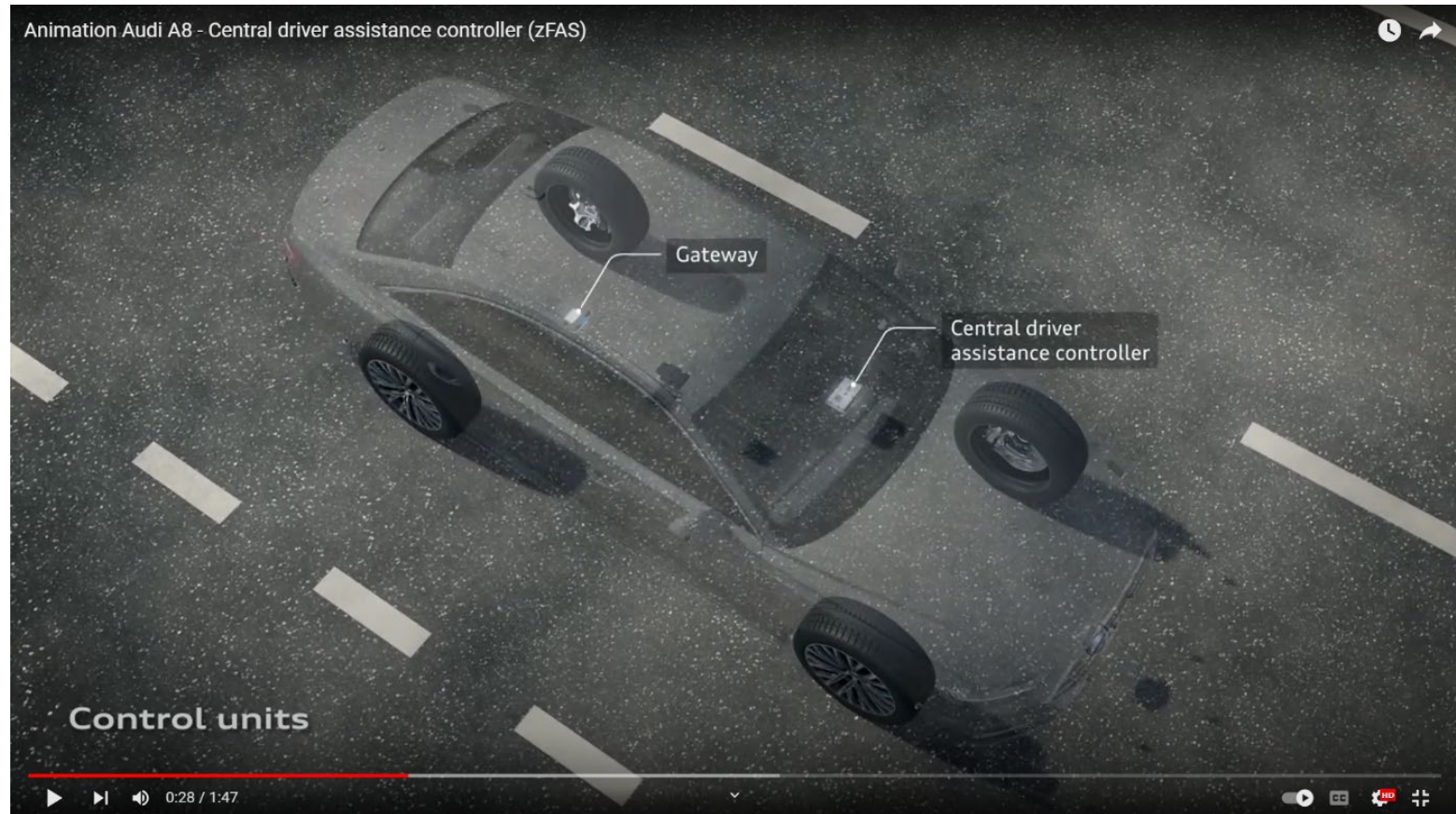
Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster.

First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

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Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



Source: <https://www.youtube.com/watch?v=kKbS3KmjDOg>

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Claim	Support
	Laser scanner Together with the long-range radar and the front camera, the laser scanner forms a trio of sensors with various strengths that complement each other. It is these sensors and the central driver assistance controller (zFAS), which generates an image of the surroundings from all the sensor data, that make automated driving possible in the first place. The laser scanner covers a field approximately 80 meters (262.5 ft) long, with an opening angle of 145 degrees. The roughly fist-sized component is mounted in the front bumper and, regardless of speed, emits moderated pulses of light on multiple vertical levels, which a mirror scatters in the shape of a fan. Having a wave length in the near-infrared range, the extremely short flashes of light are invisible and harmless to the human eye. They are reflected by objects in front of the car and return to the laser scanner in less than one microsecond, where photo diodes detect them. The result is a detailed, deeply contoured, static image of the surroundings. The laser scanner displays other vehicles as measured cuboids, and it also measures such information as distance and orientation, which it distributes to the partner control units. With its large horizontal aperture, it detects cars entering the lane very early. Detailed information about structures on the side of the road, such as guardrails, round out the spectrum. Like radar, the laser scanner also works in the dark. Automatic cleaning and heating of the covering panel keep it operational even in inclement weather and spray as long as the conditions aren't too extreme. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184
1[a]. obtaining a plurality of first images of the mobile object using a first imaging technique while obtaining a	Each Volkswagen Accused Product performs the step of obtaining a plurality of first images of the mobile object using a first imaging technique while obtaining a plurality of first measurements corresponding to movements of the mobile object using a first sensor system, the first sensor system being independent from the first imaging technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents.

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Claim	Support
plurality of first measurements corresponding to movements of the mobile object using a first sensor system, the first sensor system being independent from the first imaging technique;	For example, the Audi A8 uses a first imaging technique (e.g., the four 360-degree environment cameras) to obtain a plurality of first images of the mobile object (e.g., visual information about the estimated distance to obstructions surrounding the vehicle) for assisting drivers in parking and maneuvering. 360 degree cameras The four 360 degree cameras on the vehicle scan the immediate vicinity and display obstacles within. Drivers can choose from different views that simplify parking and maneuvering. A virtual overhead view shown in the MMI display gives the driver an overview of the overall parking situation. The panoramic view to the front and rear covers an angle of nearly 180 degrees and provides better visibility when exiting tight parking spaces, courtyard entrances and confusing intersections. Guide lines in the reversing camera view make it easier to park in perpendicular spaces and to hitch trailers. The view from the front camera helps when maneuvering, as it detects obstacles in front of the car. The system is automatically activated when driving in reverse or by pushing a button. An additional feature for some models is a virtual 3D view. The driver can use the touchscreen to steplessly swivel and zoom the image of the car and the actual vehicle surroundings. There is also a view of the front or rear tires so that the driver can pull the car up right next to the curb. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

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360 degree cameras

Photo — 01/01/2016

Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

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Top view camera (with virtual 360° camera)



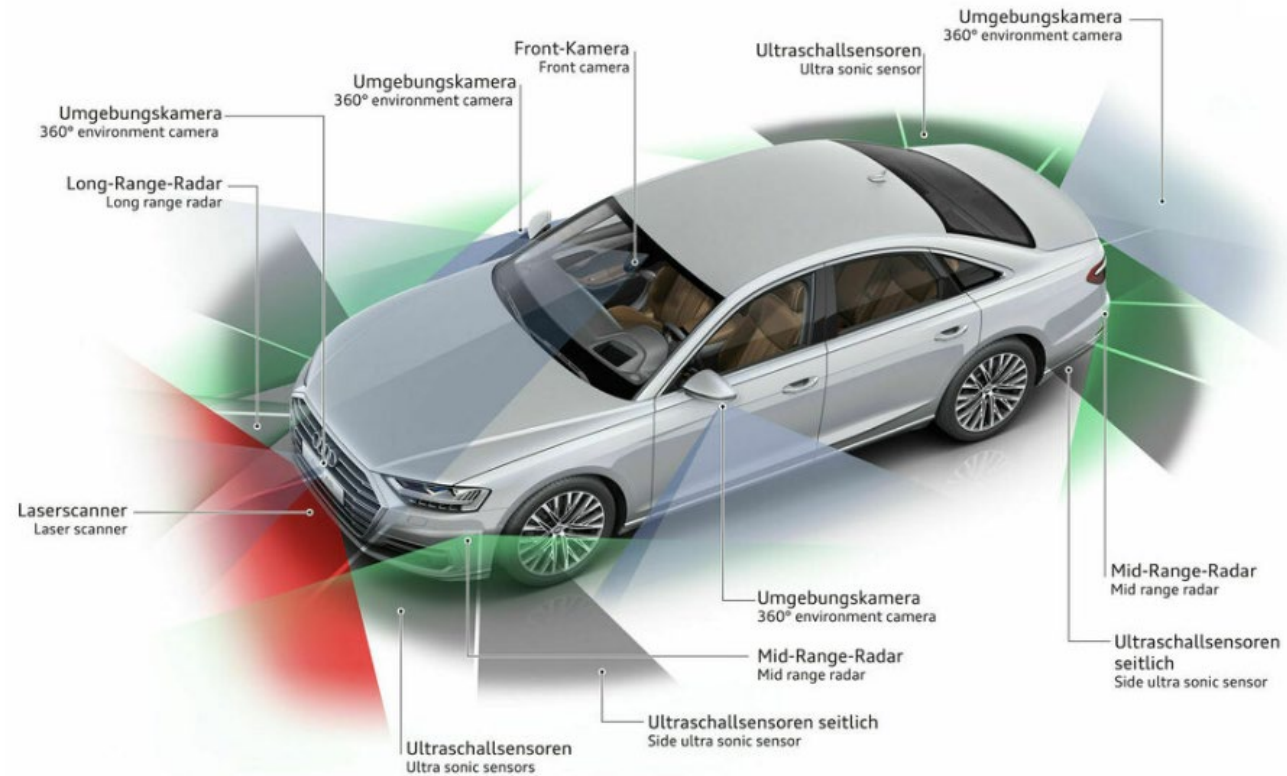
Backing up or moving in tight areas can be nerve-racking. We always worry about what we cannot see. With four available wide-angle cameras providing a 360-degree and virtual overhead view on the MMI display, you can maneuver your vehicle with precision through small parking areas or narrow multi-story parking garage entrances.

[View key feature info](#)

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

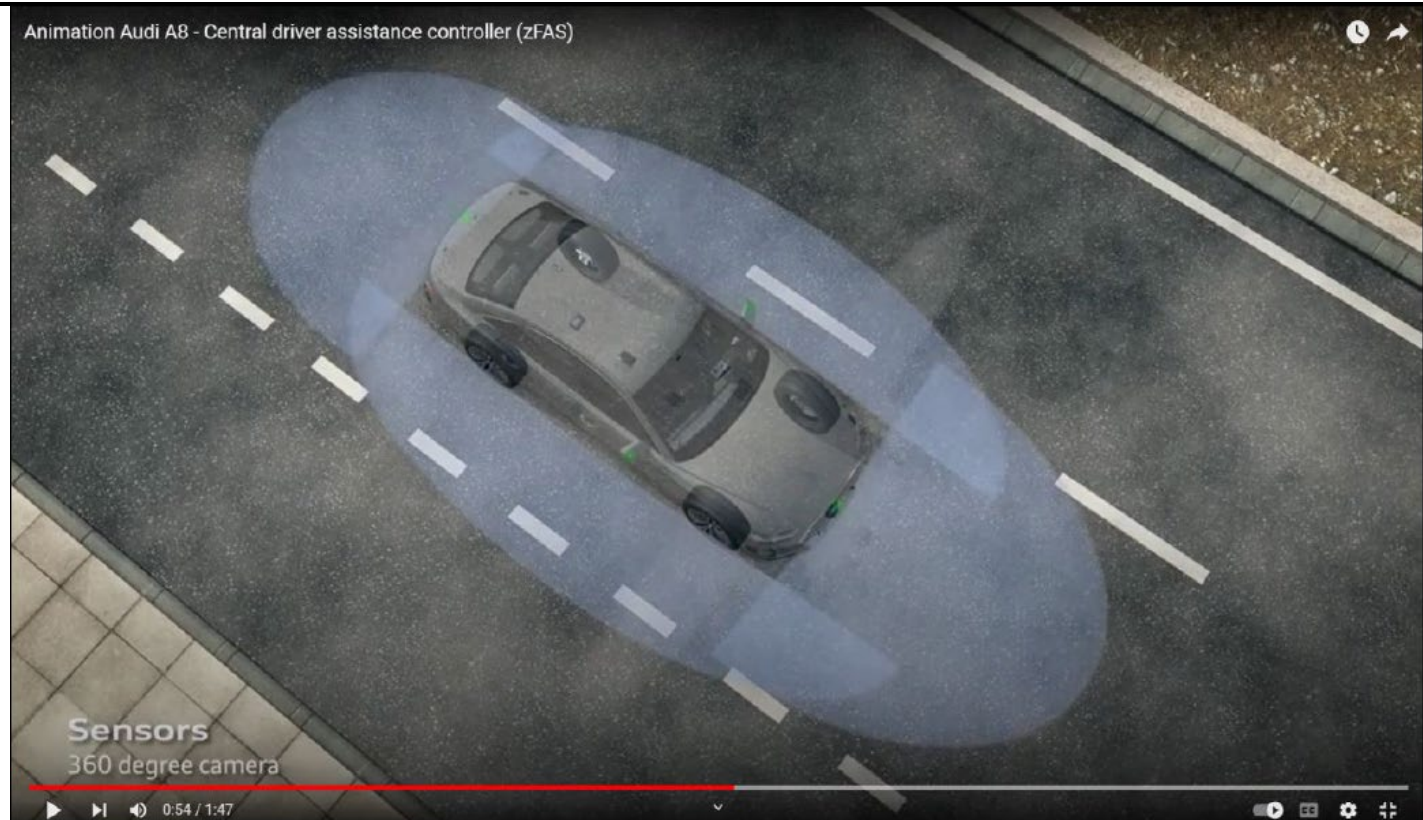
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For example, the 360-degree environment cameras can consist of one front camera, one rear camera and two side cameras – one on each side view mirror.



Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

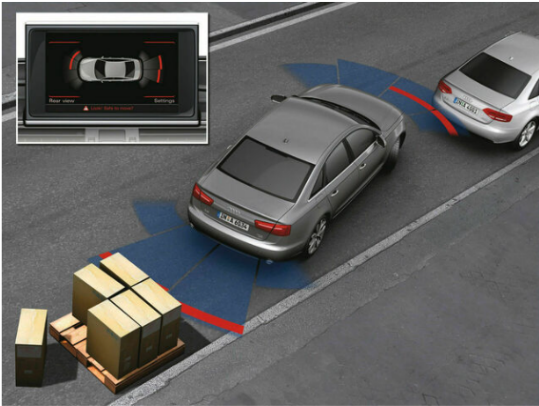
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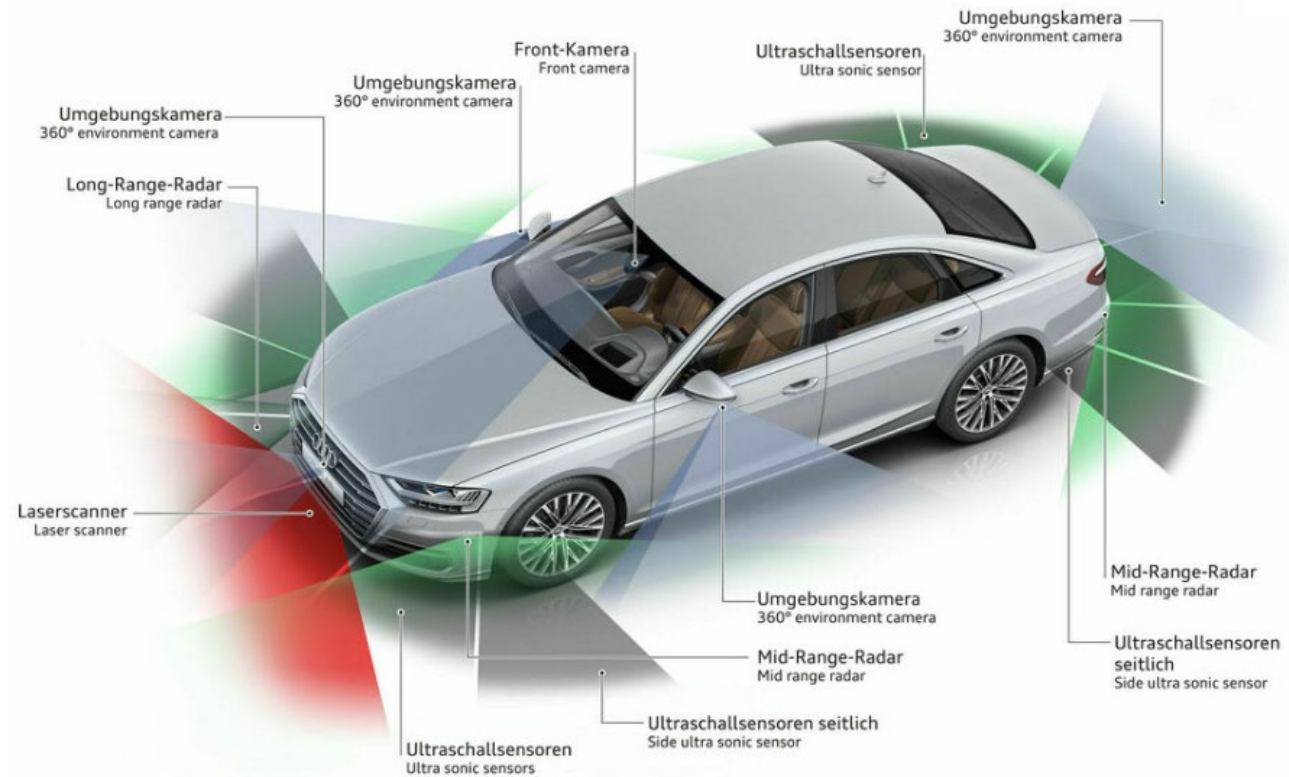
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For example, the laser scanner is positioned at the front bumper of the vehicle and emits pulses of light reflected off objects in front of the vehicle. The laser scanner uses these reflections to measure the distance to surrounding objects and creates a 3D model of the surroundings using captured data points.

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Claim	Support
	For example, the Audi Pre Sense system uses a first sensor system (e.g., Ultrasonic sensors) to obtain a plurality of first measurements corresponding to movements of the mobile object. As shown in the image below, ultrasonic sensors in combination with 360-degree environment cameras to assist driver with parking and maneuvering. For example, the first sensor system (e.g., Ultrasonic sensors) is independent from the first imaging technique (e.g., 360-degree environment cameras and/or laser scanner).  Parking system plus Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

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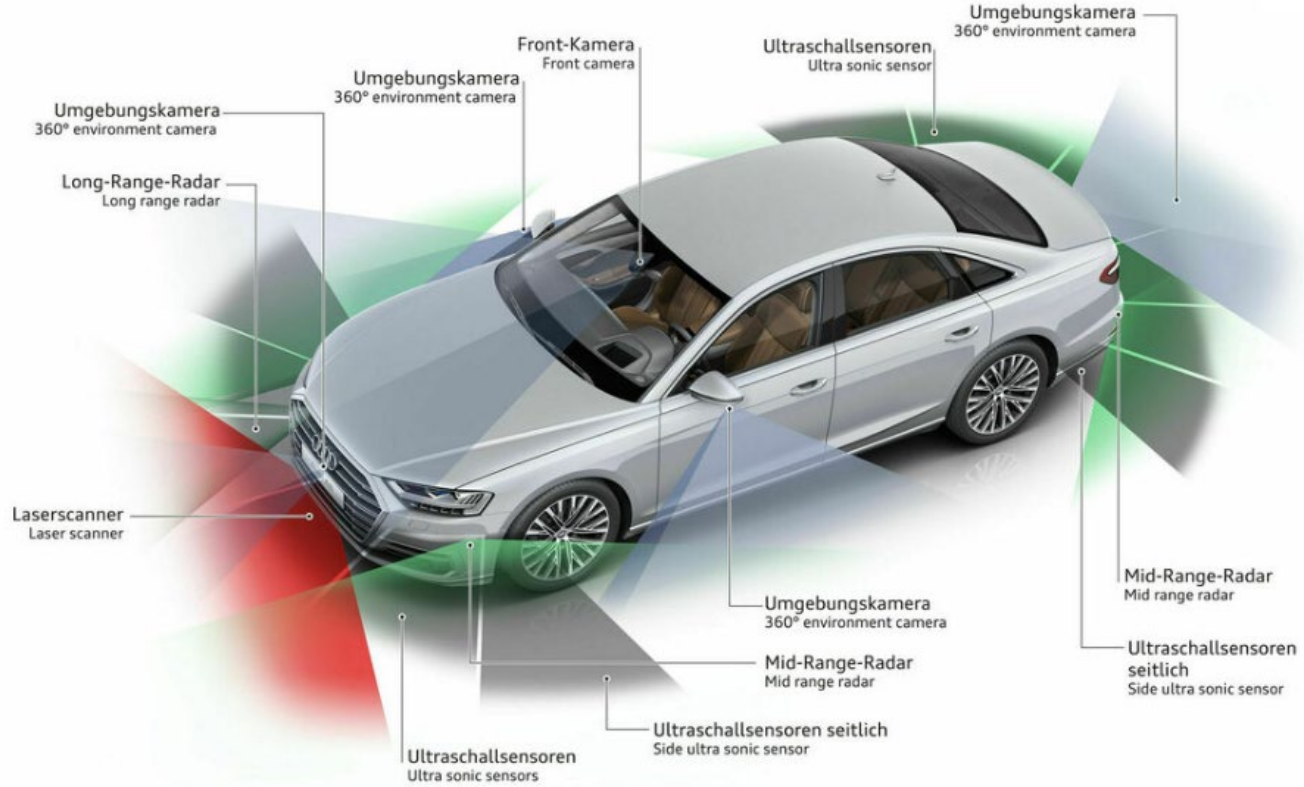
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Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

By way of further example, the Audi A8 uses a first imaging technique (e.g., the laser scanner) to obtain a plurality of first images of the mobile object (e.g., visual information about the estimated distance to obstructions surrounding the vehicle) for assisting drivers in parking and maneuvering.

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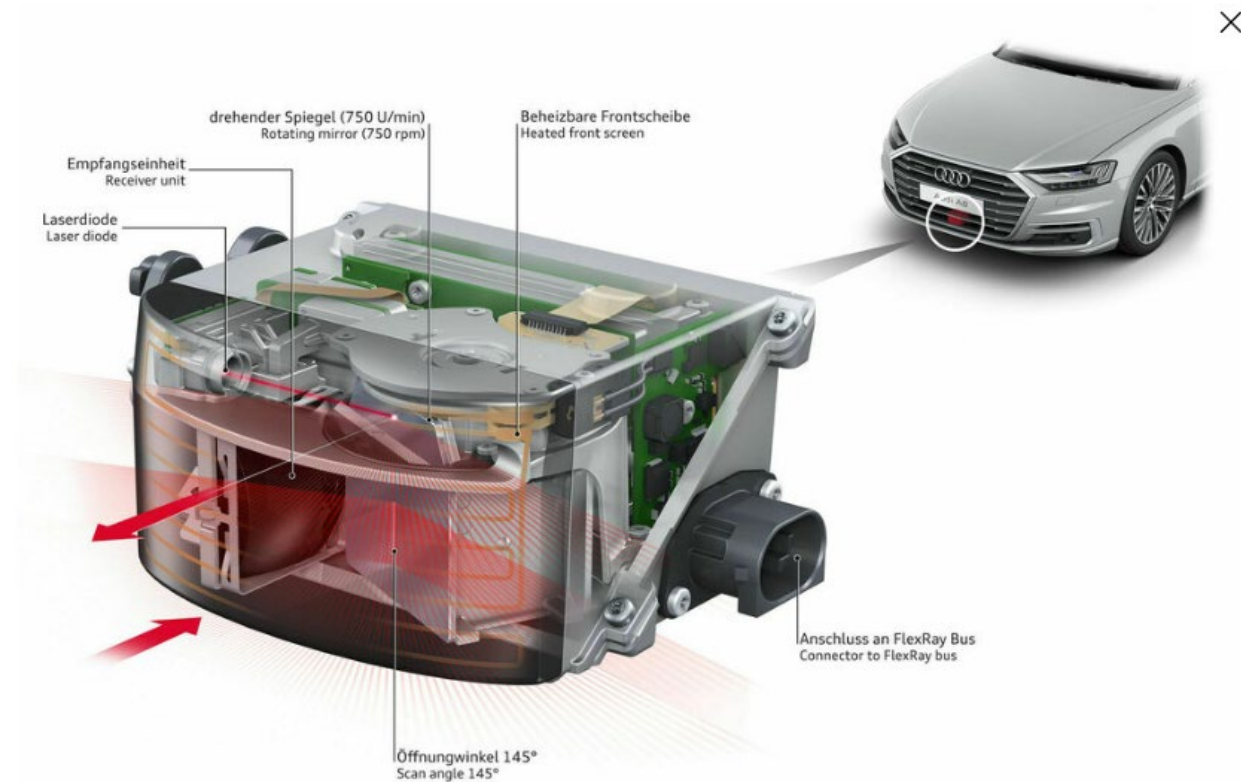
Claim	Support
	 The diagram illustrates a car equipped with various sensors. The labels and their corresponding sensor types are as follows: Umgebungskamera 360° environment camera (top left and top right) Long-Range-Radar Long range radar (top left) Laserscanner Laser scanner (front left) Front-Kamera Front camera (front center) Ultraschallsensoren Ultra sonic sensor (top right) Mid-Range-Radar Mid range radar (bottom right) Ultraschallsensoren seitlich Side ultra sonic sensor (bottom right) Ultraschallsensoren Ultra sonic sensors (bottom center) Mid-Range-Radar Mid range radar (bottom center) Umgebungskamera 360° environment camera (bottom center) Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 For example, the laser scanner is positioned at the front bumper of the vehicle and emits pulses of light reflected off objects in front of the vehicle. The laser scanner uses these reflections to measure the distance to surrounding objects and creates a 3D model of the surroundings using captured data points.

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	Laser scanner Together with the long-range radar and the front camera, the laser scanner forms a trio of sensors with various strengths that complement each other. It is these sensors and the central driver assistance controller (zFAS), which generates an image of the surroundings from all the sensor data, that make automated driving possible in the first place. The laser scanner covers a field approximately 80 meters (262.5 ft) long, with an opening angle of 145 degrees. The roughly fist-sized component is mounted in the front bumper and, regardless of speed, emits moderated pulses of light on multiple vertical levels, which a mirror scatters in the shape of a fan. Having a wave length in the near-infrared range, the extremely short flashes of light are invisible and harmless to the human eye. They are reflected by objects in front of the car and return to the laser scanner in less than one microsecond, where photo diodes detect them. The result is a detailed, deeply contoured, static image of the surroundings. The laser scanner displays other vehicles as measured cuboids, and it also measures such information as distance and orientation, which it distributes to the partner control units. With its large horizontal aperture, it detects cars entering the lane very early. Detailed information about structures on the side of the road, such as guardrails, round out the spectrum. Like radar, the laser scanner also works in the dark. Automatic cleaning and heating of the covering panel keep it operational even in inclement weather and spray as long as the conditions aren't too extreme.

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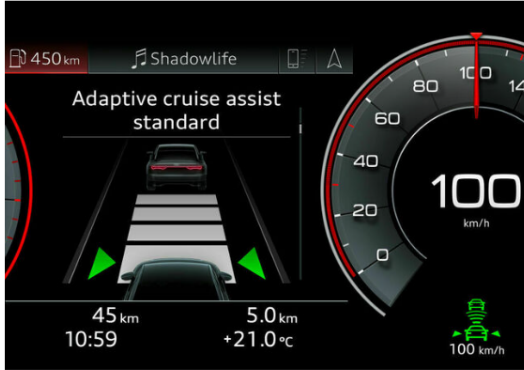
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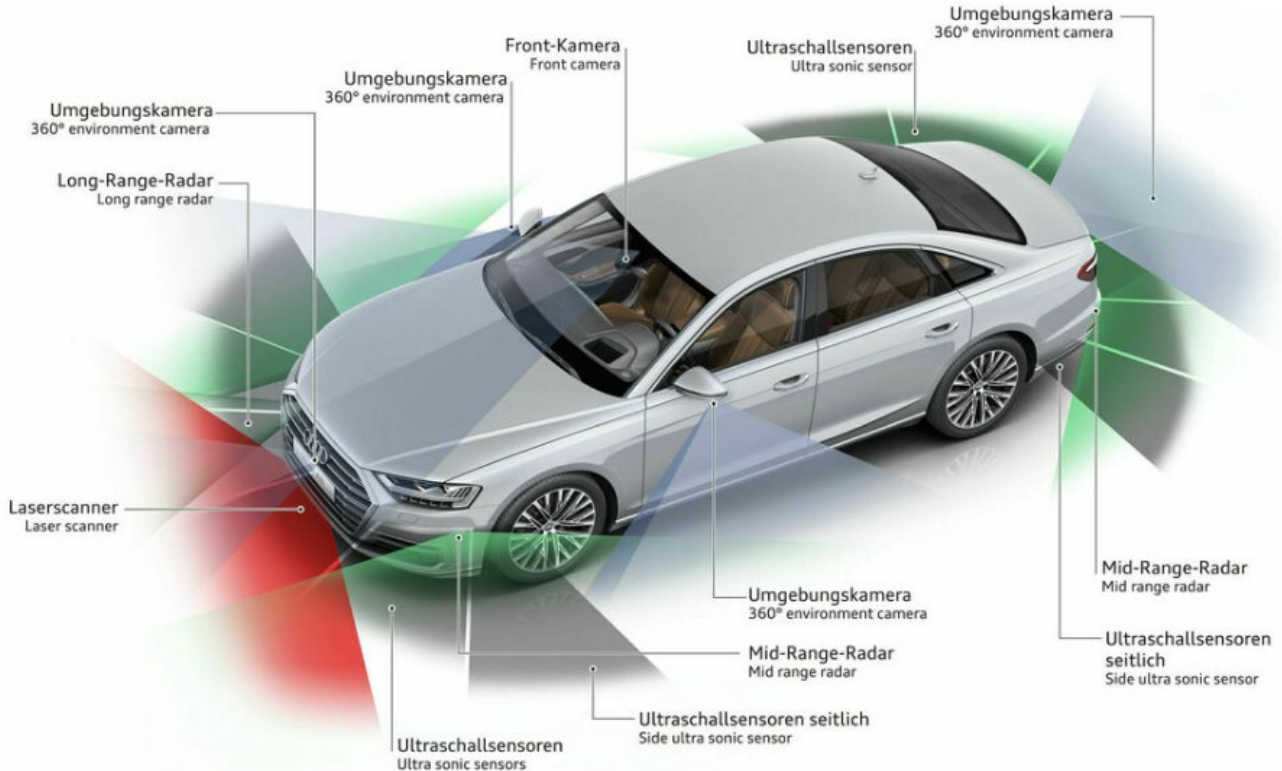
Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

For example, the Audi Pre Sense system uses a first sensor system (e.g., Ultrasonic sensors) to obtain a plurality of first measurements corresponding to movements of the mobile object. As shown in the image below, ultrasonic sensors in combination with the laser scanner assist drivers with cruise assist. For example, the first sensor system (e.g., Ultrasonic sensors) is independent from the first imaging technique (e.g., Laser scanner).

