

SUMMARY (Autopilot) 2-15-18

TRAFFIC AWARE CRUISE CONTROL (TACC)

1- IS (TACC) AVAILABLE?

Touchscreen displays a gray speedometer icon to indicate that TACC is available but is not currently active.



2- TURN (ON)- Move the gear lever fully down once then release, to cruise at the speed limit that is currently being determined by Speed Assist (including any offsets that you have set),

**The gray speedometer icon on the touchscreen gets larger, turns blue, and displays the set speed to indicate that Traffic-Aware Cruise Control is active, and is maintaining the set speed (no vehicle in front) or is maintaining a chosen following distance from a vehicle ahead (up to the set speed).



**LIMITATIONS-Traffic-Aware Cruise Control is particularly unlikely to operate as intended in the following situations:

- 1- The road has sharp curves.
- 2- Visibility is poor (due to heavy rain, snow, fog, etc.).
- 3- Bright light (such as from oncoming headlights or direct Sunlight) is interfering with the view of the camera(s).
- 4- The radar sensor is obstructed (dirty, covered, etc.).
- 5- The windshield is obstructing the view of the camera(s) (fogged over, dirty, covered by a sticker, etc.).

**Traffic-Aware Cruise Control cannot detect all objects and may not brake/decelerate for stationary vehicles, especially in situations when you are driving over 50 mph and a vehicle you are following moves out of your driving path and a stationary vehicle or object is in front of you instead."

3- TURN OFF-MOVE GEAR LEVER (Up /Release) or PRESS BRAKE PEDAL.

**The speedometer icon on the touchscreen turns gray to indicate that Traffic-Aware Cruise Control is not actively controlling your speed.

**To RESUME cruising at the current driving speed, move the gear lever fully down once then release..

4- VEHICLE DETECTED (IN FRONT OF YOU)

** Maximum set speed is 90 mph.

**No Minimum Speed, If a vehicle is detected ahead of you. You can use Traffic Aware Cruise Control at any speed, even when stationary, provided you are at least 5 feet away from the vehicle. When the vehicle is moving again, TACC resumes operating at your current set speed.

** When the vehicle you are following is no longer detected, Traffic-Aware Cruise Control accelerates up to the set speed.

** TrafficAware Cruise Control maintains your chosen following distance, up to the set speed, accelerating and decelerating Model 3 as needed.

** When Traffic-Aware Cruise Control is actively slowing down Model 3 to maintain the selected distance from the vehicle ahead, the brake lights turn on to alert other road users that you are slowing down.

**Under certain circumstances, TACC goes into a HOLD STATE instead of resuming and the touchscreen displays a message indicating that you need to resume cruise control. To resume- TACC, press accelerator pedal.



**Traffic-Aware Cruise Control may go into a HOLD state when:

- 1- You have been at a standstill for 5 minutes.
- 2- The driver's seat belt is unbuckled.
- 3- Model 3 detects a pedestrian nearby (the HOLD state may clear when the pedestrian is no longer close by).
- 4- Model 3 suddenly loses visibility of the vehicle you are following.
- 5- The ultrasonic sensors detect an obstacle in front of Model 3.

5- NO VEHICLE DETECTED (IN FRONT OF YOU)-

** Maximum set speed is 90 mph.

** Minimum driving speed at least 18 mph to use TACC, if no vehicle is detected ahead of you.

**Traffic-Aware Cruise Control will maintain the set speed.

**You can manually accelerate at any time when driving at a set speed using TACC. But when you release the accelerator, Model 3 returns to set speed

6- ADJUST- (SET SPEED)- Use the touchscreen to change the set speed while using Traffic-Aware Cruise Control. Adjusting cruise speed is (+/-) 1 mph for quick taps, 5 mph for each longer press until your desired set speed is displayed.

7- FOLLOWING DISTANCE (ADJUST)- To adjust the following distance you want to maintain between Model 3 and a vehicle traveling ahead of you, touch **Controls >Autopilot** then touch the arrows to choose a setting from 1 (the closest following distance) to 7 (the longest following distance). Each setting corresponds to a time-based distance that represents how long it takes for Model 3, from its current location, to reach the location of the rear bumper of vehicle ahead of you.

8- OVERTAKE ACCELERATION (TURN SIGNAL)- Overtake Acceleration occurs when you hold the turn signal in the momentary position (partially engaged), when following a vehicle with Traffic-Aware Cruise Control active. Model 3 accelerates towards the vehicle ahead, up to your cruising speed.