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Claim	Support
	 Adaptive cruise assist The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle's surroundings. Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches. The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

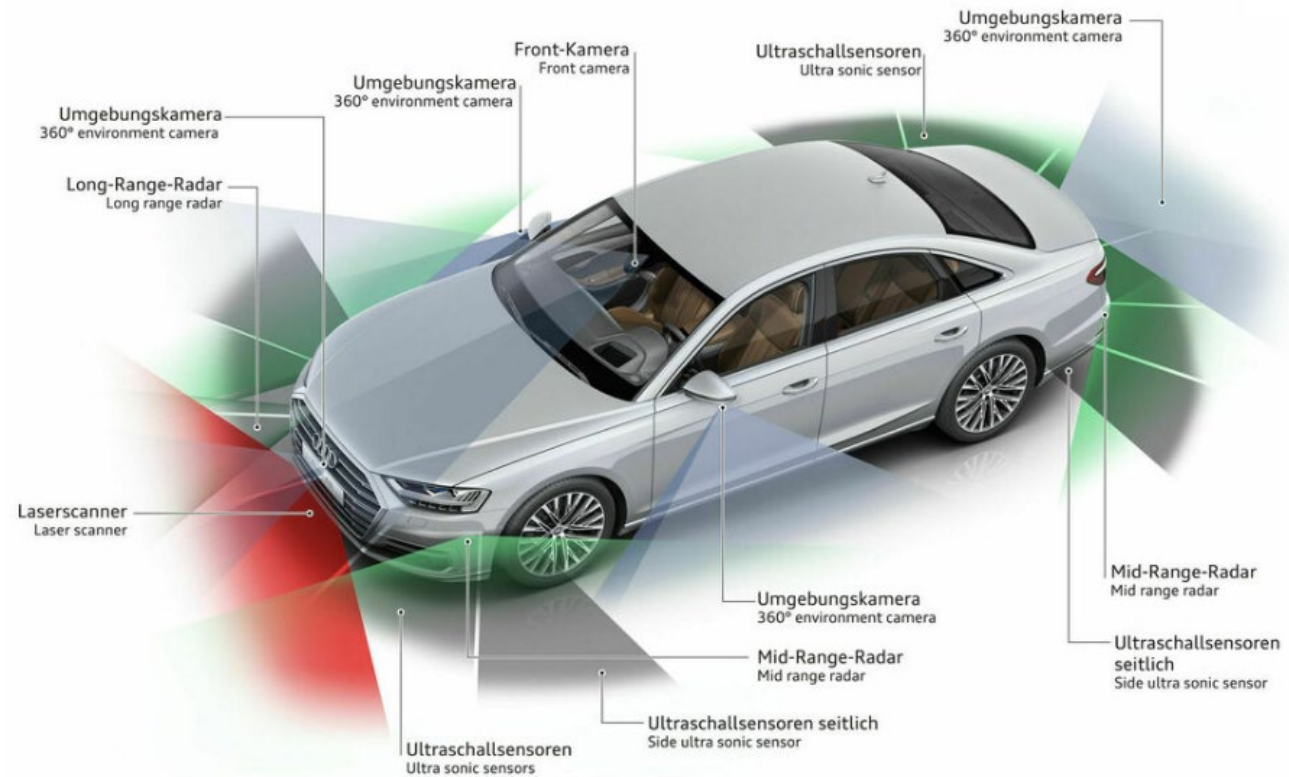
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Claim	Support
	 Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
1[b]. associating the plurality of first images with first	Each Volkswagen Accused Product performs the step of associating the plurality of first images with first movement of the mobile object using the first measurement.

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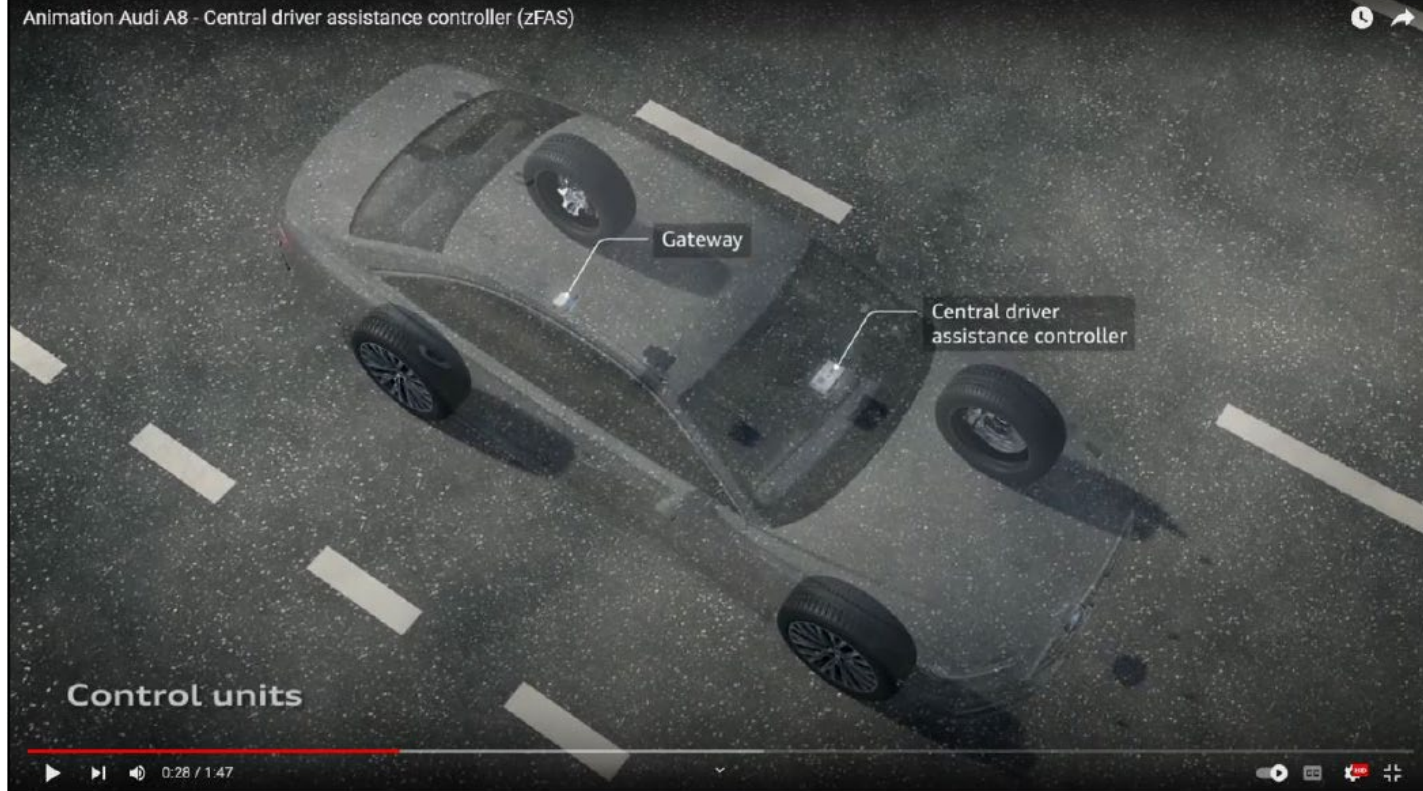
Claim	Support
movement states of the mobile object using the first measurements;	This element is infringed literally, or in the alternative, under the doctrine of equivalents. For example, Audi's Pre-Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate the plurality of first images (e.g., images captured from the 360-degree environment cameras) with the first movement states of the mobile object (e.g., moving vehicles on the road) using the first measurements (e.g., data collected from the Ultrasonic sensors).

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Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

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Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

Appendix D: Claim Chart for U.S. Patent 8,265,353



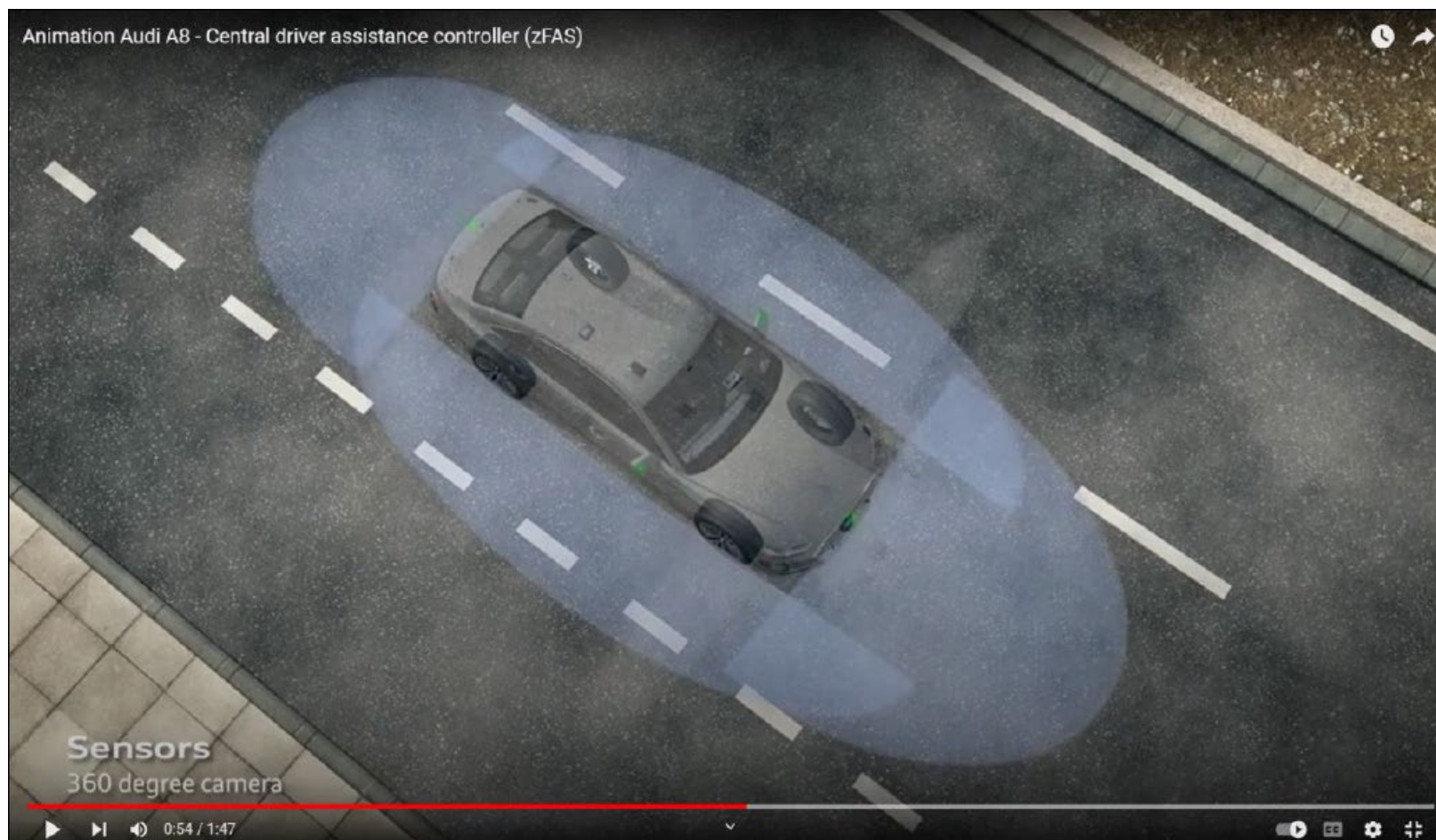
360 degree cameras

Photo — 01/01/2016

Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

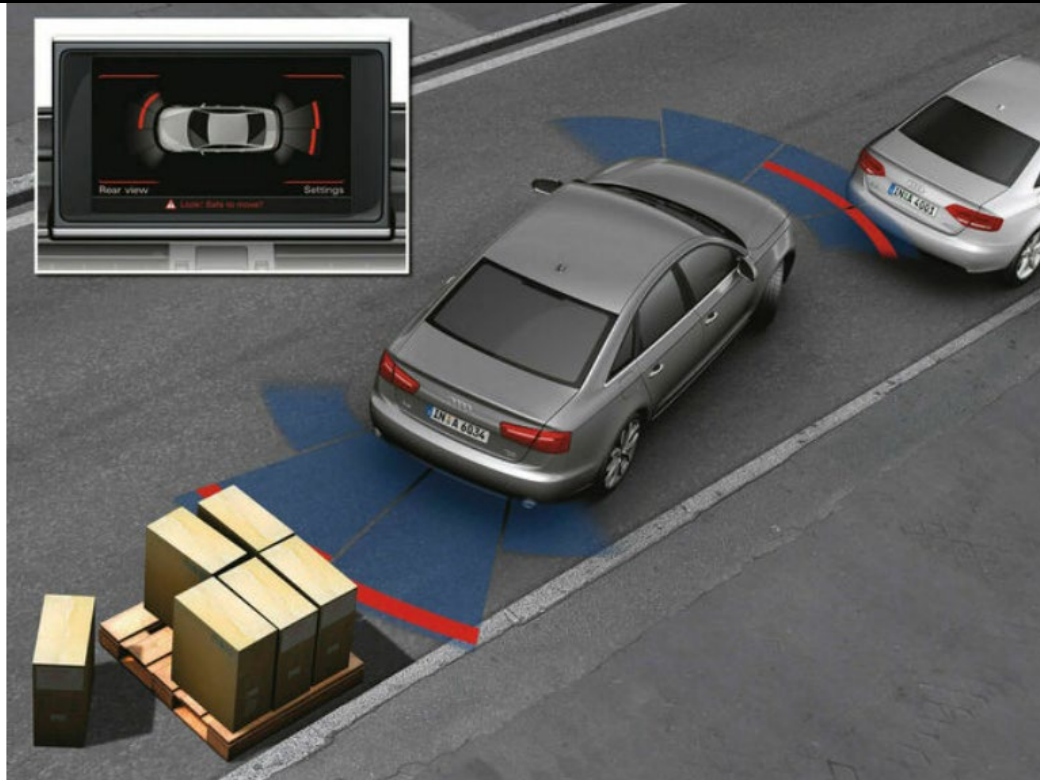
Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

For example, when the driver tries to park, the data collected from the 360-degree environment cameras and/or laser scanner and Ultrasonic sensors can be associated via the Central Driver Assistance Controller. This associated data can be used to form an image of the mobile object to assist drivers while parking (e.g., image of the mobile object with the red and white segments as mentioned in the evidence below).

Appendix D: Claim Chart for U.S. Patent 8,265,353



Parking system plus

Illustration — 01/01/2016

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Parking system plus

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

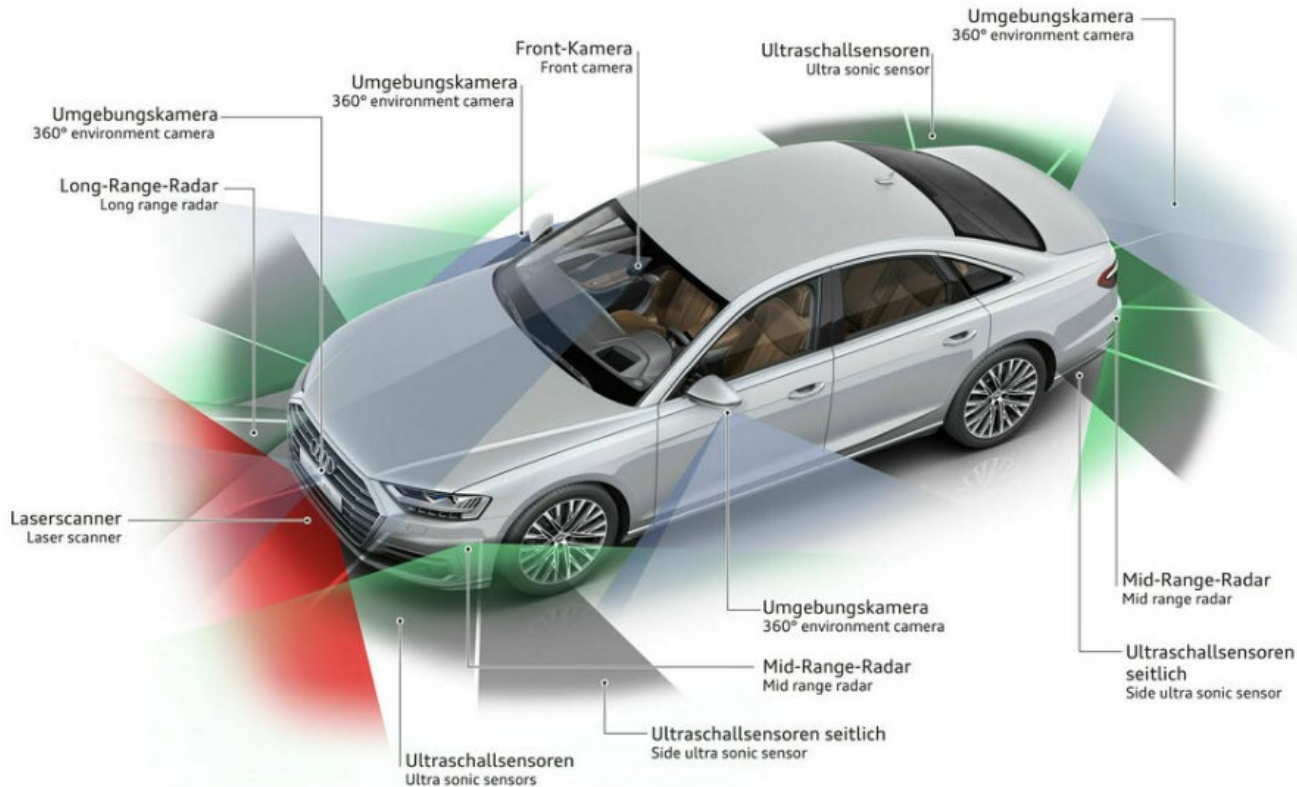
Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

By way of further example, Audi's Pre-Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate the plurality of first images (e.g., images captured from the Laser scanner) with the first movement states of the mobile object (e.g., Adaptive cruise assist) using the first measurements (e.g., data collected from the Ultrasonic sensors).

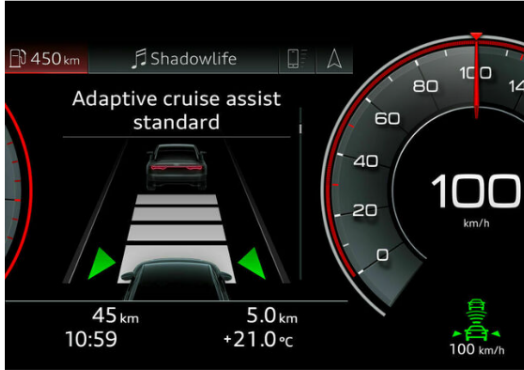
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Laser scanner Together with the long-range radar and the front camera, the laser scanner forms a trio of sensors with various strengths that complement each other. It is these sensors and the central driver assistance controller (zFAS), which generates an image of the surroundings from all the sensor data, that make automated driving possible in the first place. The laser scanner covers a field approximately 80 meters (262.5 ft) long, with an opening angle of 145 degrees. The roughly fist-sized component is mounted in the front bumper and, regardless of speed, emits moderated pulses of light on multiple vertical levels, which a mirror scatters in the shape of a fan. Having a wave length in the near-infrared range, the extremely short flashes of light are invisible and harmless to the human eye. They are reflected by objects in front of the car and return to the laser scanner in less than one microsecond, where photo diodes detect them. The result is a detailed, deeply contoured, static image of the surroundings. The laser scanner displays other vehicles as measured cuboids, and it also measures such information as distance and orientation, which it distributes to the partner control units. With its large horizontal aperture, it detects cars entering the lane very early. Detailed information about structures on the side of the road, such as guardrails, round out the spectrum. Like radar, the laser scanner also works in the dark. Automatic cleaning and heating of the covering panel keep it operational even in inclement weather and spray as long as the conditions aren't too extreme. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 The diagram illustrates a silver sedan equipped with a comprehensive suite of driver assistance sensors. The sensors are represented by colored cones emanating from the vehicle: a red cone for the front laser scanner, green cones for long-range and mid-range radar, and blue cones for 360-degree environment cameras. Numerous ultrasonic sensors are shown as small blue dots around the car's perimeter. Labels with leader lines identify the following components: - Front-Kamera (Front camera) - Long-Range-Radar (Long range radar) - Laserscanner (Laser scanner) - Umgebungs-kamera (360° environment camera) - multiple locations - Mid-Range-Radar (Mid range radar) - Ultraschallsensoren (Ultra sonic sensor) - Ultraschallsensoren seitlich (Side ultra sonic sensor) Source: https://www.audi-mediacent.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 For example, when the driver uses Adaptive cruise assist, the data collected from the Laser scanner and Ultrasonic sensors can be associated via the Central Driver Assistance Controller. This associated data can be used to form an image of the mobile object to assist drivers while driving (e.g., image of the mobile object's surroundings and distance to surroundings).

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Adaptive cruise assist  The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle's surroundings. Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches. The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 By way of further example, Audi's Pre-Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate plurality of first images (e.g., images captured from the 360-degree environment cameras) with the first movement states of the mobile object (e.g., movement of the car) using the first measurements (e.g., data collected from the Ultrasonic sensors).

Appendix D: Claim Chart for U.S. Patent 8,265,353



360 degree cameras

Photo — 01/01/2016

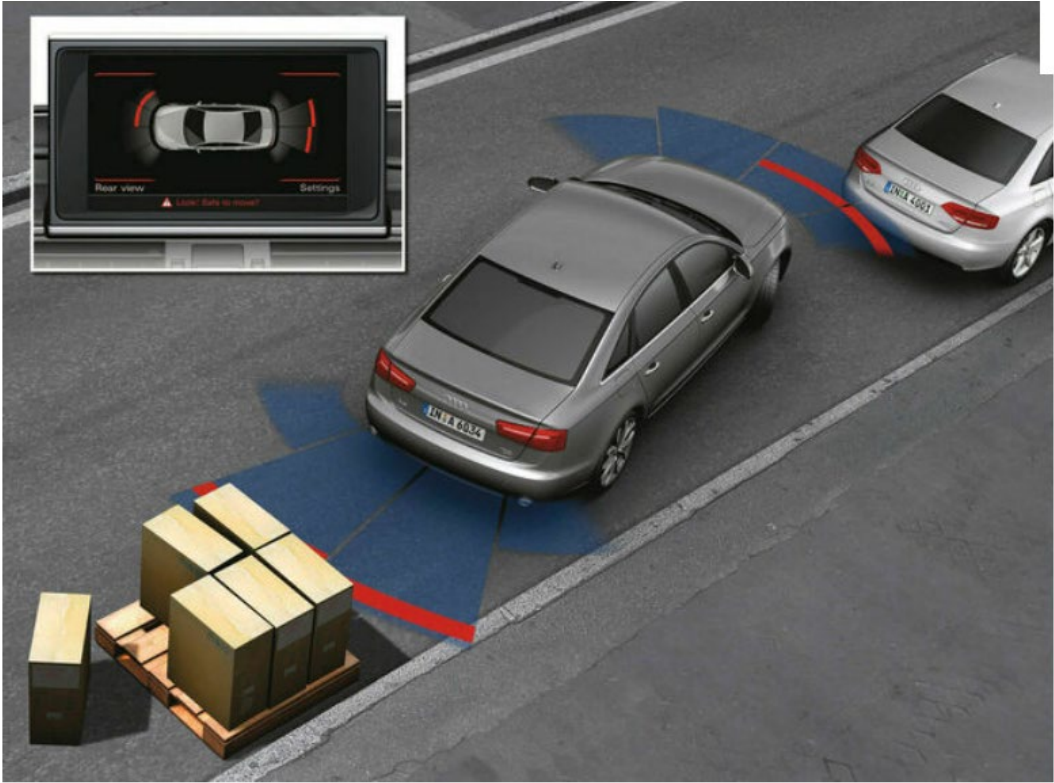
Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	For example, when the driver tries to park, the data collected from the 360-degree environment cameras and Ultrasonic sensors can be associated via the Central Driver Assistance Controller. This associated data can be used to form an image of the mobile object to assist drivers while parking or in maneuvering using Adaptive Cruise Assist (e.g., image of the mobile object with the red and white segments as mentioned in the evidence below).

Appendix D: Claim Chart for U.S. Patent 8,265,353

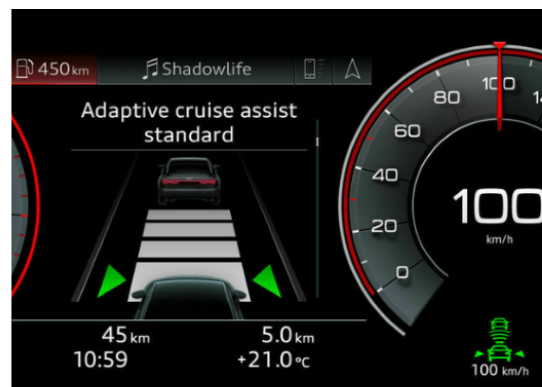
Claim	Support
	The image is a composite. The top-left portion shows a car's rearview camera feed on a monitor, with a top-down view of the car and red sensor arcs. The bottom-right portion is a 3D perspective illustration of a silver car on a road, with blue sensor waves emanating from the rear and red lines indicating obstacles like a pallet of boxes and another car. Parking system plus Illustration — 01/01/2016 Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Parking system plus

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



Adaptive cruise assist

The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle's surroundings.

Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and "guides" the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches.

The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
1[c]. obtaining a plurality of second images of the mobile object using a second imaging technique while obtaining a plurality of second measurements corresponding to movements of the mobile object using a second sensor system, the second sensor system being independent from the second imaging technique;	Each Volkswagen Accused Product performs the step of obtaining a plurality of second images of the mobile object using a second imaging technique while obtaining a plurality of second measurements corresponding to movements of the mobile object using a second sensor system, the second sensor system being independent from the second imaging technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents. For example, Audi’s Pre-Sense system equipped in the Audi A8 can use a second imaging technique (e.g., Front camera) to obtain a plurality of second images of the mobile object. Further, the Audi Pre-Sense system can use a second sensor system (e.g., Long-range and Mid-range Radar sensors) to obtain a plurality of second measurements corresponding to the movements of the mobile object. The second sensor system (e.g., Long-range and Mid-range Radar sensors) is independent from the second imaging technique (e.g., Forward camera).

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Animation Audi A8 - Central driver assistance controller (zFAS)  Source: https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY

Appendix D: Claim Chart for U.S. Patent 8,265,353



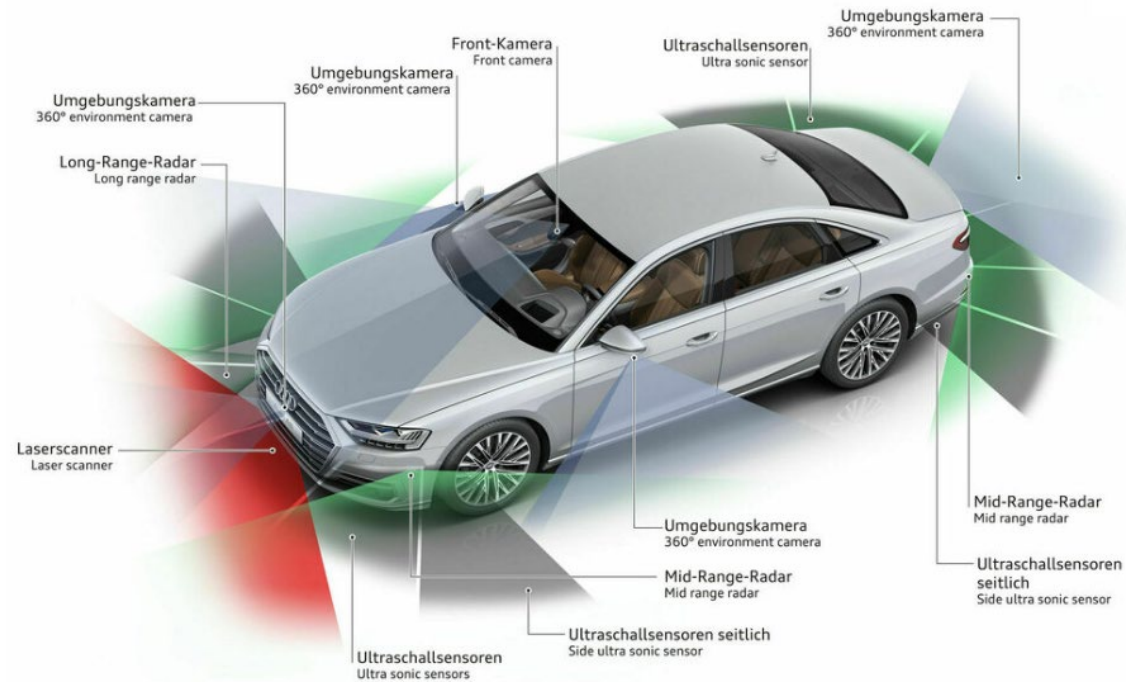
Source: <https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY>

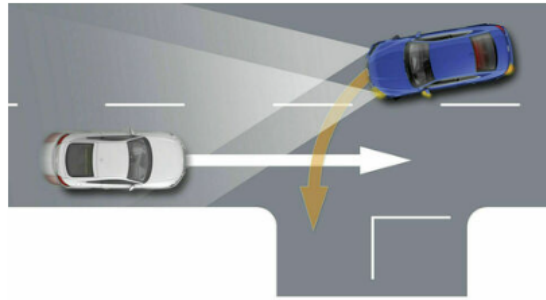
Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

For example, as shown in the image below, Audi A8 implements Turn Assist feature by using the Forward camera and Radar sensors.

Appendix D: Claim Chart for U.S. Patent 8,265,353

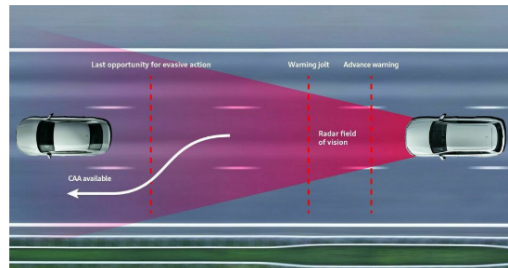


Turn assist

Turn assist monitors the road lane with oncoming traffic by means of radar sensors, the front camera and, in certain models, a laser scanner. Monitoring is initiated as soon as the driver sets the turn signal. When driving off from a stop, or during slow driving up to a speed of 10 km/h (6.2 mph), the system can intervene by applying the brakes to prevent the car from colliding with an oncoming vehicle when turning left or right (country-dependent). This brake intervention keeps the vehicle within its own driving lane. The driver is informed of the intervention by an indicator in the instrument cluster.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

For example, the Front camera and Front Radar sensors are used in the Audi Collision avoidance assist feature.



Collision avoidance assist

Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster.

First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

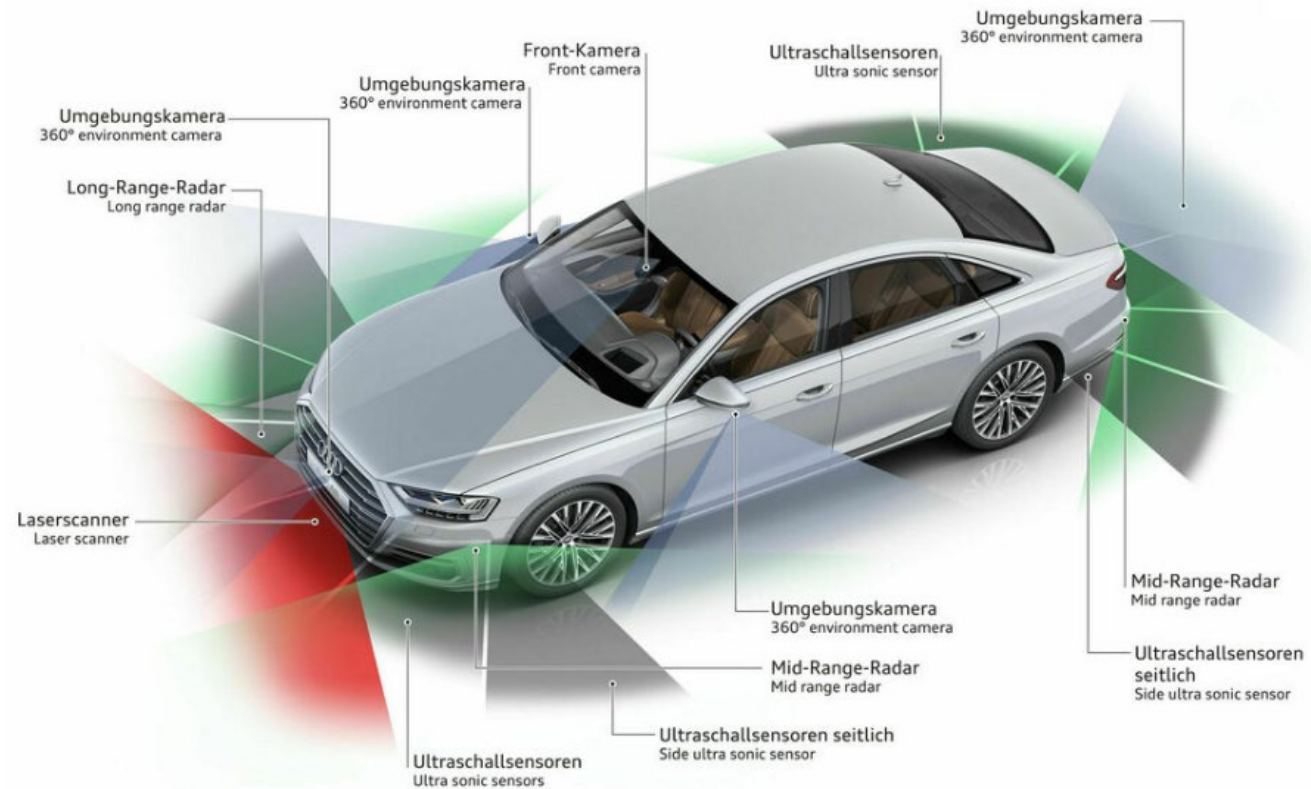
Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

By way of further example, Audi's Pre-Sense system equipped in the Audi A8 can use a second imaging technique (e.g., Front camera) to obtain a plurality of second images of the mobile object. Further, the Audi Pre-Sense system can use a second sensor

Appendix D: Claim Chart for U.S. Patent 8,265,353

system (e.g., Vehicle Speed Sensor (VSS) or Odometry Sensors) to obtain a plurality of second measurements corresponding to the movements of the mobile object.

The second sensor system (e.g., Vehicle Speed Sensor (VSS)) is independent from the second imaging technique (e.g., Forward camera).



Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	The Vehicle Speed Sensor measures and monitors the vehicle's speed, and this data is used to determine whether conditions are appropriate to activate the adaptive cruise assist features.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Speed sensor.

Part Number: 4M0907508

Supersession(s): 4M0-907-508



Included with: Motor mount.

Fits A8, Q7, S8, SQ7, SQ8

4.0 LITER. 4.0 LITER, acceleration. 4.0 LITER, SQ8.

Source: https://parts.audiusa.com/p/Audi_2019_A8/Speed-sensor--Included-with-Motor-mount/78751835/4M0907508.html

Appendix D: Claim Chart for U.S. Patent 8,265,353

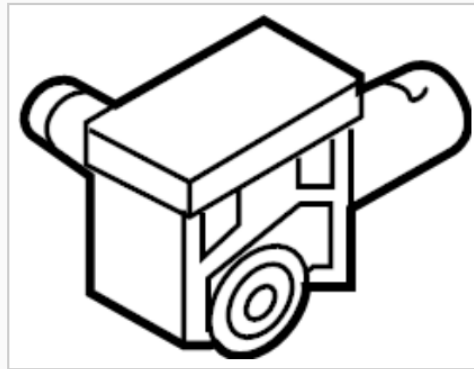
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Appendix D: Claim Chart for U.S. Patent 8,265,353

Acceleration Sensor (Rear)

Part Number: 4N0959345

Supersession(s): 4N0-959-345



Acceleration Sensor. Speed Sensor.
Acceleration Sensor.

Vehicle Speed SensorAcceleration Sensor

Fits A8, Q5, Q5 PHEV, Q5 Sportback, S8, SQ5, SQ5 Sportback

A8 Quattro. ACCELERATION SENSOR; Q5. ACCELERATION SENSOR; Q5 PHEV.
ACCELERATION SENSOR; Q5 Sportback. ACCELERATION SENSOR; SQ5. ACCELERATION
SENSOR; SQ5 Sportback. MODULES AND SENSORS. MODULES AND SENSORS,
acceleration. S8.

1 person has looked at this part recently

Appendix D: Claim Chart for U.S. Patent 8,265,353

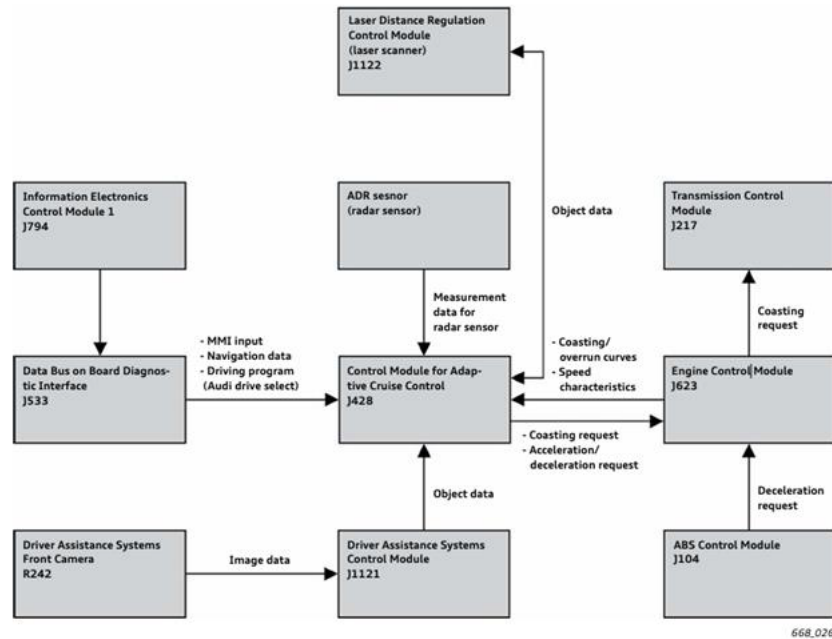
For example, data from the Vehicle Speed Sensor transmits the odometric data via the FlexRay Bus and along with other data, is used in constructing the perception model of the environment, including the image of the mobile object.

- › Provides the current vehicle speed to the FlexRay bus.
- › Is responsible for the vehicle's braking and stop management system. The function of the stop management system is to keep the stationary vehicle at a standstill. After the ESC has kept the vehicle at a standstill for three minutes, the electrical parking brake is actuated in order to protect the brake system components against overheating.

Source: <https://static.nhtsa.gov/odi/tsbs/2018/MC-10144686-9999.pdf>

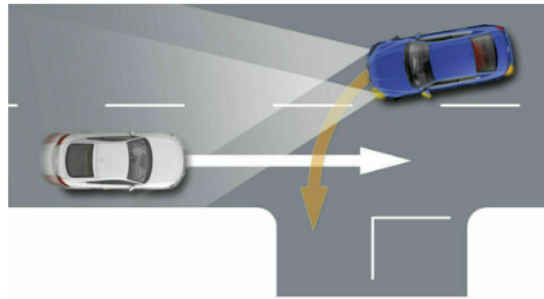
Vehicle Speed data, provided via the FlexRay Bus, is transmitted to the Control Module for Adaptive Cruise Control. This speed characteristics, such as vehicle speed/acceleration, originating from the Vehicle Speed Sensor (VSS), help determine driving dynamics such as coasting, acceleration, and deceleration, which are used to generate an image of the mobile object used in Adaptive Cruise Control.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 The diagram illustrates the interconnections of an adaptive cruise control system. The central component is the Control Module for Adaptive Cruise Control J428. It receives MMI input (including navigation data and driving program/Audi drive select) from the Data Bus on Board Diagnostic Interface J533, which is connected to Information Electronics Control Module 1 J794. It also receives Measurement data for radar sensor from the ADR sensor (radar sensor). Object data is provided to J428 from both the Laser Distance Regulation Control Module (laser scanner) J1122 and the Driver Assistance Systems Front Camera R242 via the Driver Assistance Systems Control Module J1121. J428 sends Coasting/overrun curves and Speed characteristics to the Engine Control Module J623. In return, J623 sends Coasting request and Acceleration/deceleration request back to J428. J623 also sends a Coasting request to the Transmission Control Module J217 and a Deceleration request to the ABS Control Module J104. The diagram is labeled with the number 668,026 in the bottom right corner. Source: https://static.nhtsa.gov/odi/tsbs/2018/MC-10144686-9999.pdf

Appendix D: Claim Chart for U.S. Patent 8,265,353

For example, the Audi A8 implements the turn assist feature by using the Forward camera and a Vehicle Speed Sensor. The vehicle speed sensor shares the speed data with the processor to support in Turn assist feature.

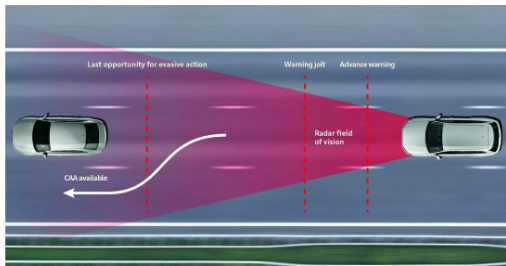


Turn assist

Turn assist monitors the road lane with oncoming traffic by means of radar sensors, the front camera and, in certain models, a laser scanner. Monitoring is initiated as soon as the driver sets the turn signal. When driving off from a stop, or during slow driving up to a speed of 10 km/h (6.2 mph), the system can intervene by applying the brakes to prevent the car from colliding with an oncoming vehicle when turning left or right (country-dependent). This brake intervention keeps the vehicle within its own driving lane. The driver is informed of the intervention by an indicator in the instrument cluster.

Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

For example, the Front camera and Vehicle Speed Sensor are used in the Collision Avoidance Assist feature.



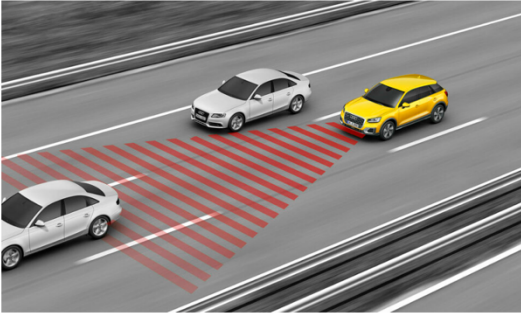
Collision avoidance assist

Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster.

First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

For example, the Front camera and Vehicle Speed Sensor are used in the Adaptive Cruise Control feature.

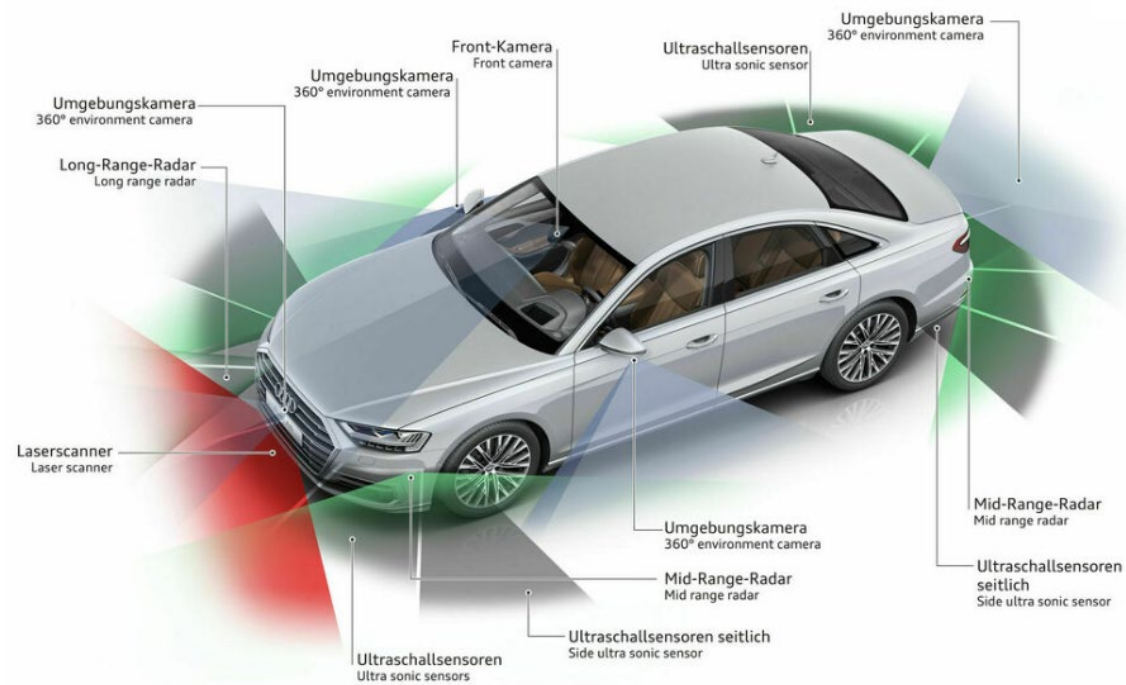
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Adaptive cruise control (with Stop&Go function) Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select. The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above. When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
1[d]. associating the plurality of second images with second movement states of the mobile object using the first measurements; and	Each Audi Accused Product performs the step of associating the plurality of second images with second movement states of the mobile object using the first measurements. This element is infringed literally, or in the alternative, under the doctrine of equivalents. For example, Audi's Pre-Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate the plurality of second images (e.g., images captured from the Front camera) with the second movement states of the

Appendix D: Claim Chart for U.S. Patent 8,265,353

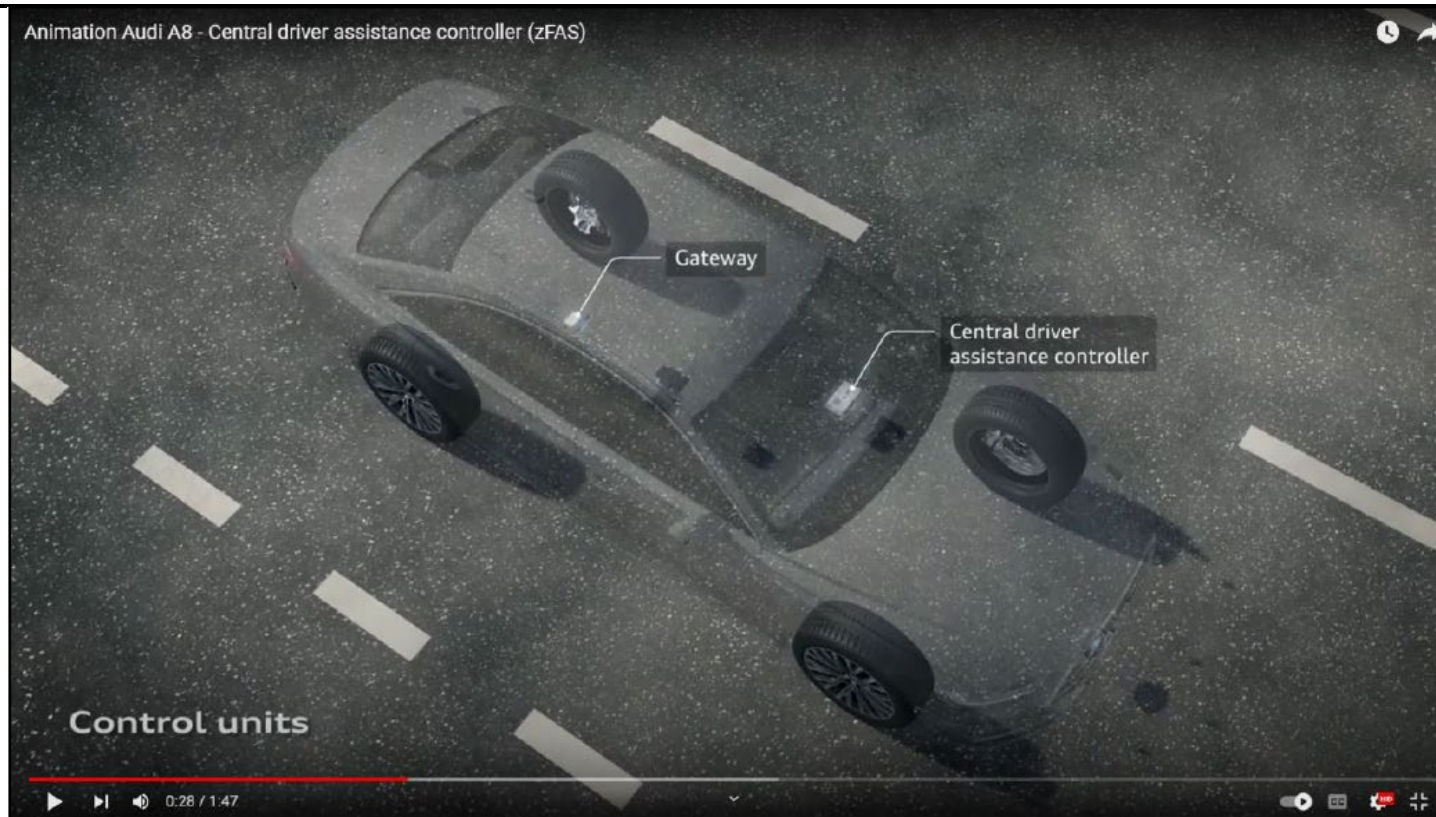
Claim	Support
	mobile object (e.g., data collected from the Long-range and Mid-range Radar sensors) using the first measurement (e.g., data collected from the Ultrasonic sensors) to provide driver assist features such as Active lane assist, Adaptive cruise control with Stop & Go function, and Adaptive cruise assist. These features rely on data from the Front camera, Radar sensors and Ultrasonic sensors to detect traffic lanes and provide cruise control. The Central Driver Assistance Controller associates data from the Front camera, and Radar sensors using Ultrasonic sensors to visualize the vehicle, traffic lanes, and distance level to the car ahead on the multimedia interface display.

Appendix D: Claim Chart for U.S. Patent 8,265,353



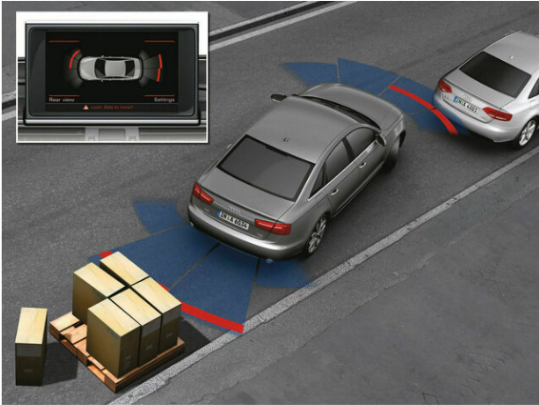
Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

Appendix D: Claim Chart for U.S. Patent 8,265,353

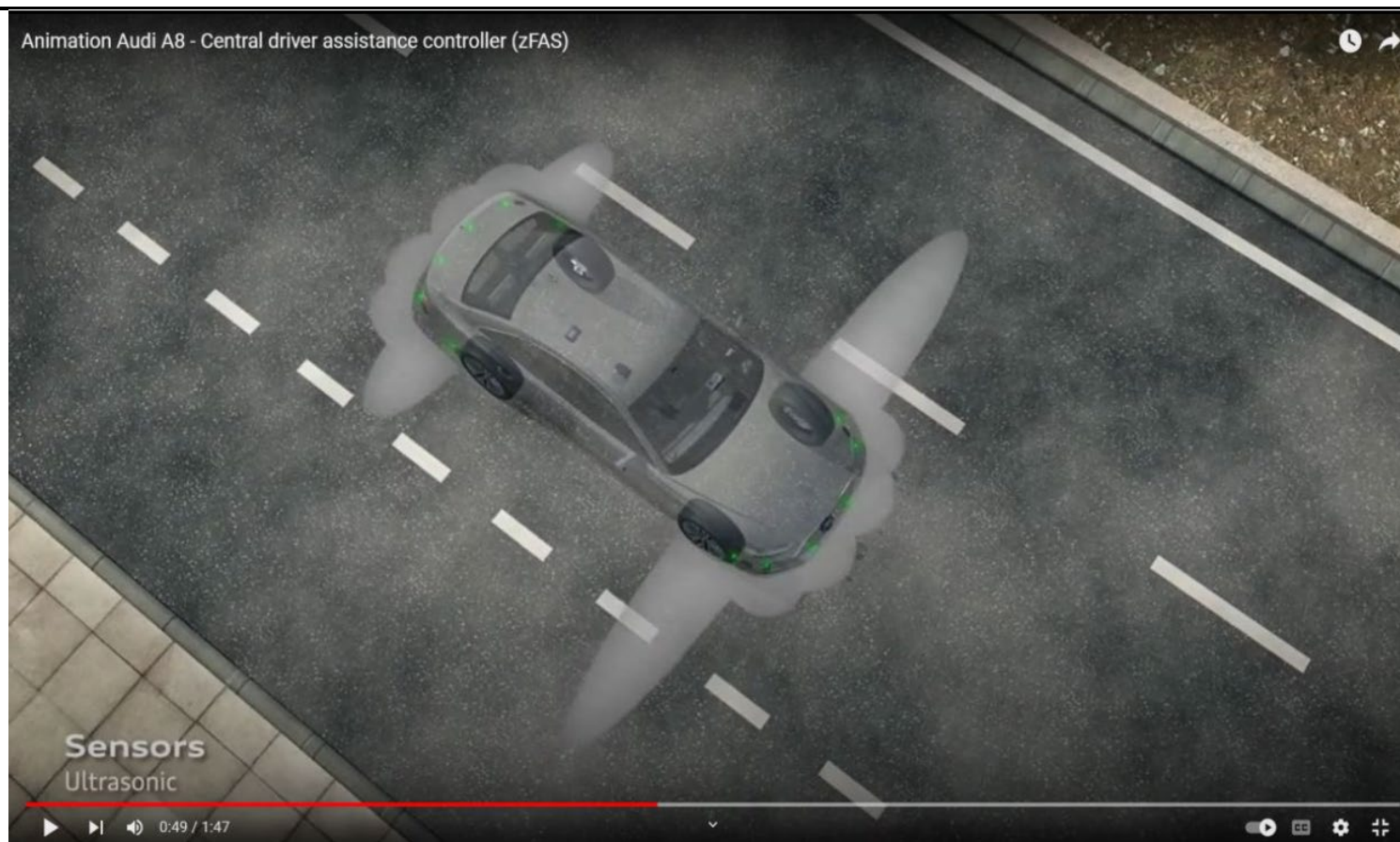
Claim	Support
	The diagram shows a silver sedan in a parking lot. Blue sensor beams emanate from the front and rear of the car. A white segment on the rear beam indicates a detected object (a pallet of boxes) outside the driving path. Red segments on the front and rear beams indicate detected objects within the driving path. An inset shows the MMI display with a top-down view of the car and sensor beams, with red and white segments indicating detected objects. Parking system plus Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353



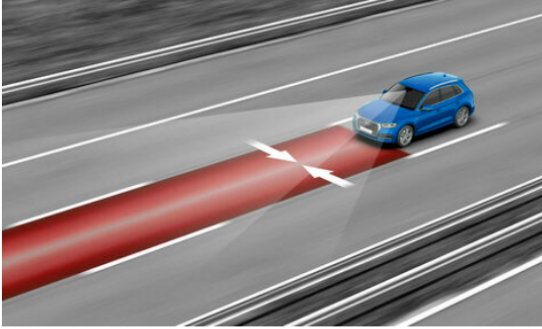
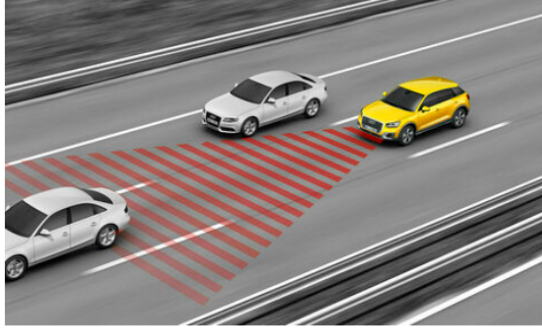
Source: <https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Audi active lane assist  Operating at speeds from 65 km/h (40.4 mph), Audi active lane assist helps the driver keep the vehicle in the driving lane. A camera detects lane lines and the track that the car is following between them. In this process, the camera can distinguish between yellow lines in construction zones and standard white markings. If the car approaches a line without the turn signal being activated, the system helps the driver to steer back into the lane by means of gentle but noticeable interventions in the electromechanical power steering. In the MMI system, the driver sets how early the control intervention should occur. In the case of an early steering intervention point, the system guides the driver towards the middle of the lane by gentle, centering steering interventions. With a late steering intervention point, Audi active lane assist does not intervene until shortly before the detected lane marking might be crossed; then it gives a corrective steering intervention in the proper direction. In addition, the driver may choose to be warned by a vibration of the steering wheel when crossing detected lane markings. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 Adaptive cruise control (with Stop&Go function)  Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select. The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above. When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353



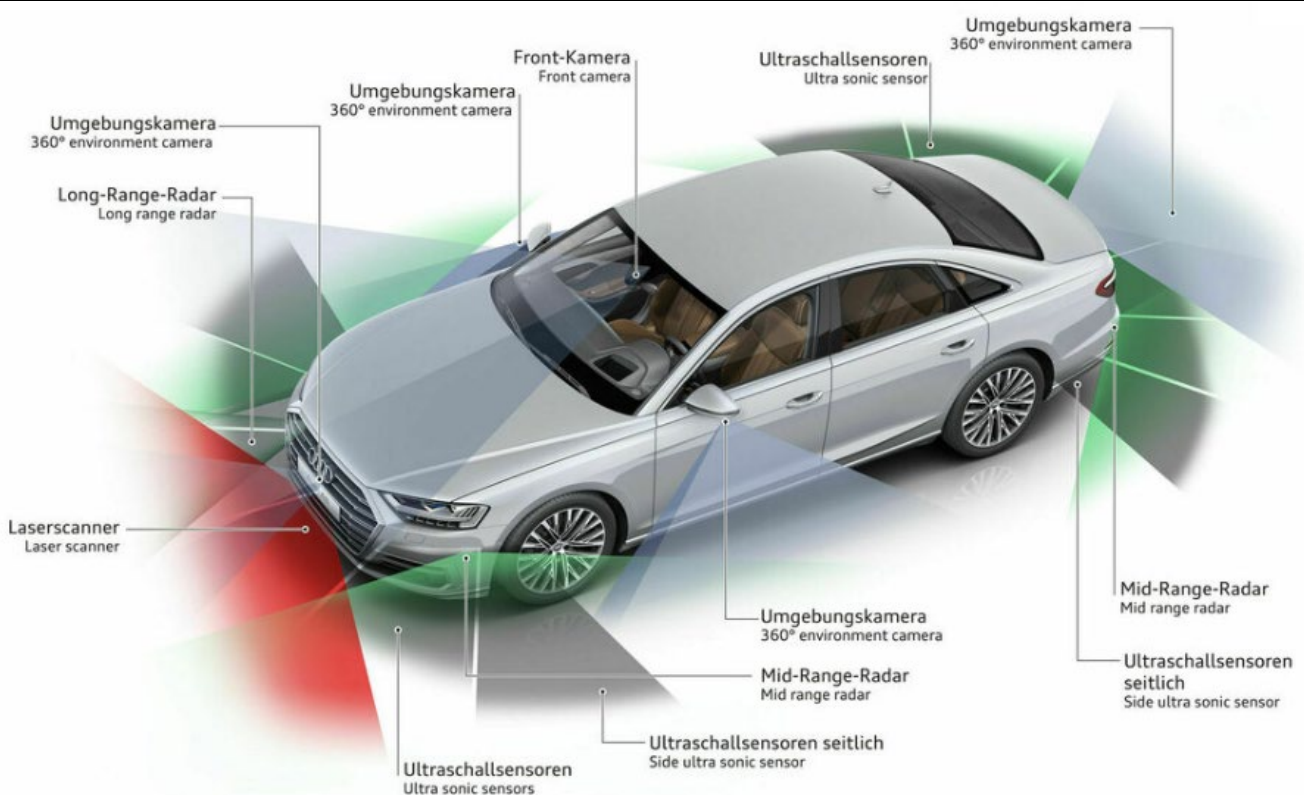
Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z

By way of further example, For example, Audi's Pre-Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate the plurality of second images (e.g., images captured from the Front camera) with the second movement states of the mobile object (e.g., data collected from the Long-range and Mid-range Radar sensors) using the first measurement (e.g., data collected from the Ultrasonic sensors) to provide driver assist features such as Active lane assist, Adaptive cruise control with Stop & Go function, and Adaptive cruise assist.