**CONDITIONS TO BE MET TO WORK;

- 1- Traffic-Aware Cruise Control is operating and detects a vehicle in front..
- 2- No obstacles or vehicles are detected in the target lane.
- 3- Model 3 is traveling below the set speed, but over 45 mph

**ACCELERATION CANCELS WHEN;

- 1- You reach your set cruising speed.
- 2- Changing lanes takes too long.
- 3- Model 3 gets too close to the vehicle ahead.
- 4- You disengage the turn signal.

9- TURN SIGNAL (EXIT RAMP)-

**In right hand traffic, engaging the right turn signal when driving in the right-most lane within 164 feet (50 meters) of an exit (on a controlled access road only, such as a highway or freeway), causes Traffic-Aware Cruise Control to assume you are exiting. As a result, Traffic-Aware Cruise Control begins to slow down the vehicle.

**Likewise in left hand traffic, when engaging the left turn signal when driving in the left-most lane within 164 feet (50 meters) of an exit.

10- SPEED ASSIST- To do so, move the gear lever fully down once then release. When you release, your cruising speed is set to the speed that is determined by Speed Assist.

**When the Speed Limit Warning is turned on, the touchscreen displays a speed limit sign.

To adjust the Speed Limit Warning setting, touch **Controls > Autopilot > Settings >Speed Limit Warning, then choose one of these options:

- 1- Off - Speed limit warnings do not display and chimes are not sounded.
- 2- Display - Speed limit signs display on the touchscreen and the sign increases in size when you exceed the determined limit.
- 3- Chime - In addition to the visual display, a chime is sounded whenever you exceed the determined speed limit.

**You can also specify how the speed limit is determined:

- 1- Relative - The speed limit is determined automatically based on detected traffic signs and GPS data. If desired, you can set a speed limit offset (+ or -) if you want to be alerted only when you exceed the offset speed limit by a specified amount. For example, you can increase the offset to +10 mph (10 km/h) if you only want to be warned when you exceed the speed limit by 10 mph (10 km/h).
- 2- Absolute - Manually specify any speed limit between 20 and 140 mph

**The forward looking camera(s) detect speed limit signs. The speed limit signs are then analyzed and compared against GPS data to determine the speed limit at your current driving location.

**Instead of determining the speed limit based on speed limit signs and GPS data, you can also manually enter an arbitrary speed limit.

**Traffic-Aware Cruise Control makes it easy to cruise at the speed limit. You can cruise at the speed limit that is currently being determined by Speed Assist, taking into consideration any offset you have.

**If Speed Assist is unable to determine a speed limit, your set speed does not change when you move the gear lever fully down once then release.

**If you are already driving faster than the speed limit when you pull the lever, the set speed does not adjust to the speed limit—it adjusts to your current driving speed.

**You can manually accelerate at any time when driving at a set speed using TACC. When you release the accelerator, speed returns to the set speed

**When you adjust the cruising speed based on the speed limit, the set speed does not change when the speed limit changes. You must move the gear lever fully down once then release to cruise at new speed limit.

AUTOSTEER

1- **START (AUTOSTEER)**- To initiate Autosteer, move the gear lever fully down twice.

A- You must enable AUTOSTEER by touching – Controls > Autopilot > Autosteer (Beta) > ON.

B- To indicate Autosteer is available (But not actively steering) - the touchscreen displays a gray Autosteer icon.



C- To indicate that Autosteer (Is now actively steering)- the touchscreen displays the (AUTOSTEER ICON IN BLUE).



****To initiate Autosteer you Must Have**

- VEHICLE IN FRONT OF YOU DETECTED or VISIBLE LANE MARKINGS.
- MIN SPEED 18 MPH (No Vehicle Detected In Front Of You)
- 0 MIN SPEED (Vehicle Detected In Front Of You)

****Using the vehicle's camera(s), the radar sensor, and the ultrasonic sensors, Autosteer detects lane markings and the presence of vehicles and objects, steering Model 3 based on the lane markings and the vehicle directly in front of you.**

****Autosteer is intended for use only on highways and limited-access roads.**

****Do not use Autosteer on city streets, in construction zones, or in areas where bicyclists or pedestrians may be present.**

****Autosteer attempts to center Model 3 in the driving lane. However, if the sensors detect the presence of an obstacle (such as a vehicle or guard rail), Autosteer may steer Model 3 in a driving path that is offset from the center of the lane.**

****Autosteer is a hands-on feature. You must keep your hands on the steering wheel at all times.**

2- **STOP (AUTOSTEER)**

Autosteer cancels when:

- 1- You start steering manually.
- 2- You press the brake pedal.
- 3- You unbuckle the driver's seat belt.
- 4- The maximum speed that Autosteer supports—90 mph is exceeded.
- 5- You move the gear lever upwards.
- 6- An Automatic Emergency Braking event occurs.