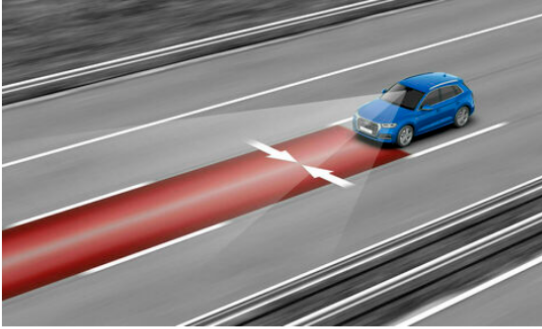
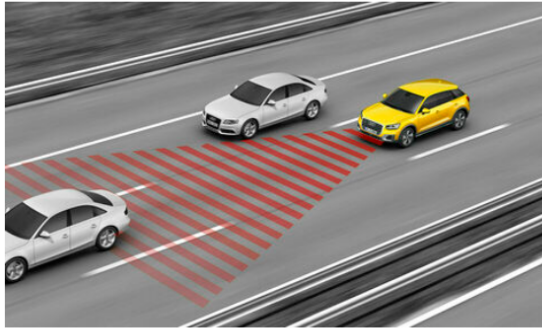
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	These features rely on data from the Front camera, Radar sensors and Ultrasonic sensors to detect traffic lanes and provide cruise control. The Central Driver Assistance Controller associates' data from the Front camera, and Radar sensors using Ultrasonic sensors to visualize the vehicle, traffic lanes, and distance level to the car ahead on the multimedia interface display. Laser scanner Together with the long-range radar and the front camera, the laser scanner forms a trio of sensors with various strengths that complement each other. It is these sensors and the central driver assistance controller (zFAS), which generates an image of the surroundings from all the sensor data, that make automated driving possible in the first place. The laser scanner covers a field approximately 80 meters (262.5 ft) long, with an opening angle of 145 degrees. The roughly fist-sized component is mounted in the front bumper and, regardless of speed, emits moderated pulses of light on multiple vertical levels, which a mirror scatters in the shape of a fan. Having a wave length in the near-infrared range, the extremely short flashes of light are invisible and harmless to the human eye. They are reflected by objects in front of the car and return to the laser scanner in less than one microsecond, where photo diodes detect them. The result is a detailed, deeply contoured, static image of the surroundings. The laser scanner displays other vehicles as measured cuboids, and it also measures such information as distance and orientation, which it distributes to the partner control units. With its large horizontal aperture, it detects cars entering the lane very early. Detailed information about structures on the side of the road, such as guardrails, round out the spectrum. Like radar, the laser scanner also works in the dark. Automatic cleaning and heating of the covering panel keep it operational even in inclement weather and spray as long as the conditions aren't too extreme. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 The diagram shows a silver sedan from a three-quarter front view. Various sensor fields of view are projected from the car, color-coded: red for long-range radar, green for 360-degree cameras, blue for mid-range radar, and yellow for ultrasonic sensors. Labels with leader lines point to these fields and specific sensors. Labels in the diagram include: - Umgebungskamera 360° environment camera (multiple locations) - Long-Range-Radar Long range radar - Laserscanner Laser scanner - Front-Kamera Front camera - Ultraschallsensoren Ultra sonic sensor - Ultraschallsensoren seitlich Side ultra sonic sensor - Mid-Range-Radar Mid range radar - Ultraschallsensoren Ultra sonic sensors Source: https://www.audi-mediacent.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Audi active lane assist  Operating at speeds from 65 km/h (40.4 mph), Audi active lane assist helps the driver keep the vehicle in the driving lane. A camera detects lane lines and the track that the car is following between them. In this process, the camera can distinguish between yellow lines in construction zones and standard white markings. If the car approaches a line without the turn signal being activated, the system helps the driver to steer back into the lane by means of gentle but noticeable interventions in the electromechanical power steering. In the MMI system, the driver sets how early the control intervention should occur. In the case of an early steering intervention point, the system guides the driver towards the middle of the lane by gentle, centering steering interventions. With a late steering intervention point, Audi active lane assist does not intervene until shortly before the detected lane marking might be crossed; then it gives a corrective steering intervention in the proper direction. In addition, the driver may choose to be warned by a vibration of the steering wheel when crossing detected lane markings. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 Adaptive cruise control (with Stop&Go function)  Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select. The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above. When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z

Appendix D: Claim Chart for U.S. Patent 8,265,353



Adaptive cruise assist

Photo — 09/12/2017

The adaptive cruise assist assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular.

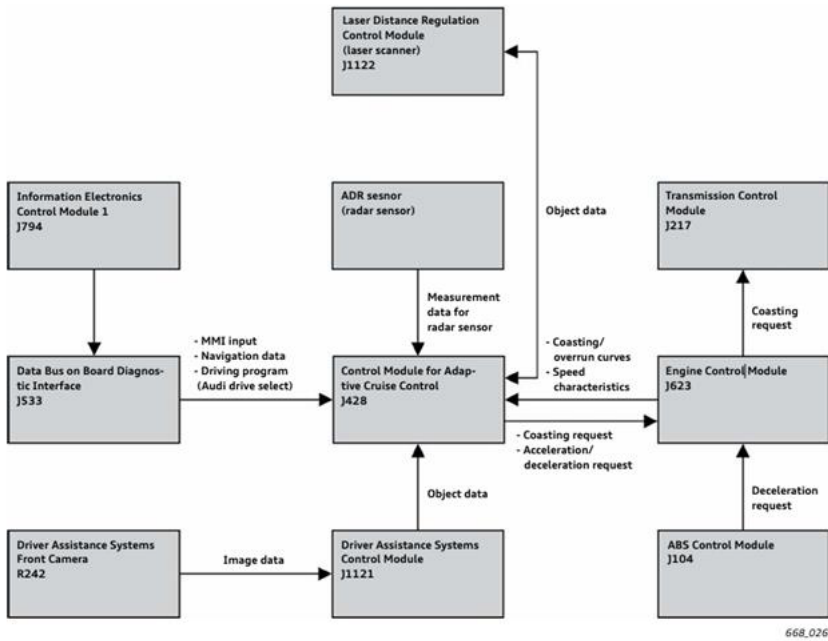
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Adaptive cruise assist The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle’s surroundings. Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches. The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 By way of further example, Audi’s Pre-Sense system equipped in the Audi A8 utilizes the Audi A8’s Central Driver Assistance Controller to associate the plurality of second images (e.g., images captured from the Front camera) with the second movement states of the mobile object (e.g., data collected from the Vehicle Speed Sensor (VSS)) to provide driver assist features such as Active Lane Assist, Adaptive Cruise Control with Stop & Go function, and Adaptive Cruise Assist. These features rely on data from the Front camera, Vehicle Speed Sensor, and Ultrasonic sensors to detect traffic lanes, measure distance to vehicles ahead, and provide cruise control. The Central Driver Assistance Controller associates data from the Front

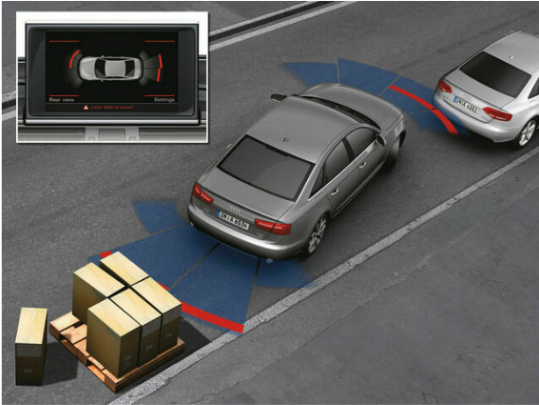
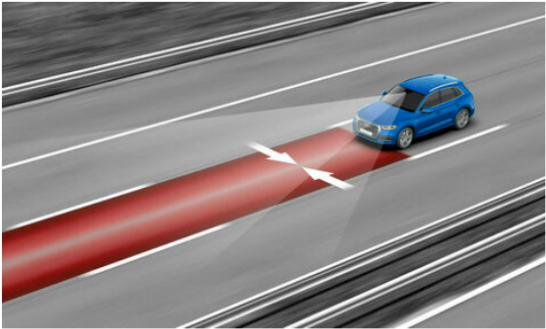
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	camera, and the Vehicle Speed Sensor to visualize the vehicle, traffic lanes, and distance level to the car ahead on the multimedia interface display. For example, data from the Vehicle Speed Sensor transmits the odometric data via the FlexRay Bus and along with other data, is used in constructing the perception model of the environment, including the image of the mobile object. ➤ Provides the current vehicle speed to the FlexRay bus. ➤ Is responsible for the vehicle's braking and stop management system. The function of the stop management system is to keep the stationary vehicle at a standstill. After the ESC has kept the vehicle at a standstill for three minutes, the electrical parking brake is actuated in order to protect the brake system components against overheating. Source: https://static.nhtsa.gov/odi/tsbs/2018/MC-10144686-9999.pdf Vehicle Speed data, provided via the FlexRay Bus, is transmitted to the Control Module for Adaptive Cruise Control. This speed characteristics, such as vehicle speed/acceleration, originating from the Vehicle Speed Sensor (VSS), help determine driving dynamics such as coasting, acceleration, and deceleration, which are used to generate an image of the mobile object used in Adaptive Cruise Control.

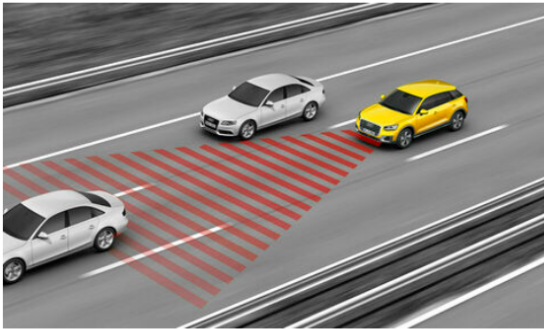
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 The diagram illustrates the architecture of an adaptive cruise control system. At the center is the Control Module for Adaptive Cruise Control (J428). It receives MMI input (including navigation data and driving program/Audi drive select) from the Data Bus on Board Diagnostic Interface (J533), which is connected to Information Electronics Control Module 1 (J794). The J428 module also receives Measurement data for radar sensor from the ADR sensor (radar sensor) and Object data from the Driver Assistance Systems Front Camera (R242) via the Driver Assistance Systems Control Module (J1121). The J428 module sends Object data to the Laser Distance Regulation Control Module (laser scanner) (J1122). It also sends Coasting/overrun curves and Speed characteristics to the Engine Control Module (J623), which in turn sends a Coasting request to the Transmission Control Module (J217). The J428 module also sends a Coasting request and an Acceleration/deceleration request to the Engine Control Module (J623), which sends a Deceleration request to the ABS Control Module (J104). The J428 module also receives a Coasting request from the Engine Control Module (J623). The diagram is labeled with the number 668,026. Source: https://static.nhtsa.gov/odi/tsbs/2018/MC-10144686-9999.pdf

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Parking system plus Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184  Audi active lane assist Operating at speeds from 65 km/h (40.4 mph), Audi active lane assist helps the driver keep the vehicle in the driving lane. A camera detects lane lines and the track that the car is following between them. In this process, the camera can distinguish between yellow lines in construction zones and standard white markings. If the car approaches a line without the turn signal being activated, the system helps the driver to steer back into the lane by means of gentle but noticeable interventions in the electromechanical power steering. In the MMI system, the driver sets how early the control intervention should occur. In the case of an early steering intervention point, the system guides the driver towards the middle of the lane by gentle, centering steering interventions. With a late steering intervention point, Audi active lane assist does not intervene until shortly before the detected lane marking might be crossed; then it gives a corrective steering intervention in the proper direction. In addition, the driver may choose to be warned by a vibration of the steering wheel when crossing detected lane markings. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353

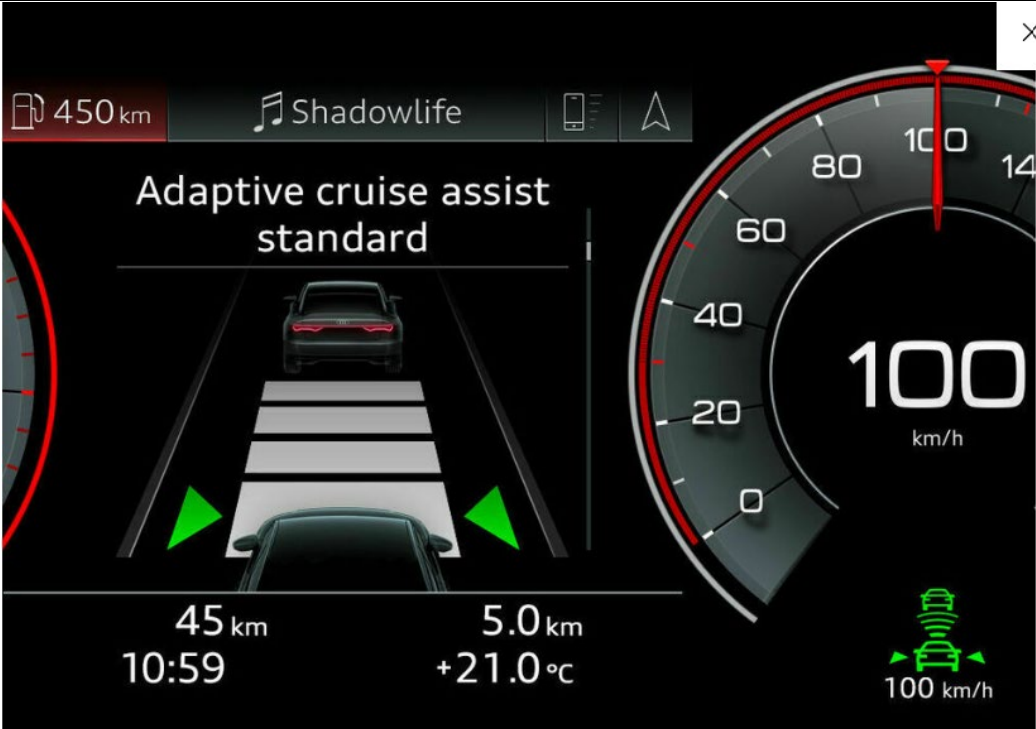
Claim	Support
	 Adaptive cruise control (with Stop&Go function) Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select. The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above. When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Adaptive cruise assist Photo — 09/12/2017 The adaptive cruise assist assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular.

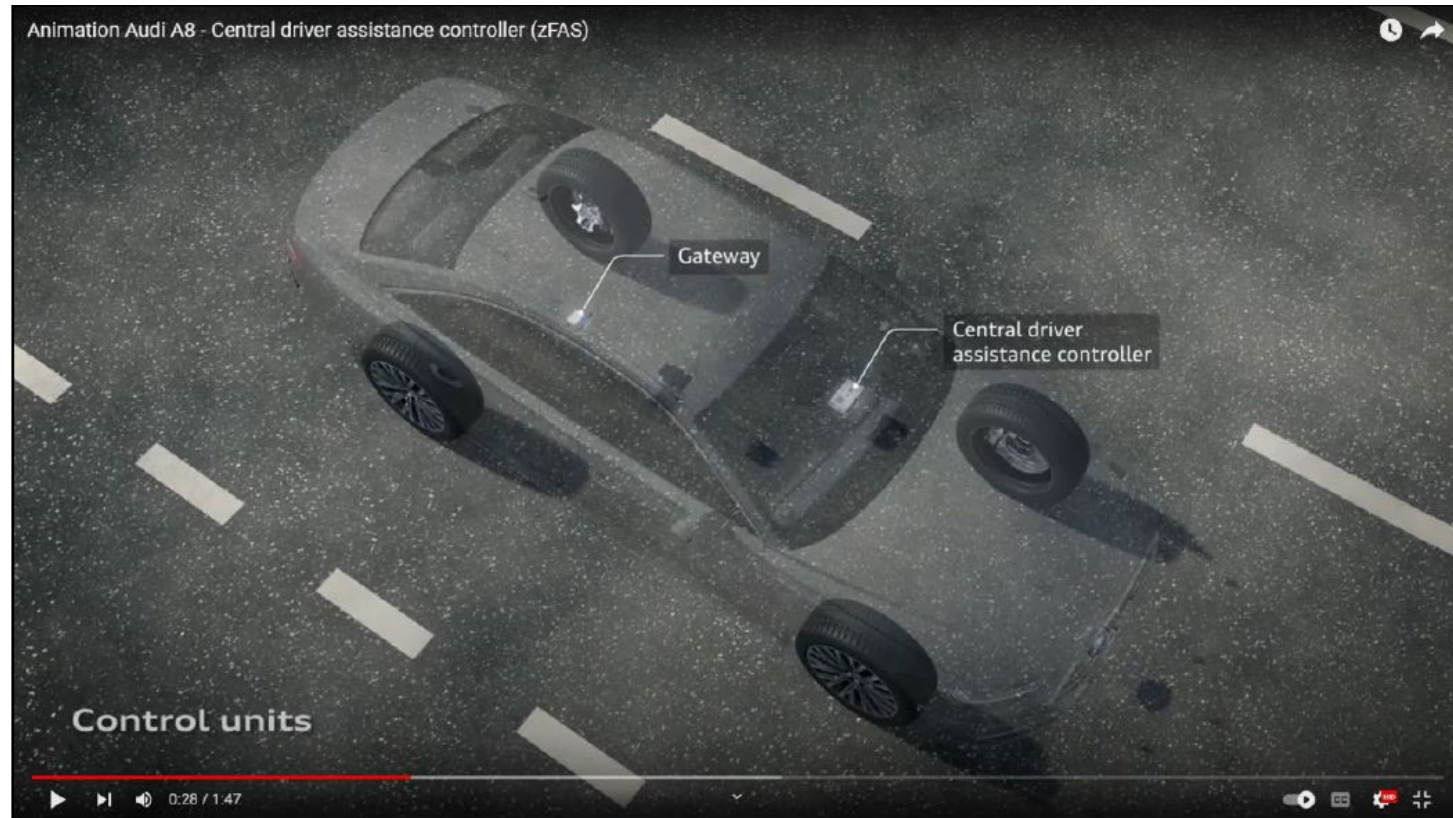
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Adaptive cruise assist The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle’s surroundings. Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches. The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
1[e]. forming an image of the mobile object based on said plurality of first images, said	Each Volkswagen Accused Product performs the step of forming an image of the mobile object based on said plurality of first images, said associated plurality of first movement measurements, and said first movement states and on said plurality of second images, said associated plurality of second movement measurements, and said second movement states. This element is infringed literally, or in the alternative, under the doctrine of equivalents.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
associated plurality of first movement measurements, and said first movement states and on said plurality of second images, said associated plurality of second movement measurements, and said second movement states,	For example, Audi's Pre-Sense system equipped in the Audi A8 system utilizes Audi A8's Central Driver Assistance Controller to collect and process data, including data from various sensors like radars, laser scanners, and cameras. It collects data such as a plurality of first images (e.g., image data collected by 360-degree environment cameras), the plurality of first movement measurements, and said first movement state (e.g., data collected by Ultrasonic sensors), the plurality of second images (e.g., image data collected by Front camera), and plurality of second movement measurements, and said second movement state (e.g., data collected by Long-range and Mid-range Radar sensors) to form an image of the mobile object. For example, the Parking system plus and/or Adaptive cruise control assist features uses a combination of data collected from the 360-degree environment cameras and Ultrasonic sensors to detect the vehicle's surroundings. Additionally, the Collision avoidance assist uses the combination of data obtained from the Front Camera and Long-range/Mid-range Radar sensors to detect the vehicle's surroundings. The image of the mobile object is displayed on the multimedia interface display.

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	The diagram illustrates a car equipped with various sensors for autonomous driving. The sensors are labeled as follows: - Front-Kamera (Front camera) - Long-Range-Radar (Long range radar) - Laserscanner (Laser scanner) - Ultraschallsensoren (Ultra sonic sensor) - Umgebungs-kamera (360° environment camera) - Mid-Range-Radar (Mid range radar) - Ultraschallsensoren seitlich (Side ultra sonic sensor)

Appendix D: Claim Chart for U.S. Patent 8,265,353

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



360 degree cameras

Photo — 01/01/2016

Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

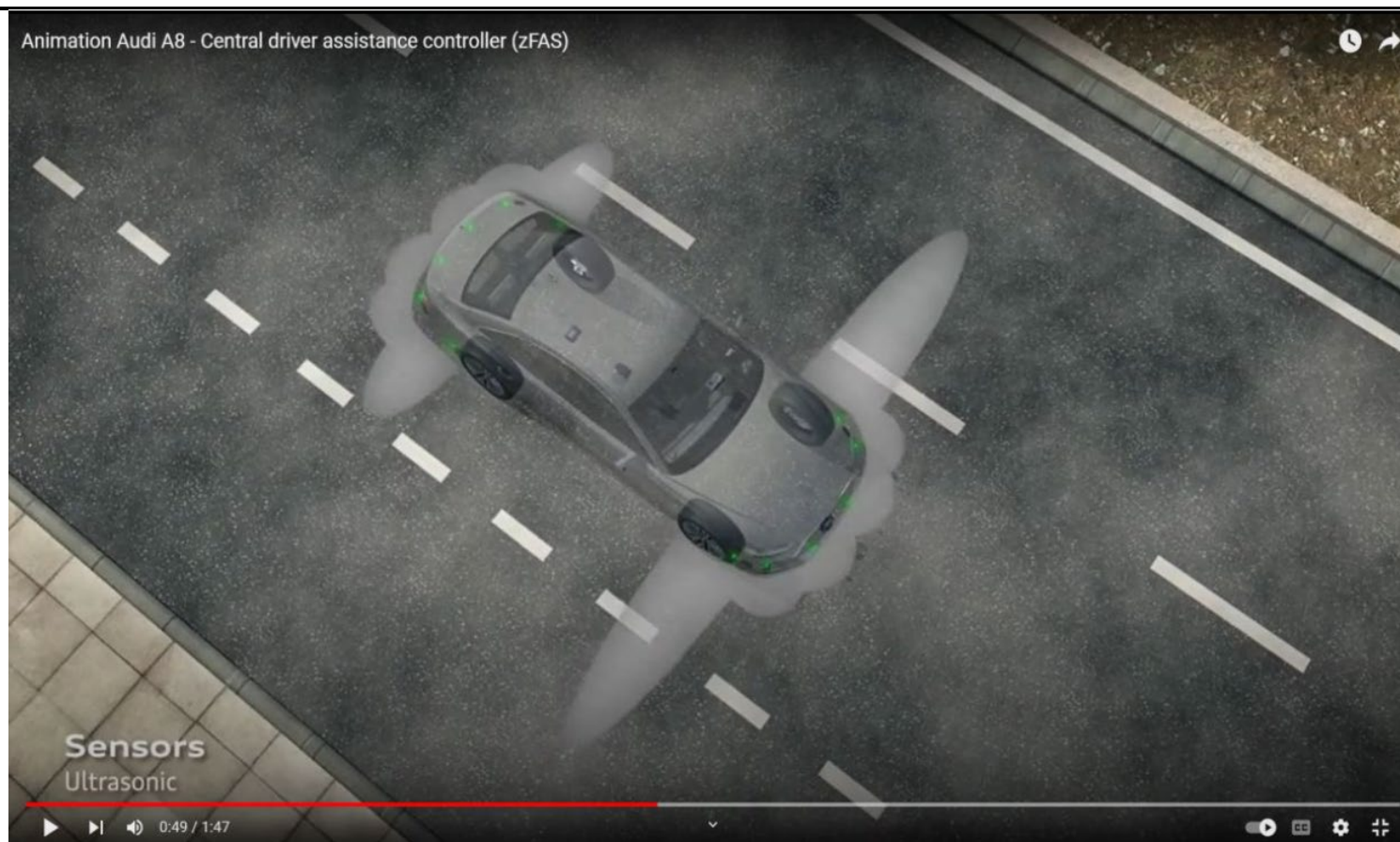
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Appendix D: Claim Chart for U.S. Patent 8,265,353



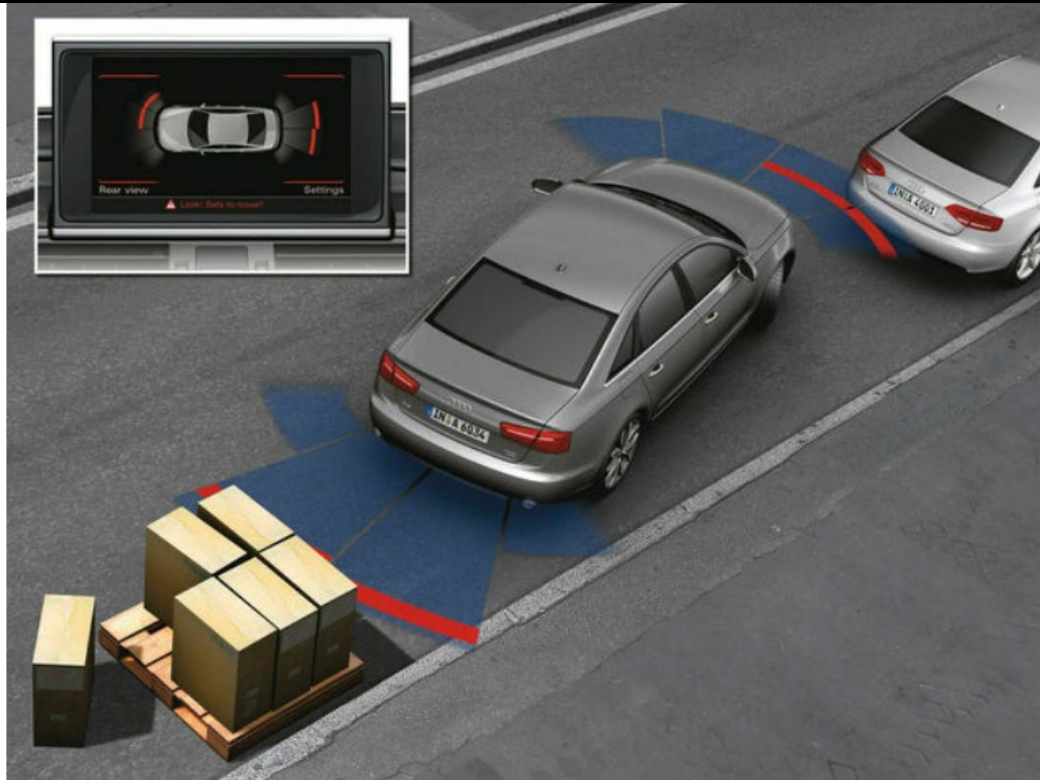
Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Parking system plus

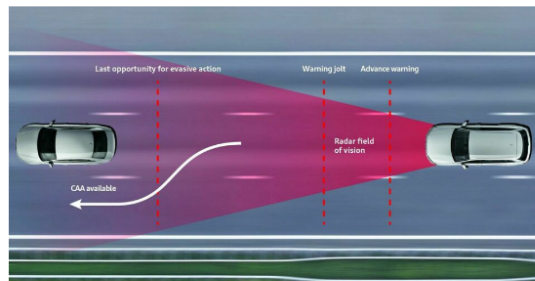
Illustration — 01/01/2016

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle.

Parking system plus

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



Collision avoidance assist

Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster.

First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

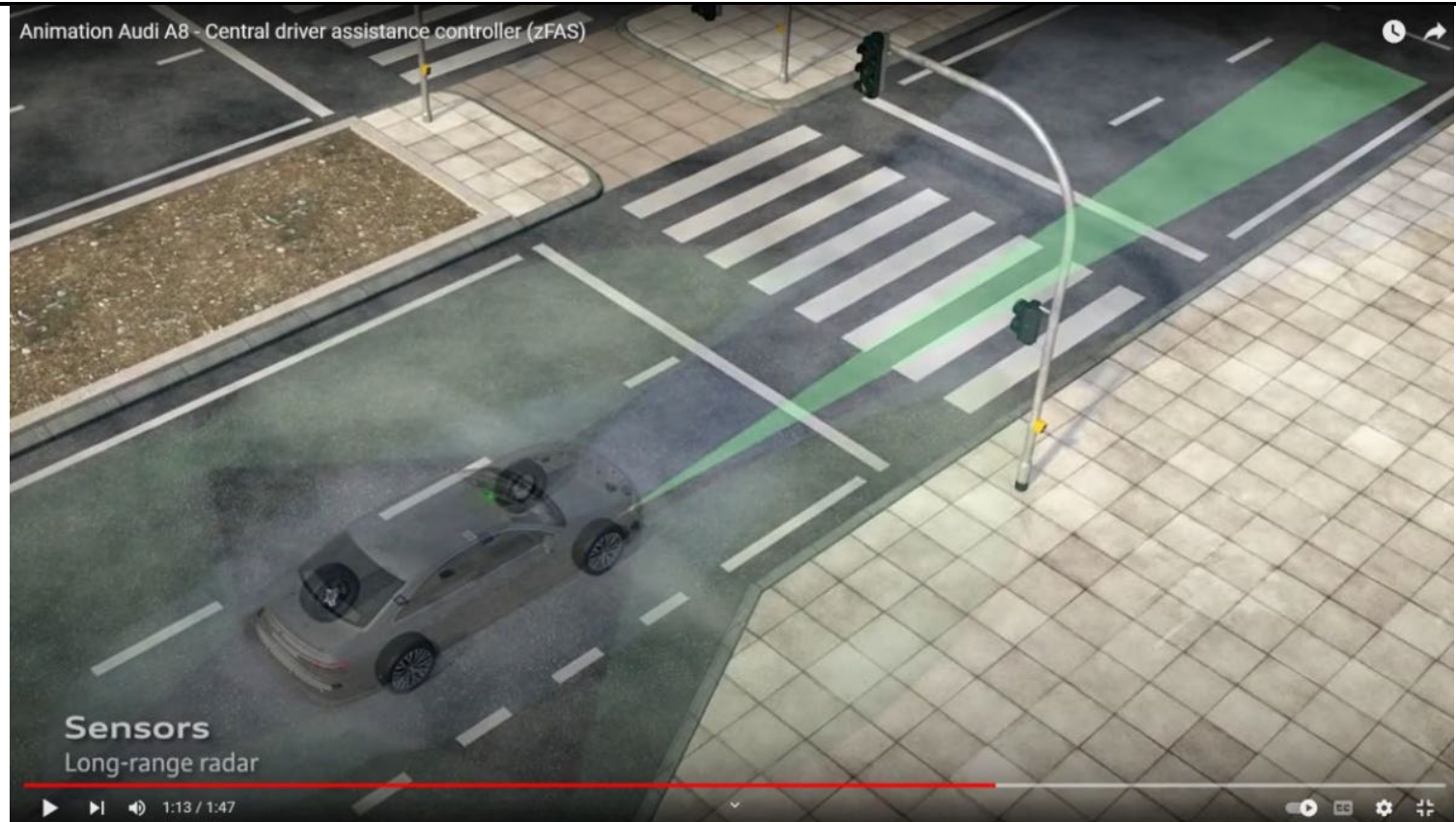
Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY>

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Appendix D: Claim Chart for U.S. Patent 8,265,353



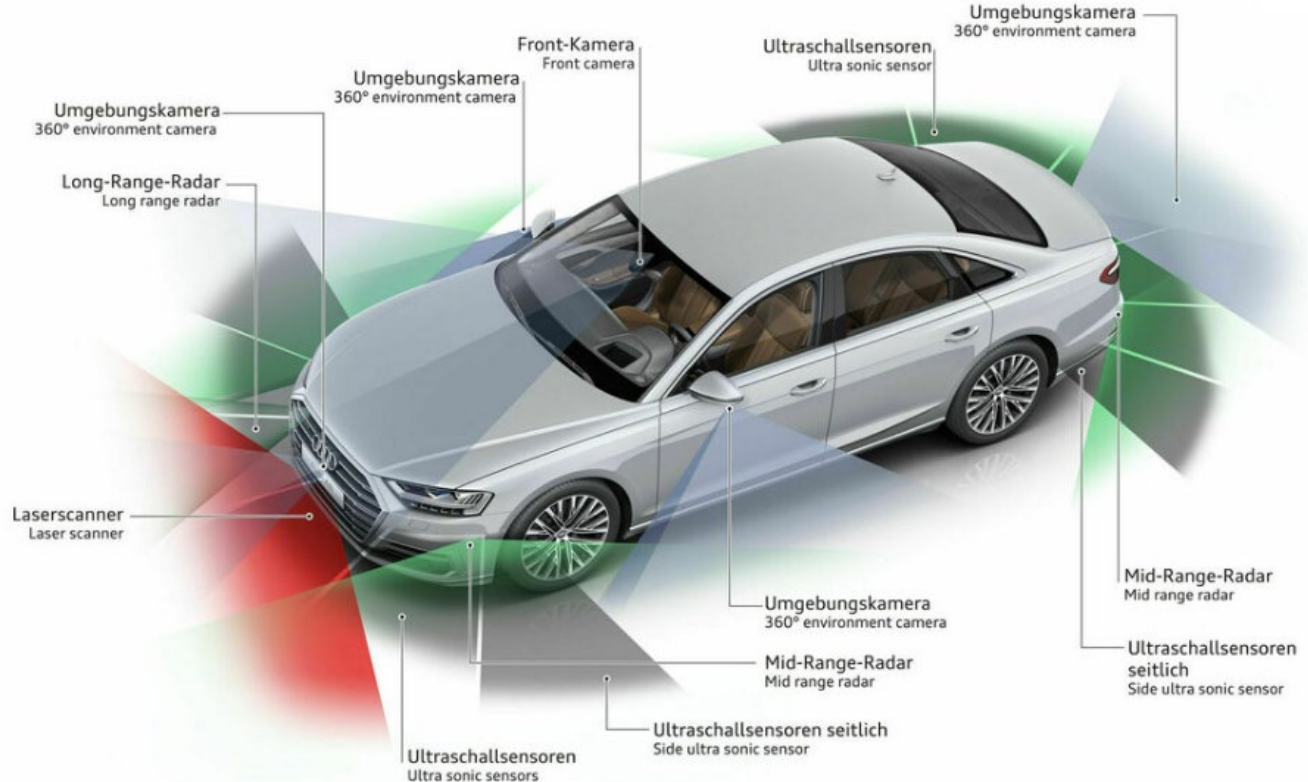
Source: <https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY>

By way of further example, Audi's Pre-Sense system equipped in the Audi A8 system utilizes Audi A8's Central Driver Assistance Controller to collect and process data, including data from various sensors like radars, laser scanners, and cameras. It collects data such as a plurality of first images (e.g., image data collected by Laser scanner), the plurality of first movement measurements, and said first movement state (e.g., data collected by Ultrasonic sensors), the plurality of second images (e.g., image data collected by Front camera), and plurality of second movement measurements, and said second movement state (e.g., data collected by Long-range and Mid-range Radar sensors) to form an image of the mobile object.

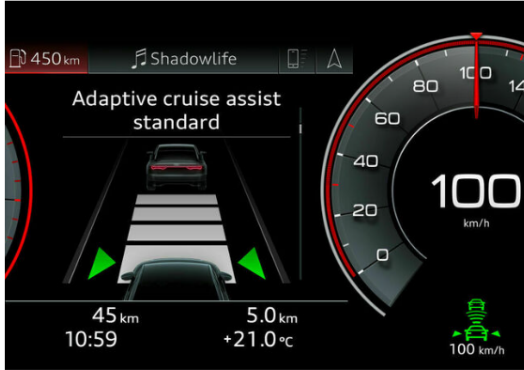
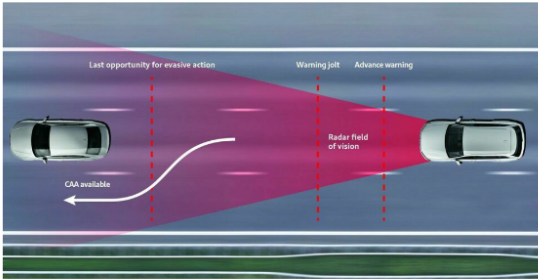
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	For example, the Adaptive cruise assist feature uses a combination of data collected from the Laser scanner and Ultrasonic sensors to detect the vehicle's surroundings while driving. Additionally, the Collision avoidance assist uses the combination of data obtained from the Front Camera and Long-range/Mid-range Radar sensors to detect the vehicle's surroundings. The image of the mobile object is displayed on the multimedia interface display. Laser scanner Together with the long-range radar and the front camera, the laser scanner forms a trio of sensors with various strengths that complement each other. It is these sensors and the central driver assistance controller (zFAS), which generates an image of the surroundings from all the sensor data, that make automated driving possible in the first place. The laser scanner covers a field approximately 80 meters (262.5 ft) long, with an opening angle of 145 degrees. The roughly fist-sized component is mounted in the front bumper and, regardless of speed, emits moderated pulses of light on multiple vertical levels, which a mirror scatters in the shape of a fan. Having a wave length in the near-infrared range, the extremely short flashes of light are invisible and harmless to the human eye. They are reflected by objects in front of the car and return to the laser scanner in less than one microsecond, where photo diodes detect them. The result is a detailed, deeply contoured, static image of the surroundings. The laser scanner displays other vehicles as measured cuboids, and it also measures such information as distance and orientation, which it distributes to the partner control units. With its large horizontal aperture, it detects cars entering the lane very early. Detailed information about structures on the side of the road, such as guardrails, round out the spectrum. Like radar, the laser scanner also works in the dark. Automatic cleaning and heating of the covering panel keep it operational even in inclement weather and spray as long as the conditions aren't too extreme. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 The diagram illustrates a car equipped with various driver assistance sensors. The sensors and their fields of view are labeled as follows: Umgebungskamera 360° environment camera (top left and top right) Long-Range-Radar Long range radar (front left) Laserscanner Laser scanner (front left) Front-Kamera Front camera (front center) Ultraschallsensoren Ultra sonic sensor (top right) Mid-Range-Radar Mid range radar (bottom right) Ultraschallsensoren seitlich Side ultra sonic sensor (bottom right) Ultraschallsensoren Ultra sonic sensors (bottom center) Mid-Range-Radar Mid range radar (bottom center) Umgebungskamera 360° environment camera (bottom center) Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Adaptive cruise assist The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle's surroundings. Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches. The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184  Collision avoidance assist Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster. First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	By way of further example, Audi's Pre-Sense system equipped in the Audi A8 system utilizes Audi A8's Central Driver Assistance Controller to collect and process data, including data from various sensors like radars, laser scanners, and cameras. It collects data such as a plurality of first images (e.g., image data collected by 360-degree environment cameras), the plurality of first movement measurements, and said first movement state (e.g., data collected by Ultrasonic sensors), the plurality of second images (e.g., image data collected by Front camera), and plurality of second movement measurements, and said second movement state (e.g., data collected by the Vehicle Speed Sensor) to form an image of the mobile object. For example, the Parking system plus uses a combination of data collected from the 360-degree environment cameras and Ultrasonic sensors to detect the vehicle's surroundings. Additionally, the Collision Avoidance Assist uses the combination of data obtained from the Front Camera and Vehicle Speed Sensor to detect the vehicle's surroundings. The image of the mobile object is displayed on the multimedia interface display.

Appendix D: Claim Chart for U.S. Patent 8,265,353



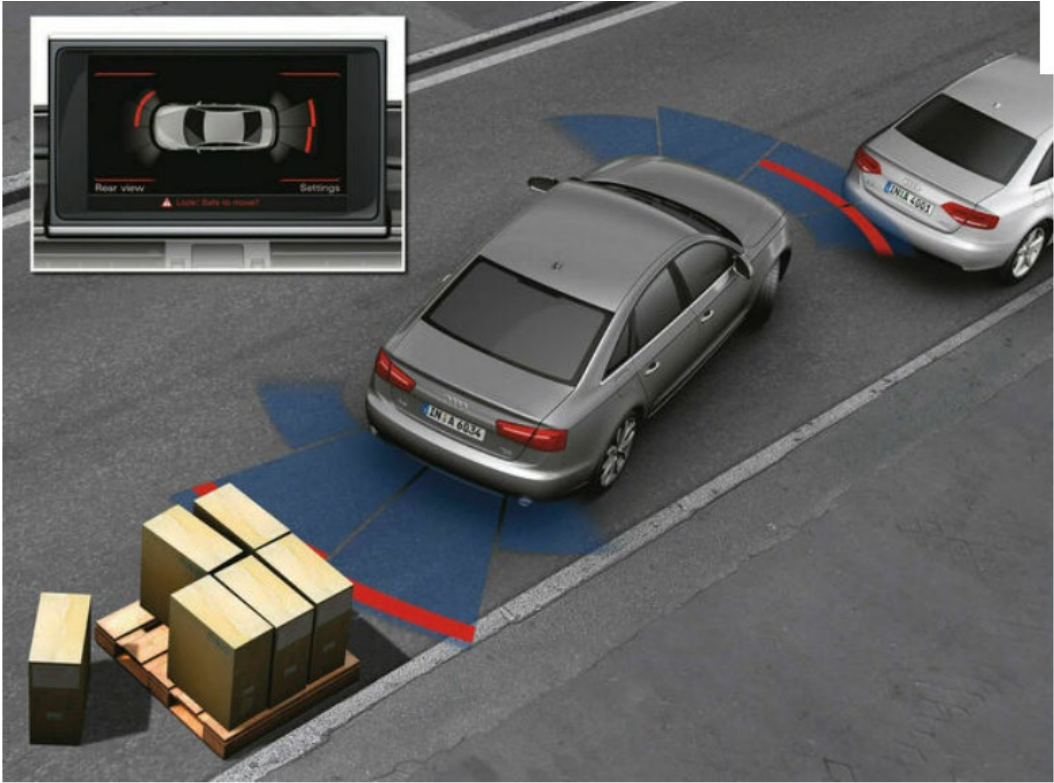
360 degree cameras

Photo — 01/01/2016

Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

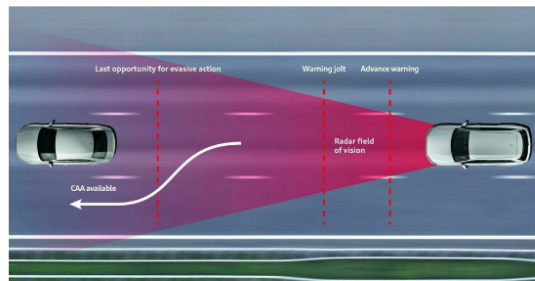
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	The image is a composite. The top-left portion shows a car's rearview camera feed on a monitor, displaying a top-down view of the car with red sensor arcs and a warning message 'Watch! Safe to proceed?'. The bottom-right portion is a 3D perspective illustration of a silver car parked on a street. Blue sensor waves emanate from the front and rear of the car, and red lines indicate obstacles: a stack of boxes on a pallet in front and another car behind. Parking system plus Illustration — 01/01/2016 Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle.

Parking system plus

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



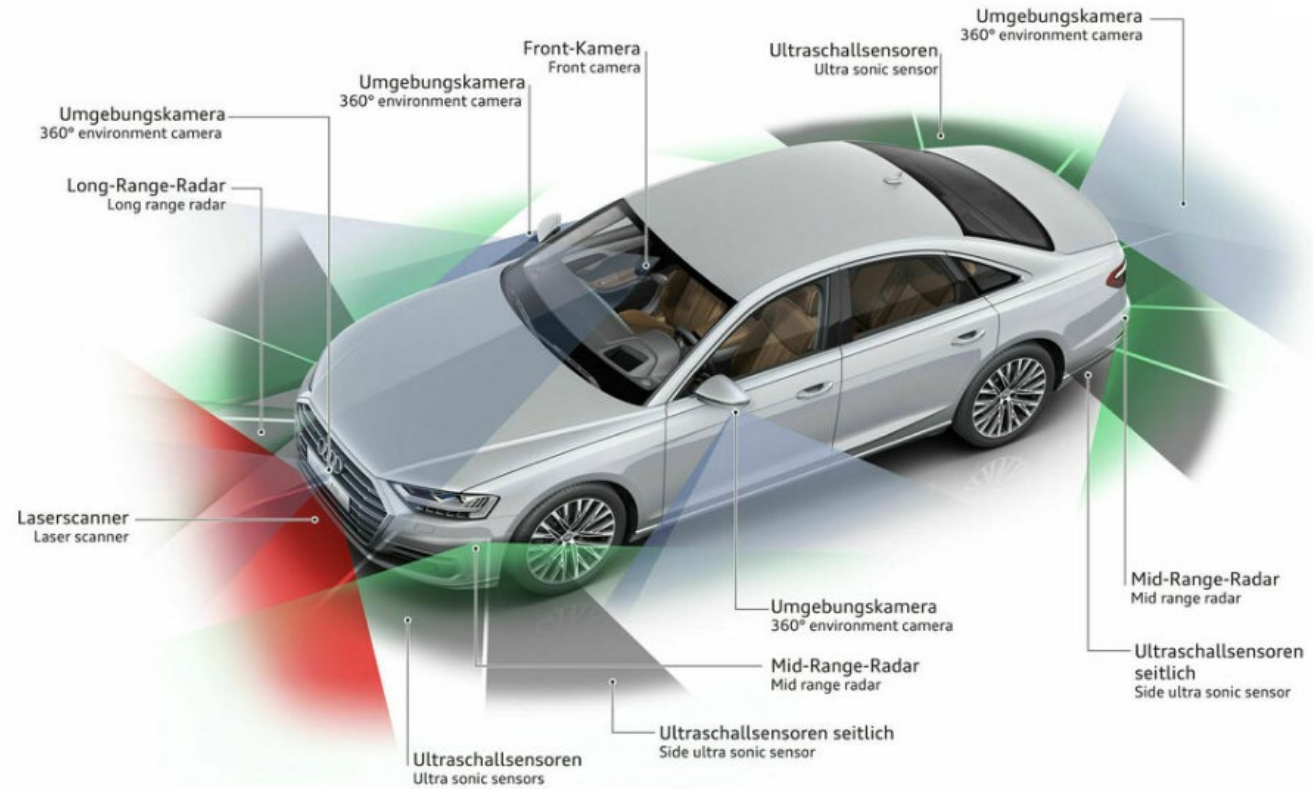
Collision avoidance assist

Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster.

First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

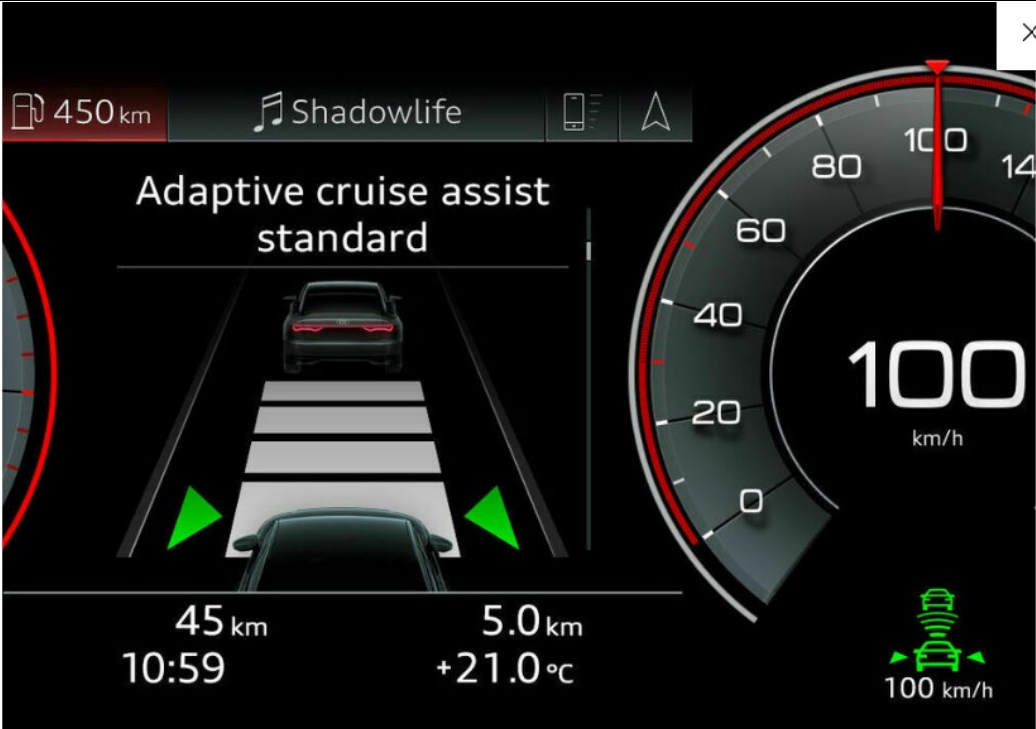
Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Adaptive cruise assist Photo — 09/12/2017 The adaptive cruise assist assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular.

Appendix D: Claim Chart for U.S. Patent 8,265,353

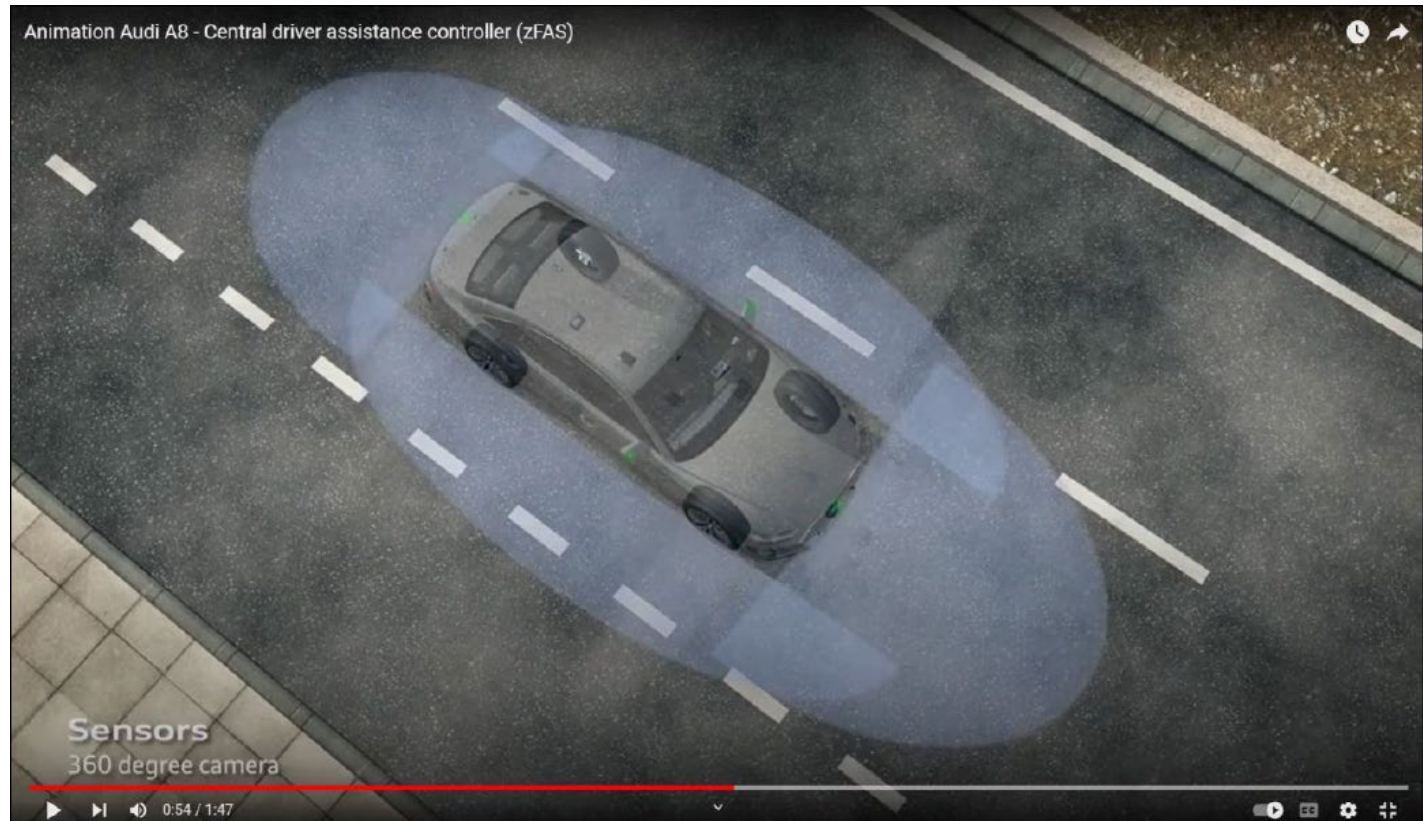
Claim	Support
	Adaptive cruise assist The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle’s surroundings. Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches. The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
1[f] . wherein the first imaging technique is different from the second imaging technique.	Each Volkswagen Accused Product performs the step of the step of forming an image of the mobile object based on said plurality of first images, said associated plurality of first movement measurements, and said first movement states and on said plurality of second images, said associated plurality of second movement measurements, and said second movement states, wherein the first imaging technique is different from the second imaging technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents.

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Claim	Support
	For example, Audi's Pre-Sense system equipped in the Audi A8 uses a first imaging technique (e.g., 360-degree environment cameras) which consist of two side cameras, a front and back camera. This technique is different from the second imaging technique (e.g., Front camera).  360 degree cameras Photo — 01/01/2016 Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



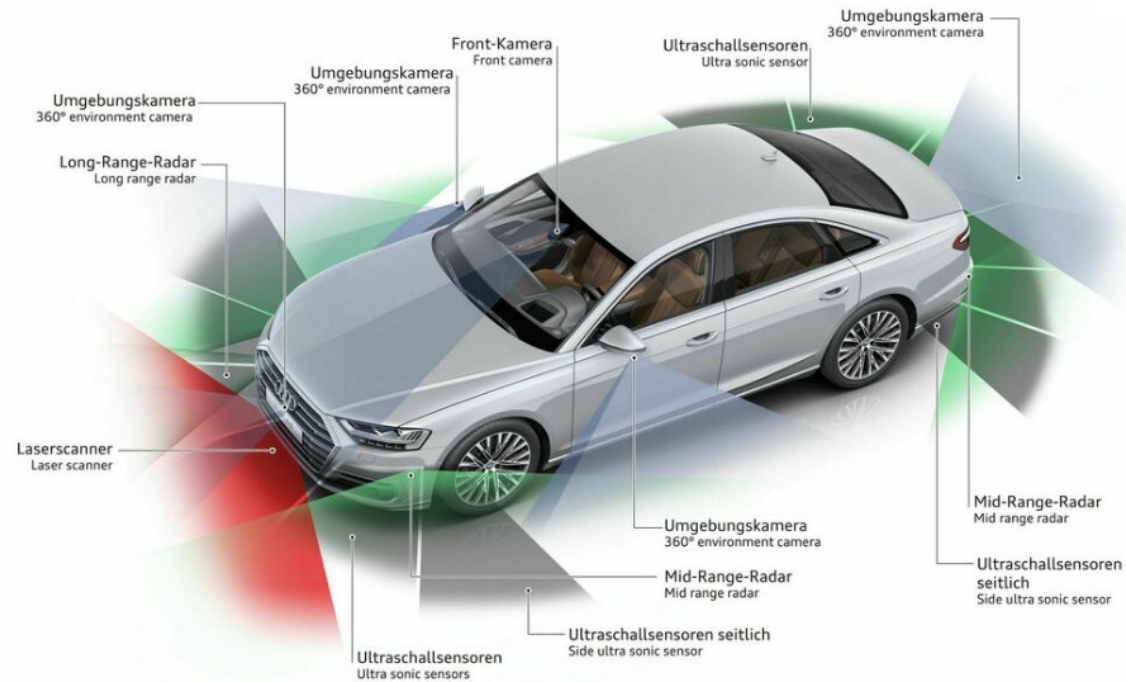
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Appendix D: Claim Chart for U.S. Patent 8,265,353



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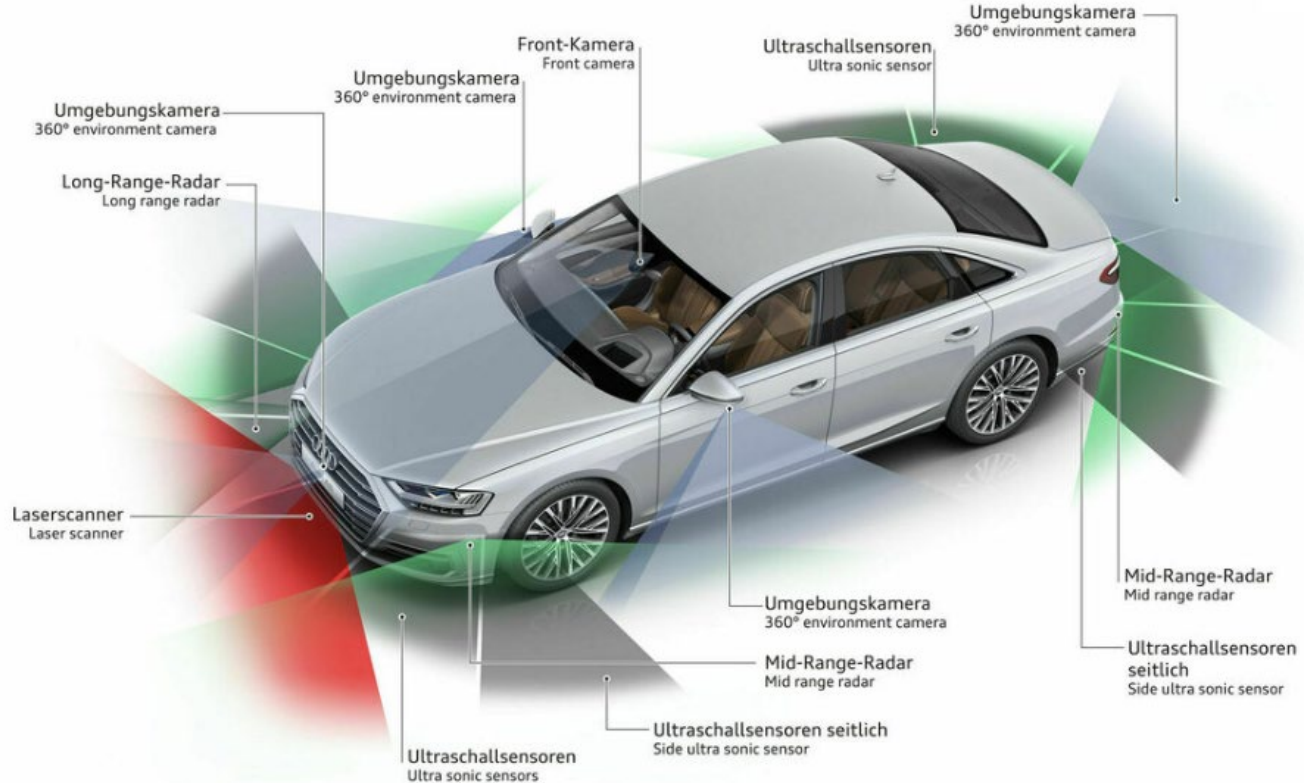
Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

By way of further example, Audi's Pre-Sense system equipped in the Audi A8 uses a first imaging technique (e.g., Laser scanner). This technique is different from the second imaging technique (e.g., Front camera).

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
2. The method of claim 1, further comprising:	Each Volkswagen Accused Product performs the method of claim 1, further comprising time-synchronizing said first plurality of images and said second plurality of images to a common time scale based on the first and second movement states.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
time-synchronizing said first plurality of images and said second plurality of images to a common time scale based on the first and second movement states.	This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claim 1[e].</i> For example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system time-synchronizes the first plurality of images (e.g., 360-degree camera data) and the second plurality of images (e.g., Front camera data) to real-time based on the first movement state (e.g., Ultrasonic sensor data) and second movement state (e.g., Long-range and Mid-range Radar sensor data). By way of further example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system time-synchronizes the first plurality of images (e.g., Laser scanner data) and the second plurality of images (e.g., Front camera data) to real-time based on the first movement state (e.g., Ultrasonic sensor data) and second movement state (e.g., Long-range and Mid-range Radar sensor data). By way of further example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system time-synchronizes the first plurality of images (e.g., 360-degree camera data) and the second plurality of images (e.g., Front camera data) to real-time based on the first movement state (e.g., Ultrasonic sensor data) and second movement state (e.g., Vehicle Speed sensor data). LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant product testing/teardown is provided.
3. The method of claim 1, further comprising: forming first reconstructed images corresponding to said plurality of first images and second reconstructed images corresponding to said	Each Volkswagen Accused Product performs the method of claim 1, further comprising: forming first reconstructed images corresponding to said plurality of first images and second reconstructed images corresponding to said plurality of second images. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claim 1.</i> For example, the Audi's Pre-Sense system equipped in the Audi A8 uses the 360-degree environment cameras and Ultrasonic sensor data to provide a first reconstructed image (e.g., top view of the vehicle and visual information about the estimated

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
plurality of second images.	distance to obstructions surrounding the vehicle during parking and/or visual information about the estimated distance to obstructions surrounding the vehicle during parking and maneuvering). For example, the images taken from four cameras set on all sides of the vehicle and/or the laser scanner are combined to form an image of the vehicle from the top view. The Ultrasonic sensors can capture the vehicle's distance from surrounding objects. The image of the vehicle captured using the 360-degree environment cameras can be reconstructed using the measurements captured from the Ultrasonic sensors to present a second reconstructed image (e.g., an image of the vehicle with white/red segments representing distance to obstructions).

Appendix D: Claim Chart for U.S. Patent 8,265,353



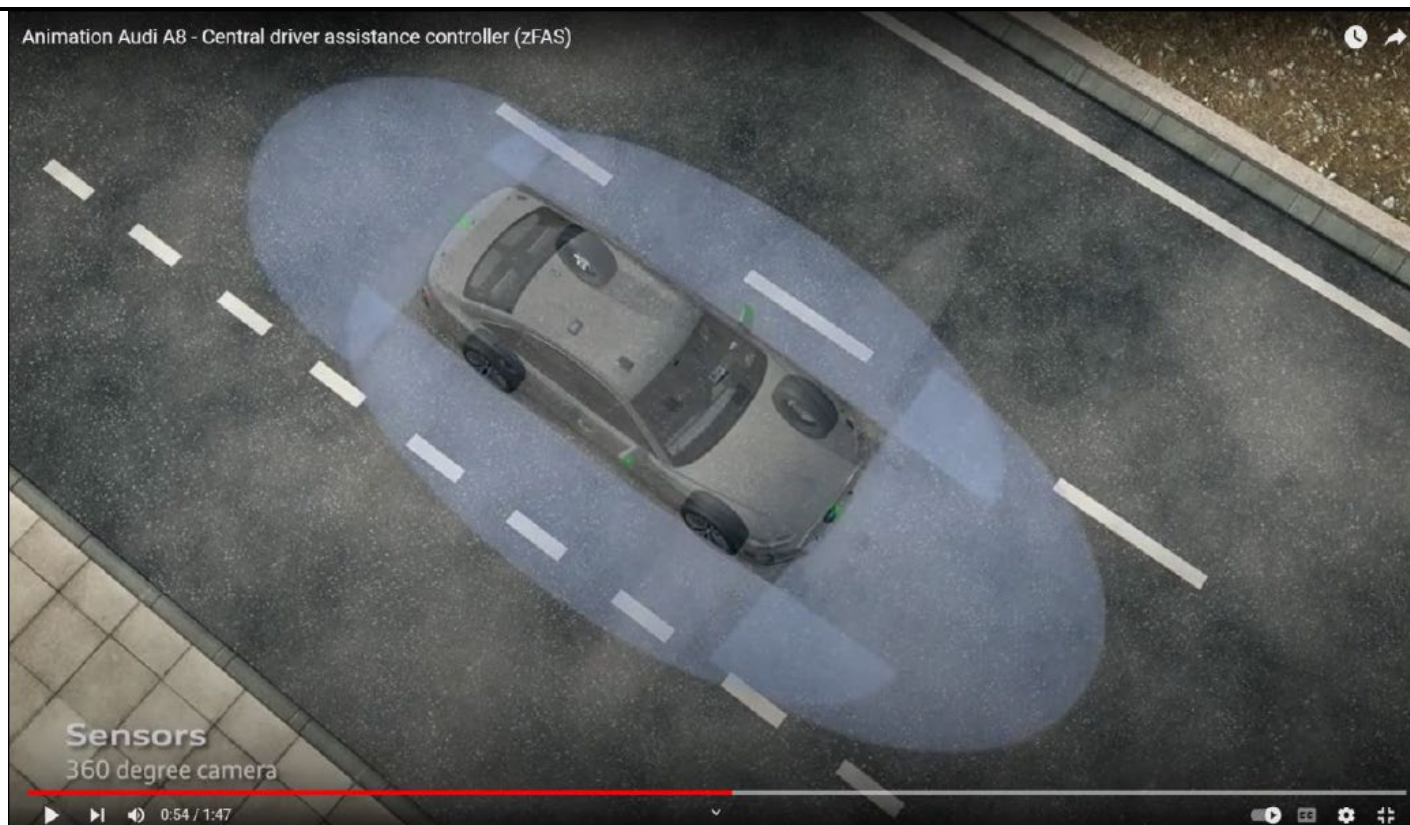
360 degree cameras

Photo — 01/01/2016

Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

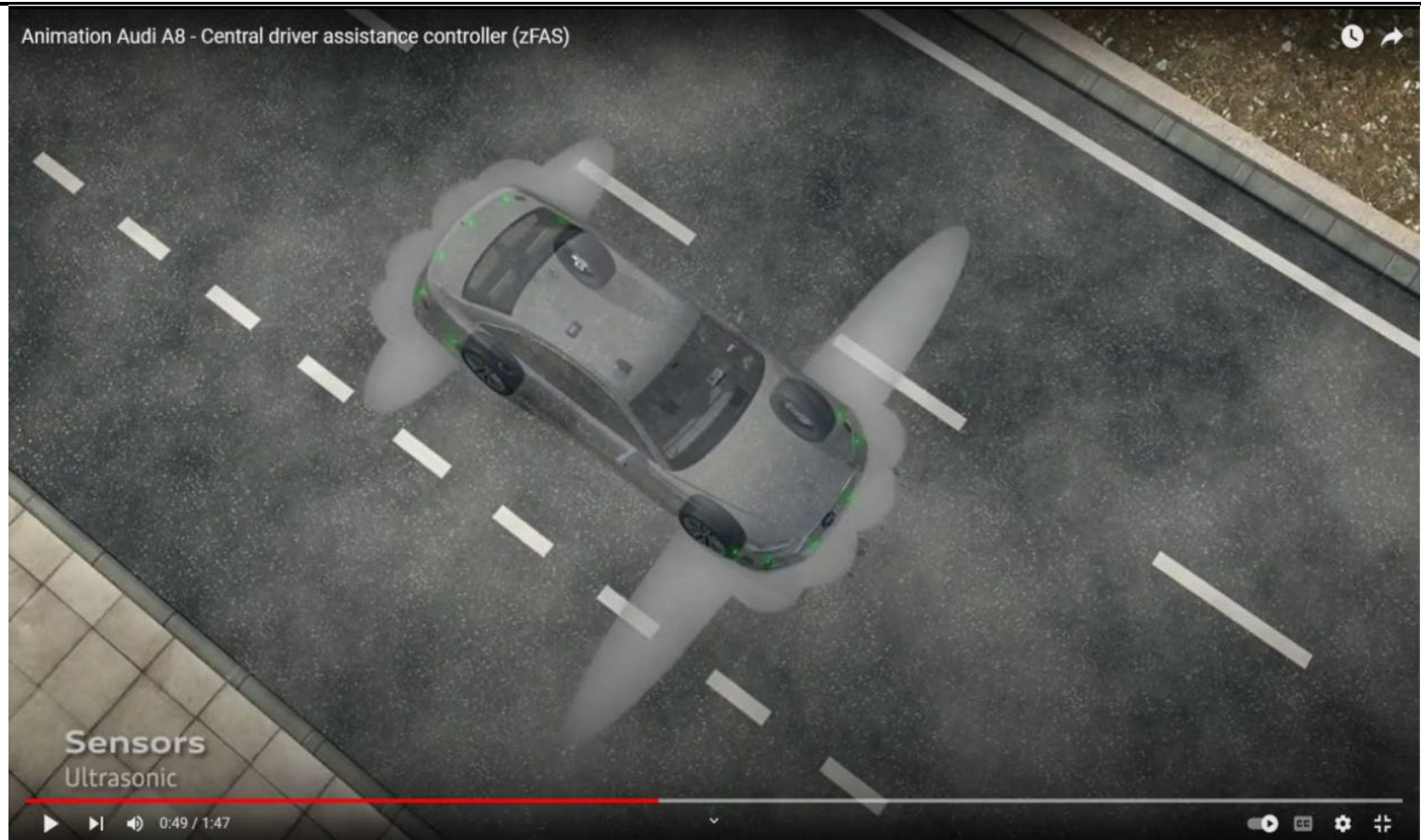
Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353



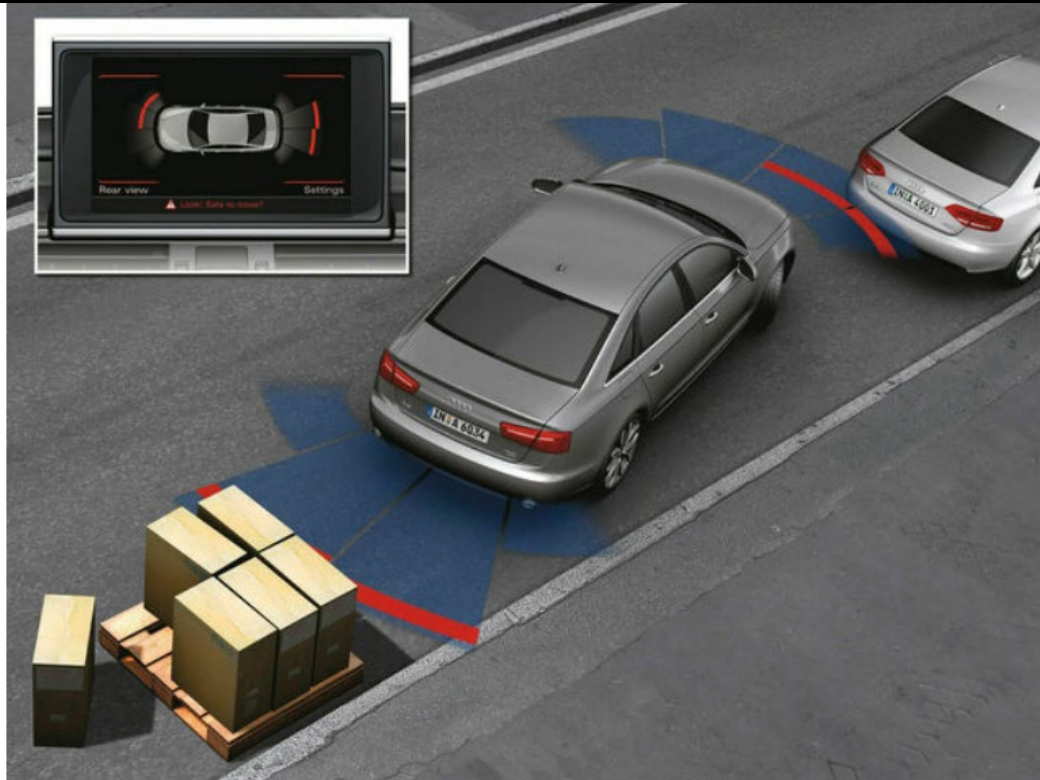
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Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Parking system plus

Illustration — 01/01/2016

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle.

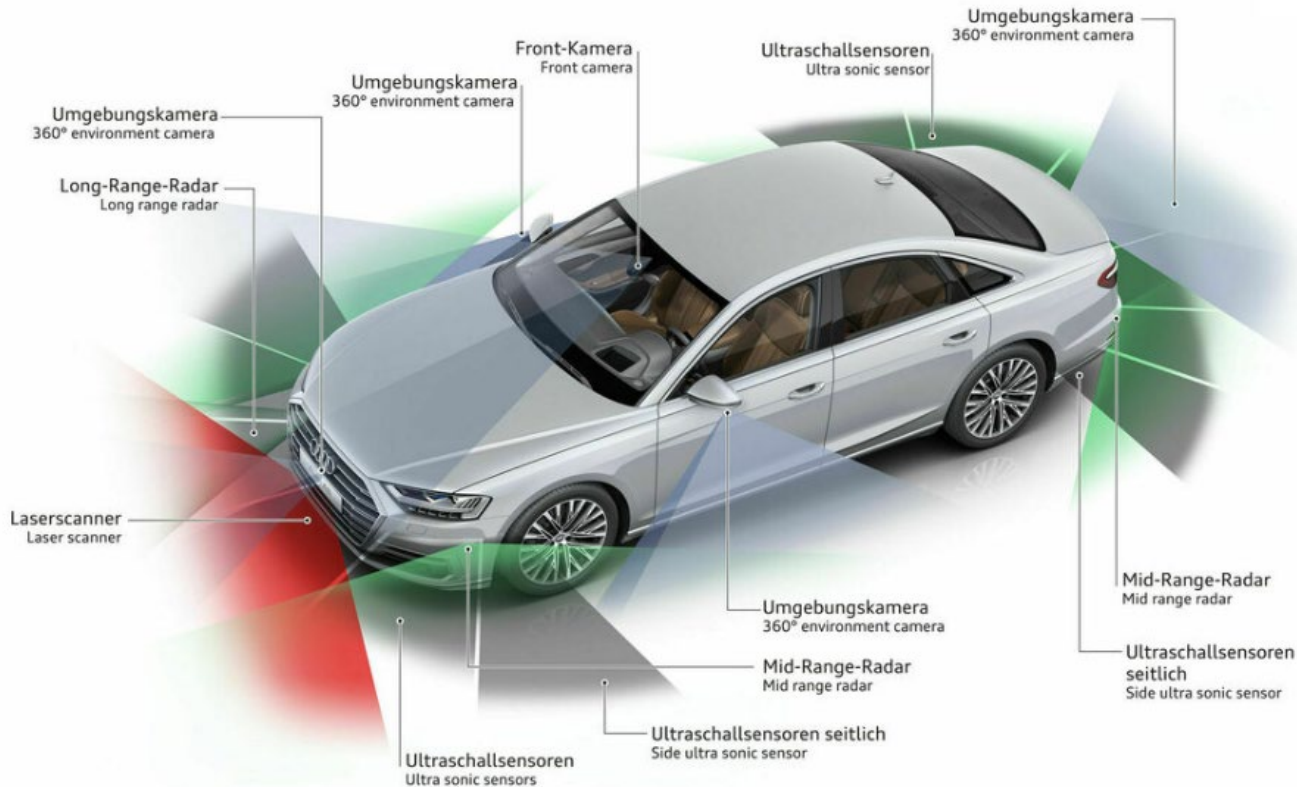
Appendix D: Claim Chart for U.S. Patent 8,265,353

Parking system plus

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353

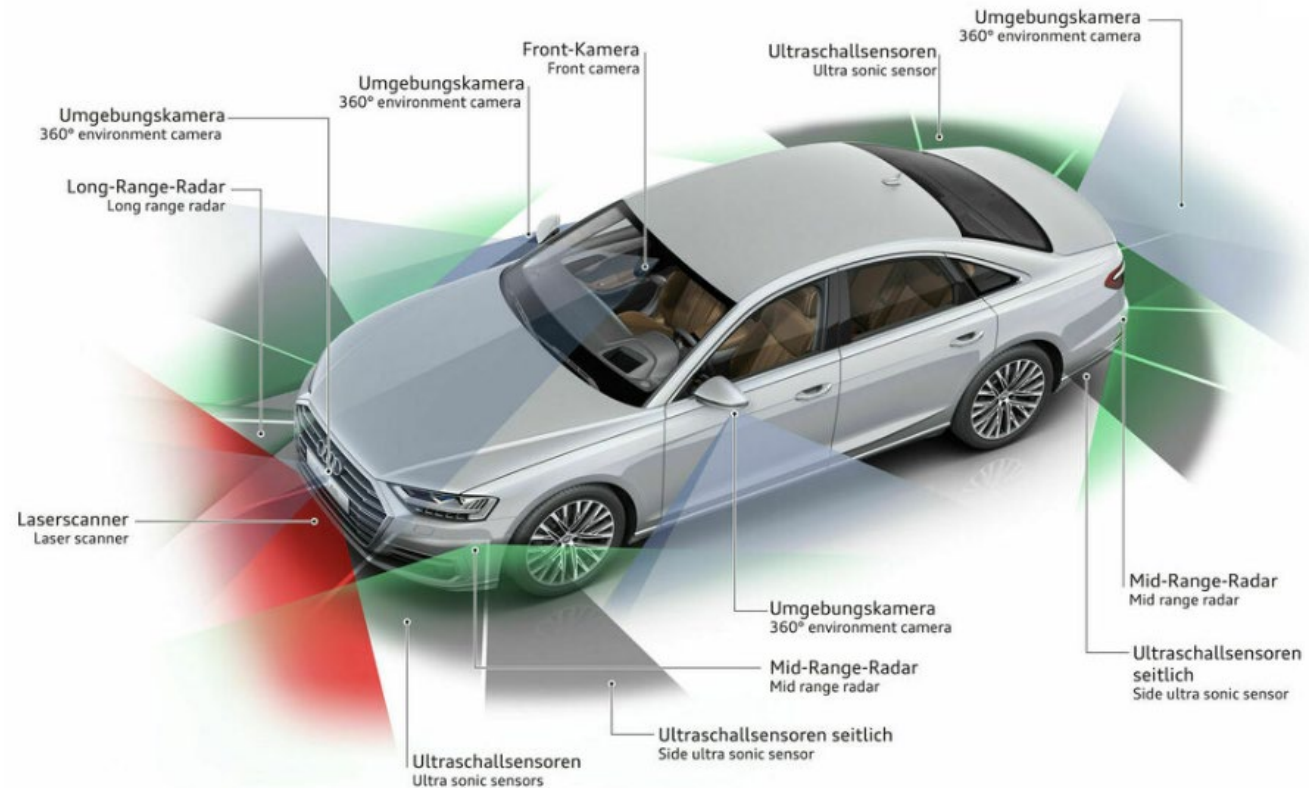
Claim	Support
	 The diagram illustrates an Audi A8 equipped with a comprehensive sensor suite for its Pre-Sense system. The sensors are labeled as follows: Front-Kamera (Front camera) Umgebungskamera 360° environment camera (multiple locations) Long-Range-Radar (Long range radar) Laserscanner (Laser scanner) Ultraschallsensoren (Ultra sonic sensor) Ultraschallsensoren seitlich (Side ultra sonic sensor) Mid-Range-Radar (Mid range radar) By way of further example, the Audi's Pre-Sense system equipped in the Audi A8 uses the Laser scanner and Ultrasonic sensor data to provide a first reconstructed image (e.g., visual information about the estimated distance to obstructions surrounding the vehicle during parking and maneuvering). For example, the image taken from the Laser scanner is combined to form an image of the vehicle's surroundings. The Ultrasonic sensors can capture the vehicle's distance from surrounding objects. The image of the vehicle captured using the Laser scanner can be reconstructed using the measurements captured from the Ultrasonic sensors to present a second reconstructed image (e.g., an image of the vehicles distance to obstructions).

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Claim	Support
	Laser scanner Together with the long-range radar and the front camera, the laser scanner forms a trio of sensors with various strengths that complement each other. It is these sensors and the central driver assistance controller (zFAS), which generates an image of the surroundings from all the sensor data, that make automated driving possible in the first place. The laser scanner covers a field approximately 80 meters (262.5 ft) long, with an opening angle of 145 degrees. The roughly fist-sized component is mounted in the front bumper and, regardless of speed, emits moderated pulses of light on multiple vertical levels, which a mirror scatters in the shape of a fan. Having a wave length in the near-infrared range, the extremely short flashes of light are invisible and harmless to the human eye. They are reflected by objects in front of the car and return to the laser scanner in less than one microsecond, where photo diodes detect them. The result is a detailed, deeply contoured, static image of the surroundings. The laser scanner displays other vehicles as measured cuboids, and it also measures such information as distance and orientation, which it distributes to the partner control units. With its large horizontal aperture, it detects cars entering the lane very early. Detailed information about structures on the side of the road, such as guardrails, round out the spectrum. Like radar, the laser scanner also works in the dark. Automatic cleaning and heating of the covering panel keep it operational even in inclement weather and spray as long as the conditions aren't too extreme.

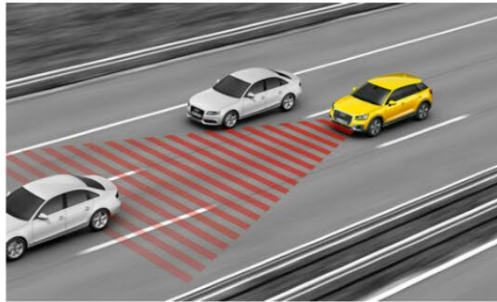
Appendix D: Claim Chart for U.S. Patent 8,265,353

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Appendix D: Claim Chart for U.S. Patent 8,265,353



Adaptive cruise control (with Stop&Go function)

Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select.

The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above.

When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings.

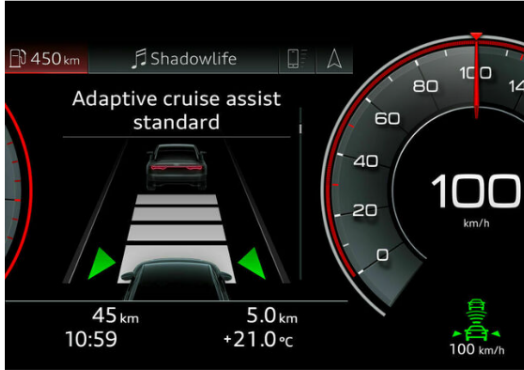
Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353



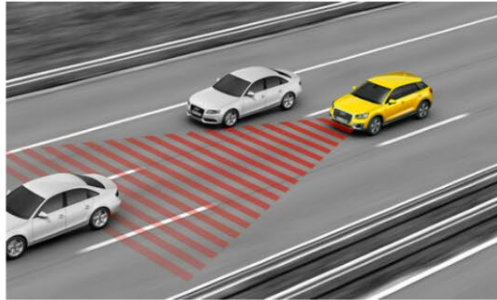
Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
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Appendix D: Claim Chart for U.S. Patent 8,265,353

be reconstructed using the measurements captured from the radar sensor to present an image of the vehicle with the traffic lane and distance level to the vehicle ahead.



Adaptive cruise control (with Stop&Go function)

Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select.

The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above.

When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353



Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z

By way of further example, Audi's Pre-Sense system equipped in the accused Audi A8 uses the 360-degree environment cameras and Ultrasonic sensor data to provide a first reconstructed image (e.g., top view of the vehicle and visual information about the estimated distance to obstructions surrounding the vehicle during parking).

For example, the images taken from four cameras set on all sides of the vehicle are combined to form an image of the vehicle from the top view. The Ultrasonic sensors can capture the vehicle's distance from surrounding objects. The image of the vehicle captured using the 360-degree environment cameras can be reconstructed using the measurements captured from the

Appendix D: Claim Chart for U.S. Patent 8,265,353

Ultrasonic sensors to present a second reconstructed image (e.g., an image of the vehicle with white/red segments representing distance to obstructions).



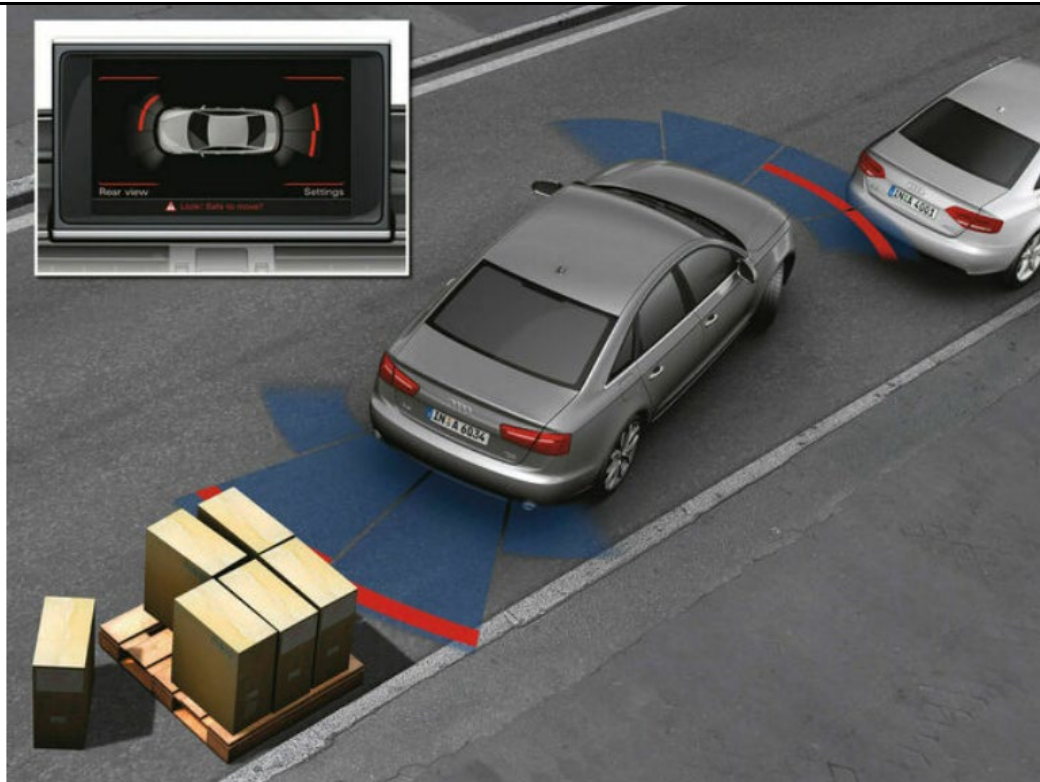
360 degree cameras

Photo — 01/01/2016

Four cameras on the vehicle scan the surroundings and display obstacles in the immediate vicinity of the vehicle.

Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

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Parking system plus

Illustration — 01/01/2016

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle.

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Parking system plus

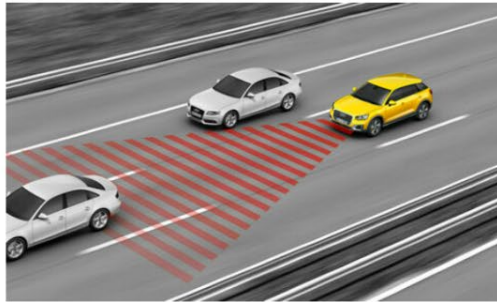
Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

For example, the Audi Pre Sense system's Audi Adaptive cruise control with Stop & Go function can use the front camera and Vehicle Speed Sensor to provide a second reconstructed image (e.g., visual of the vehicle, traffic lane and distance level from the object on the digital instrument cluster or head-up display).

For example, the images taken from the front camera can capture the conditions ahead of the vehicle and detect traffic lanes. The Vehicle Speed Sensor can help detect the relative speed and distance to the vehicle ahead. The image with the vehicle and traffic lane can be reconstructed using the measurements captured from the Vehicle Speed Sensor to present an image of the vehicle with the traffic lane and distance level to the vehicle ahead.

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Adaptive cruise control (with Stop&Go function)

Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select.

The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above.

When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
4. The method of claim 3, further comprising:	Each Volkswagen Accused Product performs the method of claim 3, further comprising: spatially-synchronizing said first reconstructed images and said second reconstructed images. This element is infringed literally, or in the alternative, under the doctrine of equivalents.

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
spatially-synchronizing said first reconstructed images and said second reconstructed images.	<i>See supporting evidence for claims 1 and 3.</i> For example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that collects data from the 360-degree environment cameras, Front camera, Ultrasonic and Long-rang/Mid-range Radar sensors to form images of the object. The Central Driver Assistance Controller spatially synchronizes the first and second reconstructed images to form the images of the object. By way of further example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that collects data from the Laser scanner, Front camera, Ultrasonic and Long-rang/Mid-range Radar sensors to form images of the object. So, the Central Driver Assistance Controller spatially synchronizes the first and second reconstructed images to form the images of the object. LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant product testing/teardown is provided.
5. The method of claim 1, wherein said first imaging technique is a radiation attenuation technique and said second imaging technique is a radiation emission technique.	Each Volkswagen Accused Product performs the method of claim 1, wherein said first imaging technique is a radiation attenuation technique and said second imaging technique is a radiation emission technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claims 1(b) and 1(d).</i> For example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can collect data using the first imaging technique (e.g., 360-degree environment cameras) and the second imaging technique (e.g., Front camera) to form images of the object. The first imaging technique can be a radiation attenuation technique and said second imaging technique is a radiation emission technique. By way of further example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can collect data using the first imaging technique (e.g., Laser scanner) and the second imaging technique (e.g., Front camera) to form

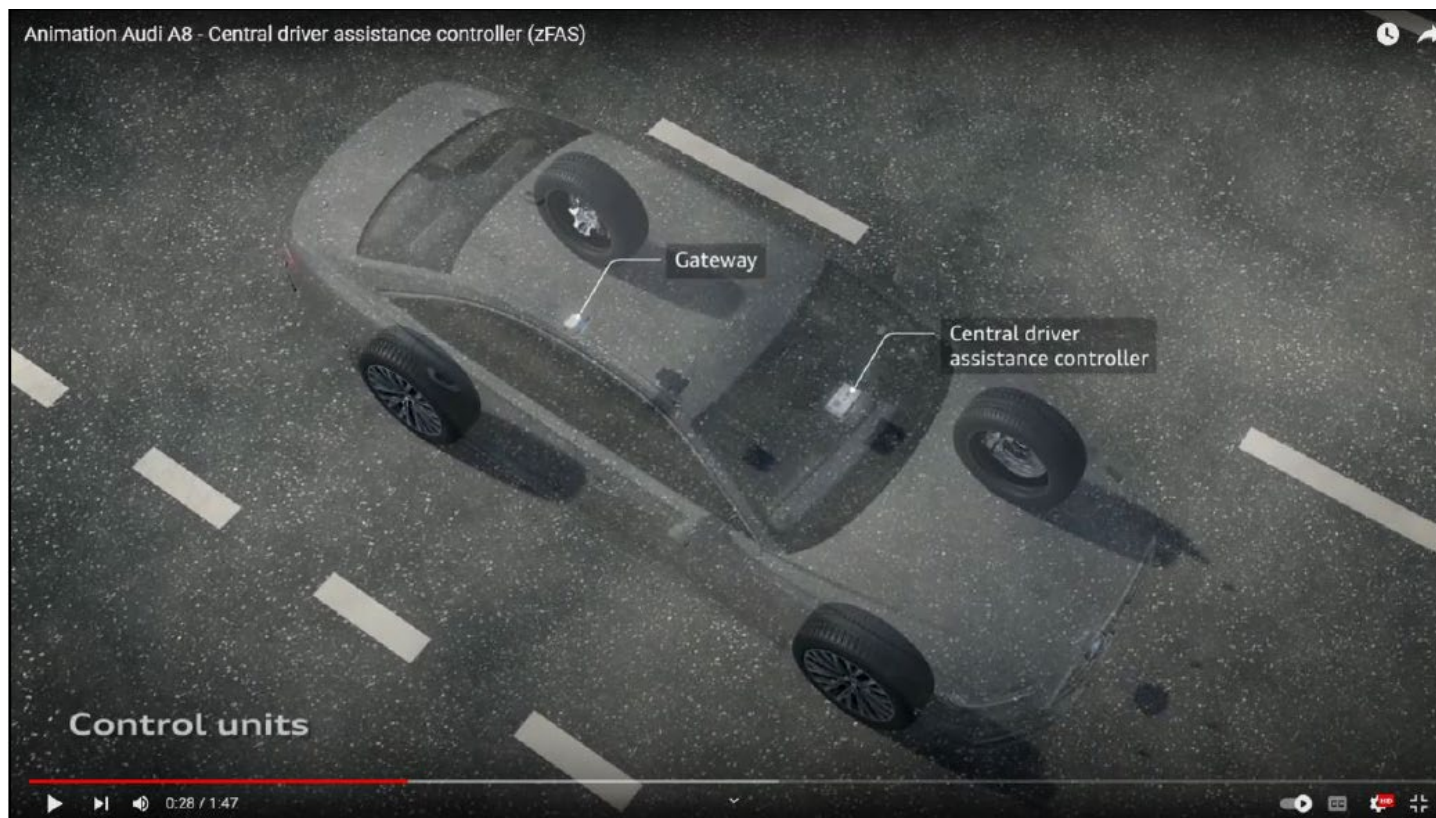
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	images of the object. The first imaging technique can be a radiation attenuation technique and said second imaging technique is a radiation emission technique. LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant product testing/teardown is provided.
6. The method of claim 1, further comprising: spatially-synchronizing the plurality of first images and the plurality of second images using said plurality of first measurements and said plurality of second measurements.	Each Volkswagen Accused Product performs the method of claim 1, further comprising: spatially-synchronizing the plurality of first images and the plurality of second images using said plurality of first measurements and said plurality of second measurements. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claims 1 and 4.</i> For example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can collect data from the 360-degree environment cameras, Front camera, Ultrasonic and Long-range/Mid-range Radar sensors to form images of the object. The Central Driver Assistance Controller can spatially synchronize the plurality of first images and the plurality of second images using said plurality of first measurements and said plurality of second measurements to form the images of the object. By way of further example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can collect data from the Laser scanner, Front camera, Ultrasonic and Long-range/Mid-range Radar sensors to form images of the object. The Central Driver Assistance Controller can spatially synchronize the plurality of first images and the plurality of second images using said plurality of first measurements and said plurality of second measurements to form the images of the object. By way of further example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can collect data from the 360-degree environment cameras, Front camera, Ultrasonic and a Vehicle Speed Sensor to form images of the object. The Central Driver Assistance Controller can spatially synchronize the plurality of first images and the plurality of second images using said plurality of first measurements and said plurality of second measurements to form the images of the object.

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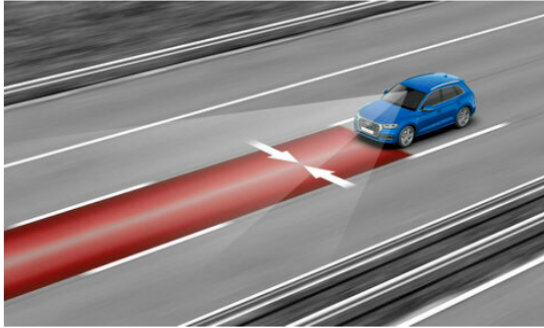
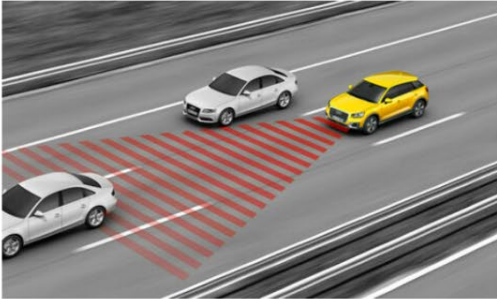
Claim	Support
	LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant product testing/teardown is provided.
7. The method of claim 1, further comprising: forming displacement fields corresponding, respectively, to said plurality of first images, said plurality of first measurements, said plurality of second images, and said plurality of second measurements.	Each Volkswagen Accused Product performs the method of claim, further comprising: forming displacement fields corresponding, respectively, to said plurality of first images, said plurality of first measurements, said plurality of second images, and said plurality of second measurements. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claims 1 and 4.</i> For example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system can form displacement fields corresponding to the plurality of first images (e.g., 360-degree camera data), the plurality of first measurements (e.g., Ultrasonic sensor data), the plurality of second images (e.g., Front camera data), and the plurality of second measurements (e.g., Long-range/Mid-range Radar sensor data). The Central Driver Assistance Controller can form these displacement fields by estimating the movement of the mobile object in real-time based on the data collected from the 360-degree environment cameras, Front camera, Ultrasonic sensors and Radar sensors. The Central Driver Assistance Controller can use the displacement fields to perform active safety technology functions such as Active Lane assist, Adaptive cruise control with Stop-and-Go function, Parking system plus and Collision avoidance assist. By way of further example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system can form displacement fields corresponding to the plurality of first images (e.g., 360-degree camera data), the plurality of first measurements (e.g., Ultrasonic sensor data), the plurality of second images (e.g., Front camera data), and the plurality of second measurements (e.g., Vehicle Speed Sensor data). The Central Driver Assistance Controller can form these displacement fields by estimating the movement of the mobile object in real-time based on the data collected from the 360-degree environment cameras, Front camera, Ultrasonic sensors and Vehicle Speed Sensor. The Central Driver Assistance Controller can use the displacement fields to perform active safety technology functions such as Adaptive cruise control with Stop-and-Go function, Parking system plus and Collision avoidance assist.

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Source: <https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke>

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Claim	Support
	A blue car is shown driving on a road. A red line is projected on the road surface, indicating the lane assist system's detection of the lane boundaries. The car is positioned within this red line. Audi active lane assist Operating at speeds from 65 km/h (40.4 mph), Audi active lane assist helps the driver keep the vehicle in the driving lane. A camera detects lane lines and the track that the car is following between them. In this process, the camera can distinguish between yellow lines in construction zones and standard white markings. If the car approaches a line without the turn signal being activated, the system helps the driver to steer back into the lane by means of gentle but noticeable interventions in the electromechanical power steering. In the MMI system, the driver sets how early the control intervention should occur. In the case of an early steering intervention point, the system guides the driver towards the middle of the lane by gentle, centering steering interventions. With a late steering intervention point, Audi active lane assist does not intervene until shortly before the detected lane marking might be crossed; then it gives a corrective steering intervention in the proper direction. In addition, the driver may choose to be warned by a vibration of the steering wheel when crossing detected lane markings. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 Two cars are shown on a road. The car in front is white, and the car behind is yellow. Red lines emanate from the front car, representing the radar waves used by the adaptive cruise control system to detect the distance to the vehicle ahead. Adaptive cruise control (with Stop&Go function) Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a preset distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select. The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above. When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings.

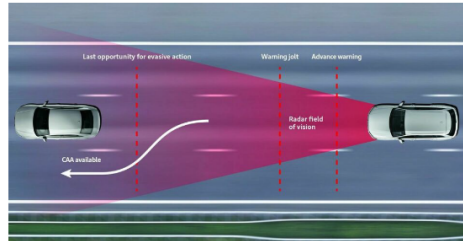
Appendix D: Claim Chart for U.S. Patent 8,265,353

Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z

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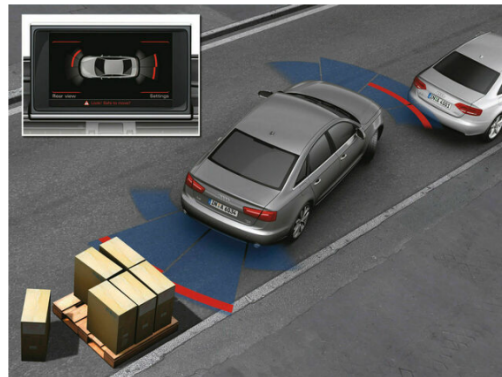


Collision avoidance assist

Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster.

First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



Parking system plus

Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop.

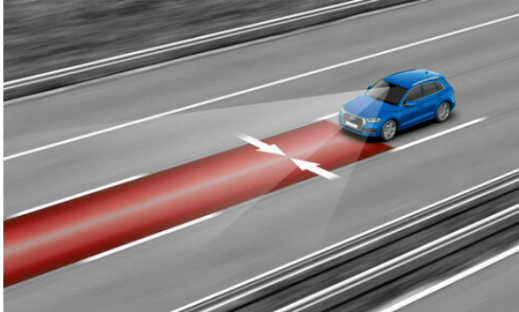
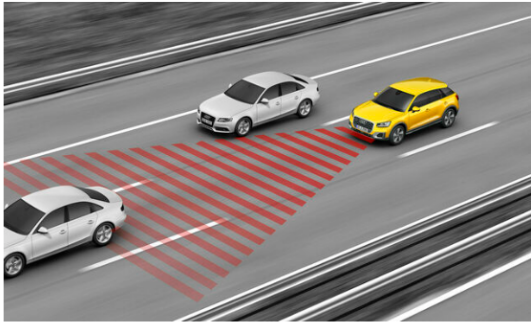
Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

By way of further example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system can form displacement fields corresponding to the plurality of first images (e.g., Laser scanner data), the plurality of first measurements (e.g., Ultrasonic sensor data), the plurality of second images (e.g., Front camera data), and the plurality of second measurements

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Claim	Support
	(e.g., Long-range/Mid-range Radar sensor data). The Central Driver Assistance Controller can form these displacement fields by estimating the movement of the mobile object in real-time based on the data collected from the Laser scanner, Front camera, Ultrasonic sensors and Radar sensors. The Central Driver Assistance Controller can use the displacement fields to perform active safety technology functions such as Adaptive cruise control with Stop-and-Go function, Adaptive cruise assist, and Collision avoidance assist. Laser scanner Together with the long-range radar and the front camera, the laser scanner forms a trio of sensors with various strengths that complement each other. It is these sensors and the central driver assistance controller (zFAS), which generates an image of the surroundings from all the sensor data, that make automated driving possible in the first place. The laser scanner covers a field approximately 80 meters (262.5 ft) long, with an opening angle of 145 degrees. The roughly fist-sized component is mounted in the front bumper and, regardless of speed, emits moderated pulses of light on multiple vertical levels, which a mirror scatters in the shape of a fan. Having a wave length in the near-infrared range, the extremely short flashes of light are invisible and harmless to the human eye. They are reflected by objects in front of the car and return to the laser scanner in less than one microsecond, where photo diodes detect them. The result is a detailed, deeply contoured, static image of the surroundings. The laser scanner displays other vehicles as measured cuboids, and it also measures such information as distance and orientation, which it distributes to the partner control units. With its large horizontal aperture, it detects cars entering the lane very early. Detailed information about structures on the side of the road, such as guardrails, round out the spectrum. Like radar, the laser scanner also works in the dark. Automatic cleaning and heating of the covering panel keep it operational even in inclement weather and spray as long as the conditions aren't too extreme. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

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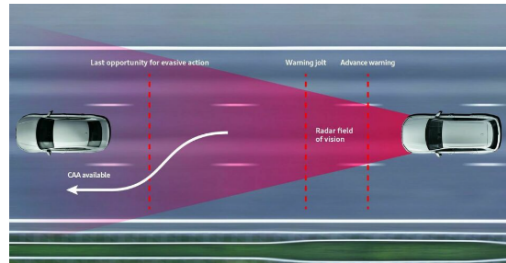
Claim	Support
	A blue car is shown driving on a road. A red line is projected on the road surface, indicating the lane assist system's detection of the lane boundaries. The car is positioned within this red line. Audi active lane assist Operating at speeds from 65 km/h (40.4 mph), Audi active lane assist helps the driver keep the vehicle in the driving lane. A camera detects lane lines and the track that the car is following between them. In this process, the camera can distinguish between yellow lines in construction zones and standard white markings. If the car approaches a line without the turn signal being activated, the system helps the driver to steer back into the lane by means of gentle but noticeable interventions in the electromechanical power steering. In the MMI system, the driver sets how early the control intervention should occur. In the case of an early steering intervention point, the system guides the driver towards the middle of the lane by gentle, centering steering interventions. With a late steering intervention point, Audi active lane assist does not intervene until shortly before the detected lane marking might be crossed; then it gives a corrective steering intervention in the proper direction. In addition, the driver may choose to be warned by a vibration of the steering wheel when crossing detected lane markings. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184
	Three cars are shown on a road. The car in the foreground is white, and the car in the middle is yellow. Red radar waves are shown emanating from the front car, indicating the adaptive cruise control system's detection of vehicles ahead. Adaptive cruise control (with Stop&Go function) Adaptive cruise control (ACC) offers relief to drivers especially on long trips and in stop-and-go traffic. It maintains a pre-set distance to the vehicle ahead by automatically accelerating and braking. The driver can choose from five distance levels and adjust acceleration and control system dynamics with Audi drive select. The system uses radar sensors and a front camera. They detect vehicles ahead and measure the distance to them. In interplay with S tronic or tiptronic, the system covers the entire speed range from 0 to 250 km/h (155.3 mph). With a manual transmission, it starts at 30 km/h (18.6 mph). When the system is deactivated, the distance indicator shows the distance to the car ahead and warns drivers when they are tailgating. Its operating speed range is 60 km/h (37.3 mph) and above. When combined with S tronic or tiptronic, ACC also includes the Stop&Go function. In heavy traffic, it autonomously decelerates the car to a stop. After a brief stop, it automatically resumes driving, following the vehicle ahead. After a longer stop, the driver must tap the accelerator pedal or the control stalk on the steering column. In addition to the radar sensors and front camera, ultrasonic sensors also monitor the vehicle's immediate surroundings. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184

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Source: https://youtu.be/7WOHL_J56E0?si=wYlr9n-2YNv4uu-z

Appendix D: Claim Chart for U.S. Patent 8,265,353

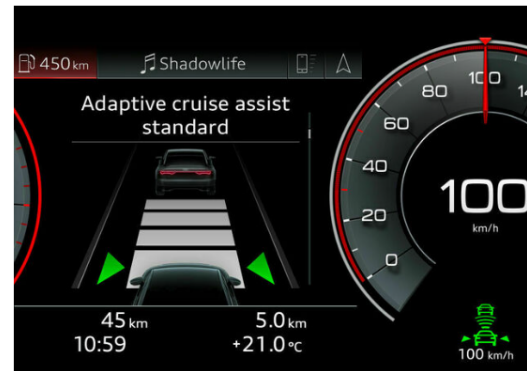


Collision avoidance assist

Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster.

First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>



Adaptive cruise assist

The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle's surroundings.

Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches.

The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again.

Source: <https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

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Claim	Support
	LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
8. The method of claim 7, wherein said forming an image of the mobile object comprises combining said displacement fields.	Each Volkswagen Accused Product performs the method of claim 7, wherein said forming an image of the mobile object comprises combining said displacement fields. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claims 1, 4, and 7.</i> For example, the Audi A8 collects data corresponding to displacement fields from the 360-degree environment cameras, Front cameras, Ultrasonic sensors and Long-rang/Mid-range Radar sensors can be combined and used to form an image of the mobile object that is displayed on the multimedia interface display. By way of further example, the Audi A8 collects data corresponding to displacement fields from the Laser scanner, Front cameras, Ultrasonic sensors and Long-rang/Mid-range Radar sensors can be combined and used to form an image of the mobile object that is displayed on the multimedia interface display. By way of further example, the Audi A8 collects data corresponding to displacement fields from the 360-degree environment cameras, Front cameras, Ultrasonic sensors and Vehicle Speed Sensor can be combined and used to form an image of the mobile object that is displayed on the multimedia interface display. LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
9. The method of claim 7, wherein said forming displacement fields comprises: estimating movement of the	Each Volkswagen Accused Product performs the method of claim 7, wherein said forming displacement fields comprises: estimating the movement of the mobile object based, respectively, on said plurality of first images, said plurality of second images, said plurality of first measurements, and said plurality of second measurements, in order to form said displacement fields This element is infringed literally, or in the alternative, under the doctrine of equivalents.

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Claim	Support
mobile object based, respectively, on said plurality of first images, said plurality of second images, said plurality of first measurements, and said plurality of second measurements, in order to form said displacement fields.	<i>See supporting evidence for claims 1, 4, and 7.</i> For example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system can form the displacement field based on the movement of the mobile object based, respectively, on plurality of first images (e.g., captured from 360-degree camera), plurality of second images (e.g., captured from front camera), plurality of first measurements (e.g., data from Ultrasonic sensors) and plurality of second measurements (e.g., data from Long-range/Mid-range Radar sensors), in order to form displacement fields. By way of further example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system can form the displacement field based on the movement of the mobile object based, respectively, on plurality of first images (e.g., captured from Laser scanner), plurality of second images (e.g., captured from front camera), plurality of first measurements (e.g., data from Ultrasonic sensors) and plurality of second measurements (e.g., data from Long-range/Mid-range Radar sensors), in order to form displacement fields. By way of further example, the Audi A8's Central Driver Assistance Controller utilized by the Audi Pre Sense system can form the displacement field based on the movement of the mobile object based, respectively, on plurality of first images (e.g., captured from 360-degree camera), plurality of second images (e.g., captured from front camera), plurality of first measurements (e.g., data from Ultrasonic sensors) and plurality of second measurements (e.g., data from Vehicle Speed Sensor), in order to form displacement fields. LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
10. The method of claim 9, wherein at least one of said movement estimates is formed relative to a reference time.	Each Volkswagen Accused Product performs the method of claim 9, wherein at least one of said movement estimates is formed relative to a reference time. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claims 1, 7, and 9.</i> For example, the Audi Pre Sense system equipped in the Audi A8's has a Collision avoidance assist feature that can use the Front camera to detect movement of vehicles and obstructions in front of the vehicle. When the driver is nearing a vehicle or

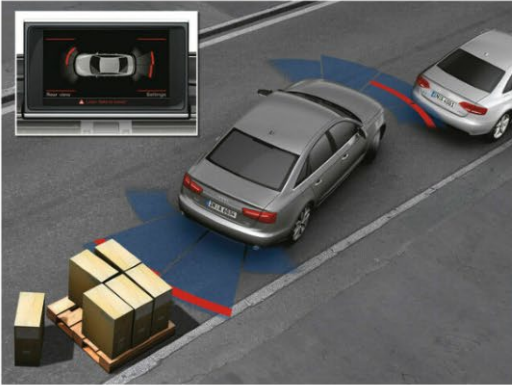
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	obstructions, the system can operate the emergency braking and adjust the steering to correct the drivers' steering. The system can estimate the movement of the vehicle relative to a reference time (e.g., the pattern of driving during a period of driving). By way of further example, the Audi Pre Sense system equipped in the Audi A8's has a Collision avoidance assist feature that can use the Front camera to detect movement of vehicles and obstructions in front of the vehicle. When the driver is nearing a vehicle or obstructions, the system can operate the emergency braking and adjust the steering to correct the drivers' steering. The system can estimate the movement of the vehicle relative to a reference time (e.g., the pattern of driving during a period of driving). By way of further example, the Audi Pre Sense system equipped in the accused Audi A8's has a Collision avoidance assist feature that can use the Front camera to detect movement of vehicles and obstructions in front of the vehicle. When the driver is nearing a vehicle or obstructions, the system can operate the emergency braking and adjust the steering to correct the drivers' steering. The system can estimate the movement of the vehicle relative to a reference time (e.g., the pattern of driving during a period of driving). LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
11. The method of claim 1, wherein the first sensor system is different from the second sensor system.	Each Volkswagen Accused Product performs the method of claim 1, wherein the first sensor system is different from the second sensor system. This element is infringed literally, or in the alternative, under the doctrine of equivalents. For example, the Audi Pre Sense system equipped in the Audi A8 can use a first sensor system (e.g., Ultrasonic sensors) which is different from the second sensor system (e.g., Long-range/Mid-range Radar sensors). For example, the Ultrasonic sensors are placed at the front, and rear bumpers of the vehicle and employ sound waves to detect and locate objects by emitting ultrasonic waves that are reflected off obstructions and by analysing returning ultrasonic waves, allowing for calculations of distance, size, and object shapes within its path.

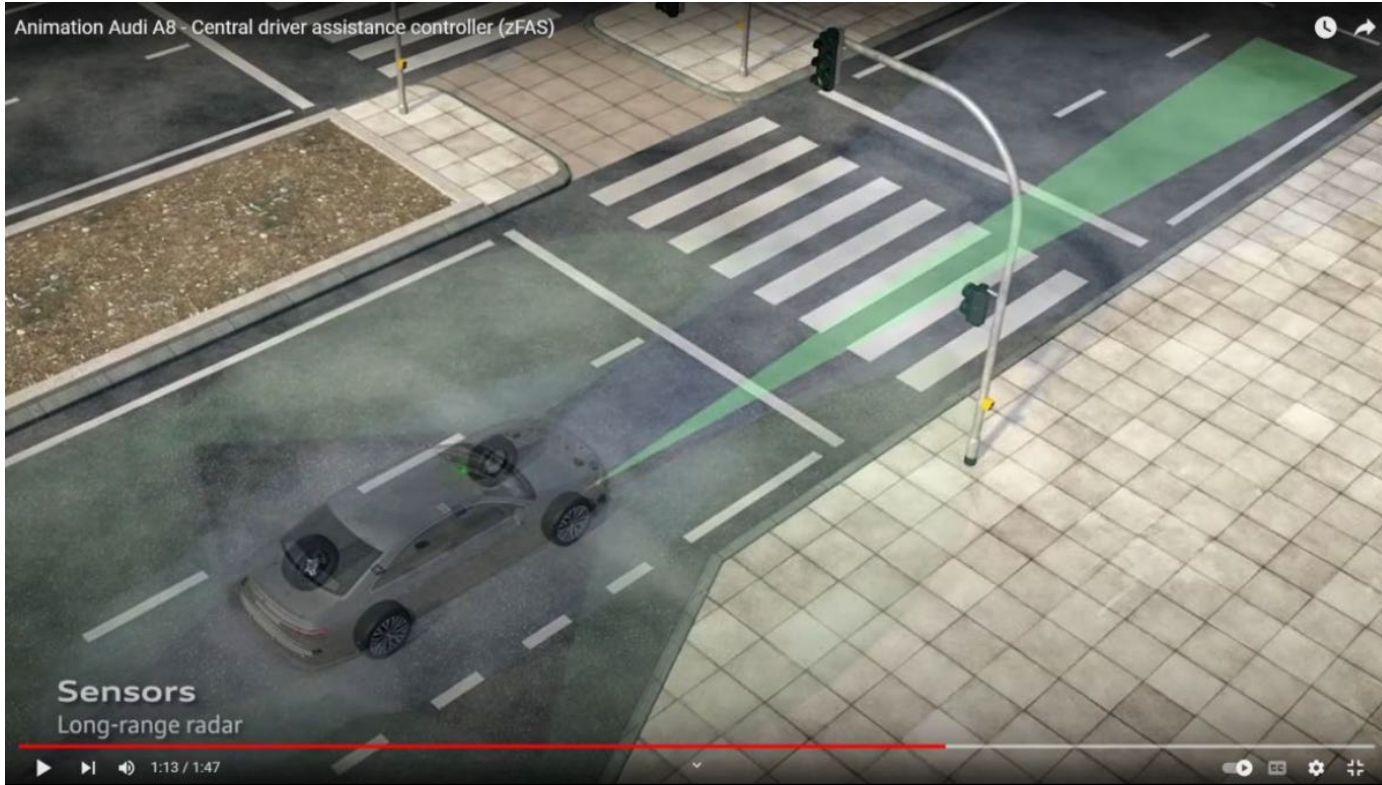
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Animation Audi A8 - Central driver assistance controller (zFAS)  Sensors Ultrasonic 0:49 / 1:47 Source: https://youtu.be/kKbS3KmjDOg?si=KPbUIK2htWvoZ6ke

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Claim	Support
	A diagram showing a silver sedan in a parking lot. Blue sensor waves emanate from the front and rear of the car. A white segment on the rear sensor wave indicates a detected object (a pallet of boxes) outside the driving path. Red segments on the front and rear sensor waves indicate detected objects within the driving path. An inset image shows a car's infotainment screen displaying a top-down view of the car with red and white sensor arcs. Parking system plus Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 For example, the Long-range/Mid-range Radar sensor is placed at the front and back of the vehicle and employs radio waves to track and detect objects in the vehicle's path, enabling collision avoidance, vehicle, and object detection.

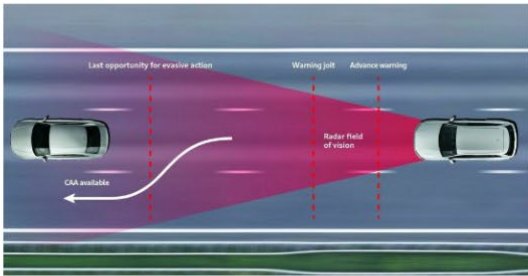
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Animation Audi A8 - Central driver assistance controller (zFAS)  Sensors Long-range radar 1:13 / 1:47 Source: https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY

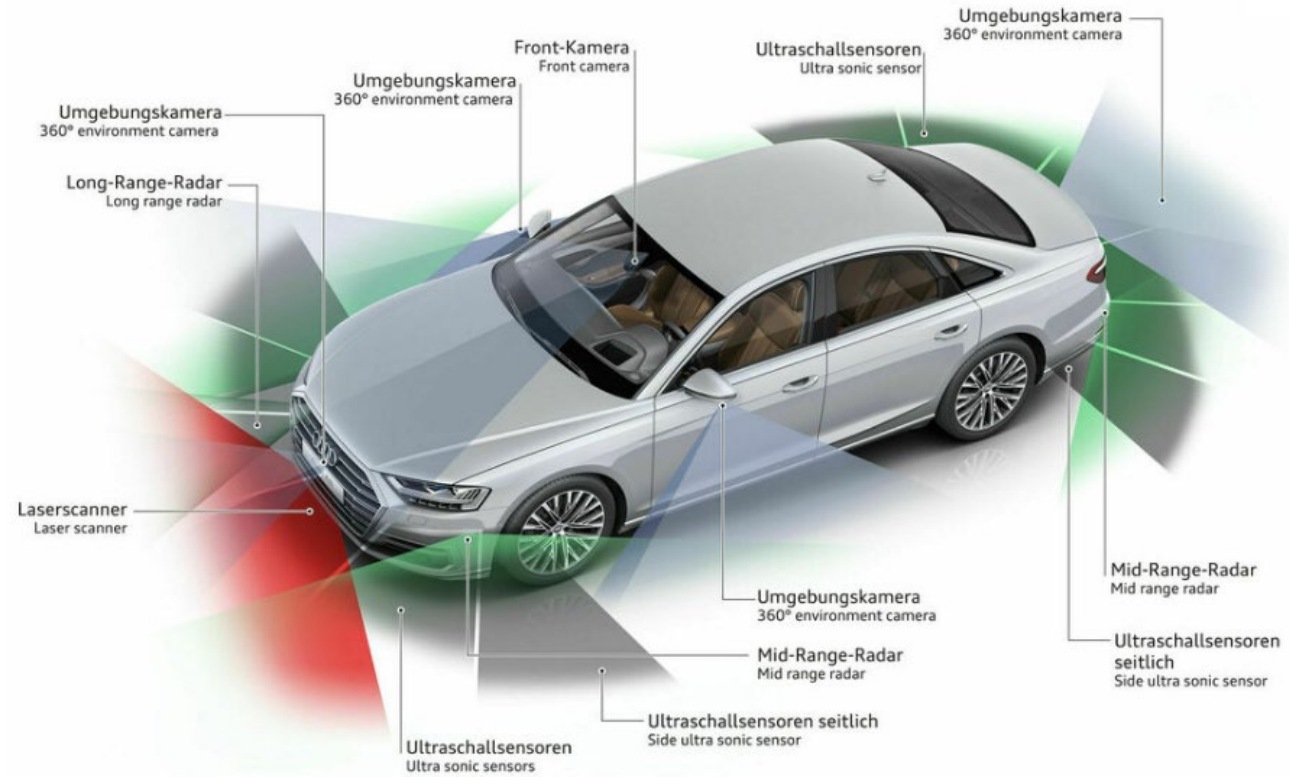
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	Animation Audi A8 - Central driver assistance controller (zFAS)  Sensors Mid-range radar 1:00 / 1:47 Source: https://youtu.be/kKbS3KmjDOg?si=QY9a6gyr1tSAvCAY

Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Collision avoidance assist Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster. First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 By way of further example, the Audi Pre Sense system equipped in the Audi A8 can use a first sensor system (e.g., Ultrasonic sensors) which is different from the second sensor system (e.g., Long-range/Mid-range Radar sensors). For example, the Ultrasonic sensors are placed at the front, and rear bumpers of the vehicle and employ sound waves to detect and locate objects by emitting ultrasonic waves that are reflected off obstructions and by analysing returning ultrasonic waves, allowing for calculations of distance, size, and object shapes within its path.

Appendix D: Claim Chart for U.S. Patent 8,265,353

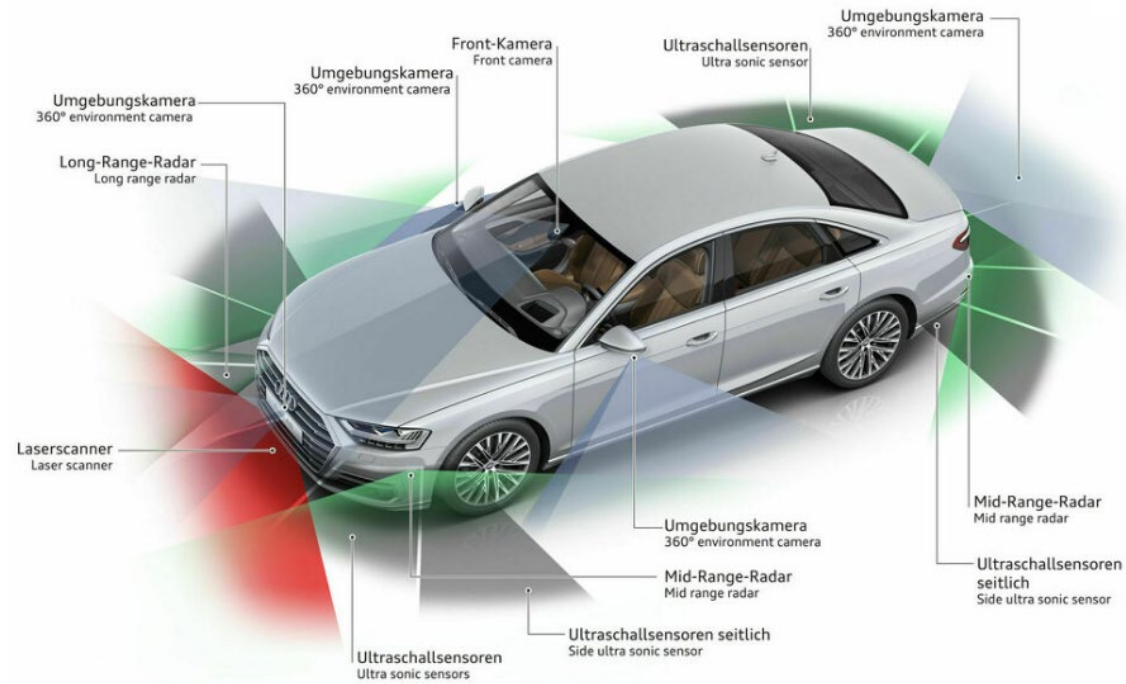


Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

Appendix D: Claim Chart for U.S. Patent 8,265,353

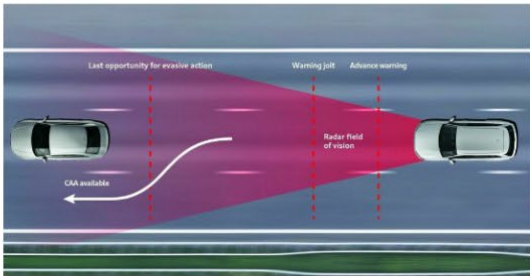
Claim	Support
	Adaptive cruise assist The adaptive cruise assist (ACA) assists the driver with longitudinal and lateral control over the entire speed range – substantially enhancing comfort on long journeys, in particular. It incorporates the functions of adaptive cruise control, traffic jam assist and active lane assist. Depending on the model, the ACA uses the radar sensor in the nose of the vehicle, the laser scanner, the front camera and the ultrasonic sensors to permanently monitor the vehicle's surroundings. Depending on the sensor set, the system detects lane markings, roadside structures, vehicles in adjacent lanes and vehicles driving ahead. The ACA uses this information to derive a virtual vehicle path and “guides” the vehicle within it. The system also includes helpful steering intervention so that the vehicle remains in the center of the lane. In some models based on the modular longitudinal platform, the system uses also the laser scanner: The ACA detects if the lane is too narrow to allow side-by-side driving and enables offset driving through narrow stretches. The adaptive cruise assist maintains proper speed and following distance via targeted acceleration and braking. The car automatically adapts its speed to the traffic situation and the route, for example at curves and cross-ways. In stop-and-go traffic as well as traffic jam situations, the ACA can bring the car to a complete stop. Depending on the duration of the stop, the car can start automatically again. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 For example, the Long-range/Mid-range Radar sensor is placed at the front and back of the vehicle and employs radio waves to track and detect objects in the vehicle's path, enabling collision avoidance, vehicle, and object detection.

Appendix D: Claim Chart for U.S. Patent 8,265,353

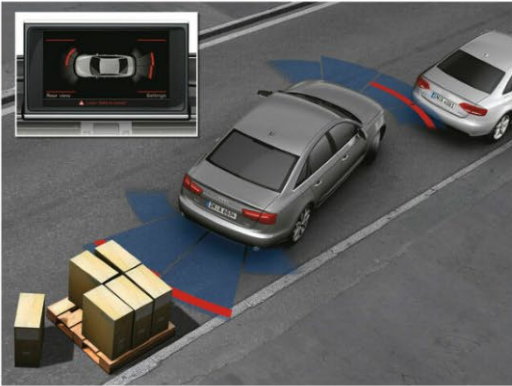


Source: <https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184>

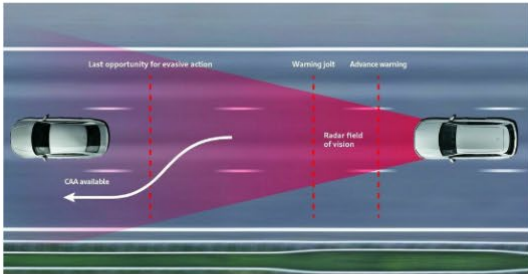
Appendix D: Claim Chart for U.S. Patent 8,265,353

Claim	Support
	 Collision avoidance assist Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster. First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course. Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 By way of further example, the Audi Pre Sense system in the accused Audi A8 can use a first sensor system (e.g., Ultrasonic sensors) which is different from the second sensor system (e.g., Vehicle Speed Sensor). For example, the Ultrasonic sensors are placed at the front, and rear bumpers of the vehicle and employ sound waves to detect and locate objects by emitting ultrasonic waves that are reflected off obstructions and by analysing returning ultrasonic waves, allowing for calculations of distance, size, and object shapes within its path.

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Claim	Support
	 Parking system plus Parking system plus informs the driver, visually and audibly, about obstacles in front of and behind the vehicle. The warnings are made when the distance to a detected object in the path of driving is less than 90 cm (35.4 in) – depending on the specific model – after the driver has engaged reverse gear and activated the system by pushing a button on the center console. Ultrasonic sensors inconspicuously integrated into the bumpers measure the distance. The MMI display depicts it visually. A white segment shows a detected object outside of the driving path. Red segments represent detected objects within the driving path. The virtual driving path display also shows lateral guide lines which are precalculated based on the currently selected steering input and thereby assists in convenient parking and exiting. Increasing frequency of the audible warning indicates that the distance to the obstacle is decreasing. At around 30 cm (11.8 in) distance to the detected object, the driver hears a constant tone – the signal to stop. Source: https://www.audi-mediacenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 For example, the Vehicle Speed Sensor (VSS) monitors the car's speed. This data is used for functions such as adaptive cruise control, anti-lock braking, and traction control, enabling the vehicle to adjust acceleration, braking, and stability systems with precision. For example, data from the Vehicle Speed Sensor transmits the odometric data such as car's speed via the FlexRay Bus and along with other data, is used in constructing the perception model of the environment, including the image of the mobile object.

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Claim	Support
	› Provides the current vehicle speed to the FlexRay bus. › Is responsible for the vehicle's braking and stop management system. The function of the stop management system is to keep the stationary vehicle at a standstill. After the ESC has kept the vehicle at a standstill for three minutes, the electrical parking brake is actuated in order to protect the brake system components against overheating. Source: https://static.nhtsa.gov/odi/tsbs/2018/MC-10144686-9999.pdf  The diagram illustrates the Collision Avoidance Assist (CAA) system. It shows a vehicle from a top-down perspective on a road. A red cone represents the 'Radar field of vision' extending forward. A white curved line indicates the 'Last opportunity for evasive action'. A dashed line marks the 'Warning jolt' point. A solid line marks the 'Advance warning' point. A label 'CAA available' with an arrow points to the left side of the vehicle. The background shows a road with lane markings and a green field. Collision avoidance assist Collision avoidance assist helps the driver steer around an obstacle in a critical situation. The system uses data from the two radar sensors and the front camera for this purpose. In calculating a suitable evasive maneuver corridor, it takes into account the distance, width and offset of the vehicle driving ahead. Collision avoidance assist is available over a speed range from approx. 30 to 150 km/h (18.6 to 93.2 mph), and it assumes that the driver is actively steering throughout the maneuver. The driver is informed of the intervention by an indicator in the instrument cluster. First, a jolt is produced to warn the driver of the hazard. If the driver then actively avoids the obstacle, the assistant applies a slight steering torque that helps by correcting the driver's steering input or helping to make a lane change. Models like the Audi A8 (2017) use a specific braking of individual wheels – with it the vehicle is made to follow the computed course.

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Claim	Support
	Source: https://www.audi-mediacycenter.com/en/audi-technology-lexicon-7180/driver-assistance-systems-7184 LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[Pre]. An apparatus to form an image of a mobile object, comprising:	The Volkswagen Accused Product infringe directly and/or indirectly by providing a system comprising: an apparatus to form an image of a mobile object. This is a non-limiting preamble. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim is a mean-plus-function claim governed by 35 U.S.C. § 112(6). The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:3-20; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; 7:59-63; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claim 1[Pre].</i> For example, Audi A8 is equipped with Audi’s Pre Sense system which is a driver assist system with a network of advanced safety and driver support features, such as, but not limited to Seatbelt Pretension, Window and Sunroof closure, Hazard Warning Lights, Breaking Assistance, Rear-end Collision Alert Signal (RECAS), Optimizing seating position, Parking system plus, Turn assist, Adaptive cruise control with Stop&Go function, Adaptive cruise assist, Hold assist, Active lane assist, Exit warning, Collision Avoidance assist, Curb warning, Multicollision brake assist, Parking System – rear, Parking system plus, Cruise control, Crossing assist, Park assist, laser scanner 360 environment cameras, Front camera, Radar sensors, and Ultrasonic sensors.

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Claim	Support
	For example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can process data from sensors and cameras on the vehicle, which allows the Audi A8 to form an image of a mobile object. (e.g., create an image of the moving environment) By way of further example, the Audi A8 is equipped with Audi's Pre Sense system which is a driver assist system with a network of advanced safety and driver support features, such as, but not limited to Seatbelt Pretension, Window and Sunroof closure, Hazard Warning Lights, Breaking Assistance, Rear-end Collision Alert Signal (RECAS), Optimizing seating position, Parking system plus, Turn assist, Adaptive cruise control with Stop & Go function, Adaptive cruise assist, Hold assist, Active lane assist, Exit warning, Collision Avoidance assist, Curb warning, Multicollision brake assist, Parking System – Rear, Parking system plus, Cruise control, Crossing assist, Park assist, laser scanner, Front camera, Radar sensors, and Ultrasonic sensors. For example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can process data from sensors and cameras on the vehicle, which allows the Audi A8 to form an image of a mobile object. (e.g., create an image of the moving environment). By way of further example, the Audi A8 equipped with Audi's Pre Sense system which is a driver assist system with a network of advanced safety and driver support features, such as, but not limited to Seatbelt Pretension, Window and Sunroof closure, Hazard Warning Lights, Breaking Assistance, Rear-end Collision Alert Signal (RECAS), Optimizing seating position, Parking system plus, Turn assist, Adaptive cruise control with Stop&Go function, Adaptive cruise assist, Hold assist, Active lane assist, Exit warning, Collision Avoidance assist, Curb warning, Multicollision brake assist, Parking System – rear, Parking system plus, Cruise control, Crossing assist, Park assist, laser scanner 360 environment cameras, Front camera, Vehicle Speed Sensor, and Ultrasonic sensors. For example, the Audi Pre Sense system utilizes the Audi A8's Central Driver Assistance Controller that can process data from sensors and cameras on the vehicle, which allows the Audi A8 to form an image of a mobile object. (e.g., create an image of the moving environment)
12[a]. means for obtaining a plurality of first images of the mobile object using a	Each Volkswagen Accused Product comprises a means for obtaining a plurality of first images of the mobile object using a first imaging technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents.

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Claim	Support
first imaging technique;	This claim limitation is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “obtaining a plurality of first images of the mobile object using a first imaging technique”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:3-20; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; 7:59-63; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claim 1(a).</i> For example, the Audi Pre Sense system equipped in the Audi A8 utilizes Audi A8’s Central Driver Assistance Controller to obtain and process data of a plurality of first images of the mobile object using a first imaging technique (e.g., 360-degree camera). By way of further example, the Audi Pre Sense system equipped in the Audi A8 utilizes Audi A8’s Central Driver Assistance Controller to obtain and process data of a plurality of first images of the mobile object using a first imaging technique (e.g., Laser scanner). By way of further, the Audi Pre Sense system in the Audi A8 utilizes Audi A8’s Central Driver Assistance Controller to obtain and process data of a plurality of first images of the mobile object using a first imaging technique (e.g., 360-degree camera). LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[b]. means for obtaining a plurality of first measurements corresponding to movements of the mobile object while obtaining the plurality of first	Each Volkswagen Accused Product comprises a means for obtaining a plurality of first measurements corresponding to movements of the mobile object while obtaining the plurality of first images, the means for obtaining the plurality of first measurements being independent from the first imaging technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim limitation is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The functions are “obtaining a plurality of first measurements corresponding to movements of the mobile object while obtaining the plurality of first images” and

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Claim	Support
images, the means for obtaining the plurality of first measurements being independent from the first imaging technique;	“obtaining the plurality of first measurements being independent from the first imaging technique”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:3-20; 3:27-48; 4:3-23; 4:28-41; 5:15-6:58; 6:60-48; 7:59-63; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claim 1(a).</i> For example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8’s Central Driver Assistance Controller to obtain and process data of a plurality of first images of the mobile object using a first imaging technique (e.g., 360-degree camera). For example, the Audi Pre Sense system can use a first sensor system (e.g., Ultrasonic sensors) to obtain a plurality of first measurements corresponding to movements of the mobile object. The first sensor system (e.g., Ultrasonic sensors) is independent from the first imaging technique (e.g., 360-degree environment cameras). By way of further example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8’s Central Driver Assistance Controller to obtain and process data of a plurality of first images of the mobile object using a first imaging technique (e.g., Laser scanner). For example, the Audi Pre Sense system can use a first sensor system (e.g., Ultrasonic sensors) to obtain a plurality of first measurements corresponding to movements of the mobile object. The first sensor system (e.g., Ultrasonic sensors) is independent from the first imaging technique (e.g., Laser scanner). LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[c]. means for associating the plurality of first	Each Volkswagen Accused Product comprises a means for associating the plurality of first images with first movement states of the mobile object, the first movement states being determined by the first measurements.

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Claim	Support
images with first movement states of the mobile object, the first movement states being determined by the first measurements;	This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim limitation is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “associating the plurality of first images with first movement states of the mobile object, the first movement states being determined by the first measurements”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claim 1(b).</i> For example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8’s Central Driver Assistance Controller to associate the plurality of first images (e.g., images captured from the 360-degree environment cameras) with the first movement states of the mobile object using the first measurements (e.g., data collected from the Ultrasonic sensors). By way of further example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8’s Central Driver Assistance Controller to associate the plurality of first images (e.g., images captured from the Laser scanner) with the first movement states of the mobile object using the first measurements (e.g., data collected from the Ultrasonic sensors). LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[d]. means for obtaining a plurality of second images of the mobile object using a second imaging technique;	Each Volkswagen Accused Product comprises a means for obtaining a plurality of second images of the mobile object using a second imaging technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim limitation is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “obtaining a plurality of second images of the mobile object using a second imaging technique”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2;

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Claim	Support
	3:3-20; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; 7:59-63; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claim 1(c).</i> For example, the Audi Pre Sense system equipped in the Audi A8 can use a second imaging technique (e.g., Front camera) to obtain a plurality of second images of the mobile object. By way of further example, the Audi Pre Sense system equipped in the Audi A8 can use a second imaging technique (e.g., Front camera) to obtain a plurality of second images of the mobile object. LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[e]. means for obtaining a plurality of second measurements corresponding to movements of the mobile object while obtaining the plurality of second images, the means for obtaining the plurality of second measurements being independent from the second imaging technique;	Each Volkswagen Accused Product comprises a means for obtaining a plurality of second measurements corresponding to movements of the mobile object while obtaining the plurality of second images, the means for obtaining the plurality of second measurements being independent from the second imaging technique This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim limitation is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “obtaining a plurality of second measurements corresponding to movements of the mobile object while obtaining the plurality of second images, the means for obtaining the plurality of second measurements being independent from the second imaging technique”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:3-20; 3:27-48; 4:3-23; 4:28-41; 5:15-6:58; 6:60-48; 7:59-63; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code.

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Claim	Support
	<i>See supporting evidence for claim 1(c).</i> For example, the Audi Pre Sense system equipped in the Audi A8 can use a second imaging technique to obtain a plurality of second images of the mobile object. Further, the Audi Pre Sense system can use a second sensor system (e.g., Long-range/Mid-range Radar sensors) to obtain a plurality of second measurements corresponding to the movements of the mobile object. The second sensor system (e.g., Long-range/Mid-range Radar sensors) is independent from the second imaging technique (e.g., Front camera). The Front camera and Radar sensors are used in the Collision avoidance assist feature. By way of further example, the Audi Pre Sense system equipped in the Audi A8 can use a second imaging technique to obtain a plurality of second images of the mobile object. Further, the Audi Pre Sense system can use a second sensor system (e.g., Long-range/Mid-range Radar sensors) to obtain a plurality of second measurements corresponding to the movements of the mobile object. The second sensor system (e.g., Long-range/Mid-range Radar sensors) is independent from the second imaging technique (e.g., Front camera). The Front camera and Radar sensors are used in the Collision avoidance assist feature. By way of further example, the Audi Pre Sense system equipped in the Audi A8 can use a second imaging technique to obtain a plurality of second images of the mobile object. Further, the Audi Pre Sense system can use a second sensor system (e.g., Vehicle Speed Sensor) to obtain a plurality of second measurements corresponding to the movements of the mobile object. The second sensor system (e.g., Vehicle Speed Sensor) is independent from the second imaging technique (e.g., Front camera). The Front camera and Vehicle Speed Sensor are used in the Collision avoidance assist feature. LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[f]. means for associating the plurality of second images with second movement states of the mobile object, the second movement states being determined by the	Each Volkswagen Accused Product comprises a means for associating the plurality of second images with second movement states of the mobile object, the second movement states being determined by the second measurements. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim limitation is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “associating the plurality of second images with second movement states of the mobile object, the second movement states being determined by the second measurements”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; and/or hardware

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second measurements; and	and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claim 1(d).</i> For example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate the plurality of second images (e.g., images captured from the Front camera) with the second movement states of the mobile object (e.g., data collected from the Long-range/Mid-range Radar sensors) determined by the data of Radar sensors to provide driver assist features such as Active lane assist, Adaptive cruise control with Stop-and-Go function. Both of these features rely on data from the Front camera and Radar sensors to detect traffic lanes and provide cruise control. The Central Driver Assistance Controller coordinates can associate data from the Front camera, and Radar sensors to visualize the vehicle, traffic lanes, and distance level to the car ahead on the multimedia interface display. By way of further example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate the plurality of second images (e.g., images captured from the Front camera) with the second movement states of the mobile object (e.g., data collected from the Long-range/Mid-range Radar sensors) determined by the data of Radar sensors to provide driver assist features such as Active lane assist, Adaptive cruise control with Stop-and-Go function. Both of these features rely on data from the Front camera and Radar sensors to detect traffic lanes and provide cruise control. The Central Driver Assistance Controller coordinates can associate data from the Front camera, and Radar sensors to visualize the vehicle, traffic lanes, and distance level to the car ahead on the multimedia interface display. By way of further example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller to associate the plurality of second images (e.g., images captured from the Front camera) with the second movement states of the mobile object (e.g., data collected from the Vehicle Speed Sensor) determined by the data of Vehicle Speed Sensor to provide driver assist features such as Active lane assist, Adaptive cruise control with Stop-and-Go function. Both of these features rely on data from the Front camera and Vehicle Speed Sensor to detect traffic lanes and provide cruise control. The Central Driver Assistance Controller coordinates can associate data from the Front camera, and Vehicle Speed Sensor to visualize the vehicle, traffic lanes, and distance level to the car ahead on the multimedia interface display.

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	LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[g]. means for forming an image of the mobile object based on said plurality of first images, said associated plurality of first measurements, and said first movement states and on said plurality of said second images, said associated plurality of second measurements, and said second movement states,	Each Volkswagen Accused Product comprises a means for forming an image of the mobile object based on said plurality of first images, said associated plurality of first measurements, and said first movement states and on said plurality of said second images, said associated plurality of second measurements, and said second movement states. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim limitation is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “forming an image of the mobile object based on said plurality of first images, said associated plurality of first measurements, and said first movement states and on said plurality of said second images, said associated plurality of second measurements, and said second movement states”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claim 1(e).</i> For example, the Audi Pre Sense system equipped in the Audi A8 utilizes Audi A8’s Central Driver Assistance Controller to form an image of the mobile object based on said plurality of first images, said associated plurality of first measurements, and said first movement states and on said plurality of said second images, said associated plurality of second measurements, and said second movement states. By way of further example, the Audi Pre Sense system equipped in the Audi A8 utilizes Audi A8’s Central Driver Assistance Controller to form an image of the mobile object based on said plurality of first images, said associated plurality of first measurements, and said first movement states and on said plurality of said second images, said associated plurality of second measurements, and said second movement states.

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Claim	Support
	LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
12[h]. wherein the first imaging technique is different from the second imaging technique.	Each Volkswagen Accused Product comprises a first imaging technique and a second imaging technique that are different from each other. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claim 1(f).</i> For example, the Audi Pre Sense system equipped in the Audi A8 can use a first imaging technique (e.g., 360-degree environment cameras) which consists of two side cameras, a front and back camera. This technique is different from the second imaging technique (e.g., Front camera). By way of further example, the Audi Pre Sense system equipped in the Audi A8 can use a first imaging technique (e.g., Laser scanner). This technique is different from the second imaging technique (e.g., Front camera). LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
13. The apparatus of claim 12, further comprising: means for forming first reconstructed images corresponding to said plurality of first images and second reconstructed images corresponding to said plurality of second images.	Each Volkswagen Accused Product comprises the apparatus of claim 12, further comprising: a means for forming first reconstructed images corresponding to said plurality of first images and second reconstructed images corresponding to said plurality of second images. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “forming first reconstructed images corresponding to said plurality of first images and second reconstructed images corresponding to said plurality of second images”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification

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	of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claims 3 and 12.</i> For example, the Audi Pre Sense system equipped in the Audi A8 can use the 360-degree environment cameras and Ultrasonic sensor data to provide a first reconstructed image (e.g., top view of the vehicle and visual information about the estimated distance to obstructions surrounding the vehicle during parking). For example, the images taken from four cameras set on all sides of the vehicle can be combined to form an image of the vehicle from the top view. The Ultrasonic sensors can capture the vehicle's distance from surrounding objects. The image of the vehicle captured using the 360-degree environment cameras is reconstrued using the measurements captured from the Ultrasonic sensors to present a second reconstructed image (e.g., an image of the vehicle with white/red segments representing distance to obstructions). By way of further example, the Audi Pre Sense system equipped in the Audi A8 can use the Laser scanner and Ultrasonic sensor data to provide a first reconstructed image (e.g., visual information about the estimated distance to obstructions surrounding the vehicle during parking and maneuvering). For example, the image taken from the Laser scanner is combined to form an image of the vehicle's surroundings. The Ultrasonic sensors can capture the vehicle's distance from surrounding objects. The image of the vehicle captured using the Laser scanner can be reconstructed using the measurements captured from the Ultrasonic sensors to present a second reconstructed image (e.g., an image of the vehicles distance to obstructions). LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
14. The apparatus of claim 12, wherein said first imaging technique is a	Each Volkswagen Accused Product comprises the apparatus of claim 12, wherein said first imaging technique is a radiation attenuation technique and said second imaging technique is a radiation emission technique. This element is infringed literally, or in the alternative, under the doctrine of equivalents.

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Claim	Support
radiation attenuation technique and said second imaging technique is a radiation emission technique.	<i>See supporting evidence for claims 5 and 12.</i> For example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller that can collect data using the first imaging technique (e.g., 360-degree environment cameras) and the second imaging technique (e.g., Front camera) to form images of the object. The first imaging technique can be a radiation attenuation technique and said second imaging technique can be radiation emission technique. By way of further example, the Audi Pre Sense system equipped in the Audi A8 utilizes the Audi A8's Central Driver Assistance Controller that can collect data using the first imaging technique (e.g., Laser scanner) and the second imaging technique (e.g., Front camera) to form images of the object. The first imaging technique can be a radiation attenuation technique and said second imaging technique can be radiation emission technique. LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant product testing/teardown is provided.
15. The apparatus of claim 12, further comprising: means for forming displacement fields corresponding, respectively, to said plurality of first images, said plurality of first measurements, said plurality of second images, and said plurality of second measurements.	Each Volkswagen Accused Product comprises the apparatus of claim 12, further comprising: means for forming displacement fields corresponding, respectively, to said plurality of first images, said plurality of first measurements, said plurality of second images, and said plurality of second measurements. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “forming displacement fields corresponding, respectively, to said plurality of first images, said plurality of first measurements, said plurality of second images, and said plurality of second measurements”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code.

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	<i>See supporting evidence for claims 4, 7, and 12.</i> For example, the Audi A8 includes Central Driver Assistance Controller utilized by the Audi Pre Sense system can form displacement fields corresponding to the plurality of first images (e.g., 360-degree camera data), the plurality of first measurements (e.g., Ultrasonic sensor data), the plurality of second images (e.g., Front camera data), and the plurality of second measurements (e.g., Long-range/Mid-range Radar sensor data). The Central Driver Assistance Controller can form these displacement fields by estimating the movement of the mobile object in real-time based on the data collected from the 360-degree environment cameras, Front camera, Ultrasonic sensors and Long-range/Mid-range Radar sensors. The Central Driver Assistance Controller can use the displacement fields to perform active safety technology functions such as Active Lane assist, Adaptive cruise control with Stop-and-Go function, Parking system plus, and Collision avoidance assist. By way of further example, the Audi A8 includes Central Driver Assistance Controller utilized by the Audi Pre Sense system can form displacement fields corresponding to the plurality of first images (e.g., Laser scanner data), the plurality of first measurements (e.g., Ultrasonic sensor data), the plurality of second images (e.g., Front camera data), and the plurality of second measurements (e.g., Long-range/Mid-range Radar sensor data). The Central Driver Assistance Controller can form these displacement fields by estimating the movement of the mobile object in real-time based on the data collected from the Laser scanner, Front camera, Ultrasonic sensors and Long-range/Mid-range Radar sensors. The Central Driver Assistance Controller can use the displacement fields to perform active safety technology functions such as Active Lane assist, Adaptive cruise control with Stop-and-Go function, Adaptive cruise assist, and Collision avoidance assist. By way of further example, the Audi A8 includes Central Driver Assistance Controller utilized by the Audi Pre Sense system can form displacement fields corresponding to the plurality of first images (e.g., 360-degree camera data), the plurality of first measurements (e.g., Ultrasonic sensor data), the plurality of second images (e.g., Front camera data), and the plurality of second measurements (e.g., Vehicle Speed sensor data). The Central Driver Assistance Controller can form these displacement fields by estimating the movement of the mobile object in real-time based on the data collected from the 360-degree environment cameras, Front camera, Ultrasonic sensors and Vehicle Speed Sensor. The Central Driver Assistance Controller can use the displacement fields to perform active safety technology functions such as Active Lane assist, Adaptive cruise control with Stop-and-Go function, Parking system plus, and Collision avoidance assist. LAG reserves its right to identify source code under Local Rule 3-1 and the Court's Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.

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16. The apparatus of claim 15, wherein said means for forming an image of the mobile object comprises means for combining said displacement fields.	Each Volkswagen Accused Product comprises the apparatus of claim 15, wherein said means for forming an image of the mobile object comprises means for combining said displacement fields. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “combining said displacement fields”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claims 7, 8, 12, and 15.</i> For example, the Audi A8 includes four 360-degree environment cameras. The displacement fields corresponding to all the data collected from the 360-degree environment cameras, Front camera, Ultrasonic sensors and Long-range/Mid-range Radar sensors can be combined and used to form an image of the mobile object that is displayed on the multimedia interface display. By way of further example, the Audi A8 includes a Laser scanner. The displacement fields corresponding to all the data collected from the Laser scanner, Front camera, Ultrasonic sensors and Long-range/Mid-range Radar sensors can be combined and used to form an image of the mobile object that is displayed on the multimedia interface display. By way of further, the Audi A8 includes four 360-degree environment cameras. The displacement fields corresponding to all the data collected from the 360-degree environment cameras, Front camera, Ultrasonic sensors and Vehicle Speed sensors can be combined and used to form an image of the mobile object that is displayed on the multimedia interface display. LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
17. The apparatus of claim 15, wherein	Each Volkswagen Accused Product comprises the apparatus of claim 15, wherein said means for forming displacement fields comprises means for estimating movement of the mobile object based, respectively, on said plurality of first images, said plurality

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said means for forming displacement fields comprises: means for estimating movement of the mobile object based, respectively, on said plurality of first images, said plurality of second images, said plurality of first measurements, and said plurality of second measurements, in order to form said displacement fields.	of second images, said plurality of first measurements, and said plurality of second measurements, in order to form said displacement fields. This element is infringed literally, or in the alternative, under the doctrine of equivalents. This claim is a mean-plus-function limitation governed by 35 U.S.C. § 112(6). The function is “estimating movement of the mobile object based, respectively, on said plurality of first images, said plurality of second images, said plurality of first measurements, and said plurality of second measurements, in order to form said displacement fields”. The corresponding structure(s) comprises, for example, one or more of the following: hardware and/or software components disclosed in the 353 Patent at FIG. 1; 2:53-3:2; 3:27-48; 4:3-41; 5:15-6:58; 6:60-48; and/or hardware and/or software components of the imaging processing unit; one or more of hardware and/or software sensors, data capture components, and/or data transfer components; and/or corresponding source code for one or more of the features identified herein. This identification of corresponding structure(s) is preliminary, and Plaintiff reserves the right to amend this identification after inspection of relevant source code. <i>See supporting evidence for claims 7, 8, 9, 12, and 15.</i> For example, the Audi A8’s Central Driver Assistance Controller utilized by the Audi Pre Sense system can form the displacement field based on the movement of the mobile object based, respectively, on said plurality of first images (e.g., captured from 360-degree camera), said plurality of second images (e.g., captured from Front camera), said plurality of first measurements (e.g., data from Ultrasonic sensors) and said plurality of second measurements (e.g., data from Long-rang/Mid-range Radar sensors), in order to form said displacement fields. By way of further example, the Audi A8’s Central Driver Assistance Controller utilized by the Audi Pre Sense system can form the displacement field based on the movement of the mobile object based, respectively, on said plurality of first images (e.g., captured from Laser scanner), said plurality of second images (e.g., captured from Front camera), said plurality of first measurements (e.g., data from Ultrasonic sensors) and said plurality of second measurements (e.g., data from Long-rang/Mid-range Radar sensors), in order to form said displacement fields. By way of further example, the Audi A8 includes four 360-degree environment cameras. The displacement fields corresponding to all the data collected from the 360-degree environment cameras, Front camera, Ultrasonic sensors and Vehicle Speed sensors can be combined and used to form an image of the mobile object that is displayed on the multimedia interface display.

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	LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.
18. The apparatus of claim 17, wherein at least one of said movement estimates is to be formed relative to a reference time.	Each Volkswagen Accused Product comprises the apparatus of claim 17, wherein at least one of said movement estimates is to be formed relative to a reference time. This element is infringed literally, or in the alternative, under the doctrine of equivalents. <i>See supporting evidence for claims 7, 10, 12, 15, and 17.</i> For example, the Audi Pre Sense system equipped on the Audi A8 has a Collision avoidance assist feature that can use the Front camera to detect movement of vehicles and obstructions in front of the vehicle. When the driver is nearing a vehicle or obstructions, the system can operate automatic emergency breaking and adjust the steering to assist the driver. The system can estimate the movement of the vehicle relative to a reference time (e.g., the pattern of driving during a period of driving). By way of further example, the Audi Pre Sense system equipped on the Audi A8 has a Collision avoidance assist feature that can use the Front camera to detect movement of vehicles and obstructions in front of the vehicle. When the driver is nearing a vehicle or obstructions, the system can operate automatic emergency breaking and adjust the steering to assist the driver. The system can estimate the movement of the vehicle relative to a reference time (e.g., the pattern of driving during a period of driving). LAG reserves its right to identify source code under Local Rule 3-1 and the Court’s Standing Proposed Discovery Order Section 3(a)(i) once access to relevant source code is provided.