****When Autosteer cancels, it sounds chimes and the Autosteer icon turns gray to indicate that Autosteer is no longer active or disappears to indicate that it is not currently available.**

****If Autosteer cancels because you started steering manually, Traffic-Aware Cruise Control remains active. Disengage Traffic-Aware Cruise Control as you normally would, by pressing the brake pedal.**

****To disable Autosteer so it is no longer available, touch Controls > Autopilot > Autosteer (Beta) > OFF.**

3- **LANE MARKINGS-**

****When Autosteer is able to detect lane markings, it also displays the driving lane in blue.**

****In situations where Autosteer is unable to detect lane markings, the driving lane is determined based on the vehicle you are following. In these situations, the vehicle in front of you is highlighted in blue.**

4- **VEHICLE DETECTED (IN FRONT OF YOU)-**

****If a vehicle is detected ahead of you, you can initiate Autosteer at any speed, even when stationary.**

****In these situations, the vehicle in front of you is highlighted in blue.**

5- **NO VEHICLE DETECTED (IN FRONT OF YOU)-**

****To initiate Autosteer when there is no vehicle in front of you, you must be driving at least 18 mph on a roadway with visible lane markings.**

6- **SPEED CONTROL-**

****In situations where you attempt to engage Autosteer, but you are not driving within the required driving speed for Autosteer to operate, or Autosteer is not receiving adequate data from the camera(s) or sensors, a message displays on the touchscreen indicating that Autosteer is temporarily unavailable.**

****If you choose to use Autosteer on residential roads, a road without a center divider, or a road where access is not limited, Autosteer may limit the maximum allowed cruising speed (Detected Speed Limit +5 mph)**

****In situations where the speed limit cannot be detected, Autosteer reduces your driving speed and limits the set speed to 45 mph, Although you can manually accelerate to exceed the limited speed,**

****You may control SPEED ASSIST Speed by tapping the plus (+) or minus (-).**

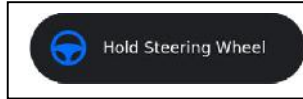
7- **AUTOSTEER (FAILURE)-**

In situations where Autosteer is unable to steer Model 3, Autosteer sounds a warning chime and displays following message on touchscreen:

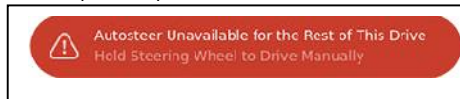


8- **HOLD STEERING WHEEL-**

1- If your hands are NOT detected on the steering wheel for a period of time, a flashing white light appears on the touchscreen and the following message displays: also sound a chime at the same time that the message is initially displayed.



2- If you repeatedly ignore hands-on prompts, Autosteer displays the following message and Autosteer becomes disabled for the rest of the drive. If you don't resume manual steering, Autosteer sounds a continuous chime, turns on the warning flashers, and slows the vehicle to a complete stop.



3- For the rest of the drive, you must steer manually. Autosteer is available again after you stop and shift the vehicle into Park.

9- **LANE CHANGE-**

****START (LANE CHANGE)**

A- Before you can operate Auto Lane Change, you must enable it by touching Controls > Autopilot > Auto Lane Change > ON.

B- Before you can turn on Auto LaneChange, you must have both Traffic-Aware Cruise Control and Autosteer ACTIVE.

C- Engage the appropriate turn signal.

D- Disengage the turn signal after you are in the target lane.

****Auto Lane Change is designed for use on restricted-access highways with visible lane markings.**

****Using the forward looking camera(s), the radar sensor, and ultrasonic sensors, Model 3 detects lane markings and presence of other vehicles.**

****As the lane change is in progress, Overtake Acceleration is activated, allowing Model 3 to accelerate closer to a vehicle in front.**

****Midway through the lane change, Auto Lane Change must be able to detect the target lane's outside lane marking. If this lane marking cannot be detected, both Auto Lane Change and Autosteer will cancel.**

****On the touchscreen, the lane line you are crossing over displays as a dashed blue line and once in your new lane, the lane markings display as solid blue lines.**

****Auto Lane Change moves Model 3 one lane at a time. Moving into an additional lane requires you to engage the turn signal a second time after the first lane change is complete.**

****Do not use Auto Lane Change on winding roads with sharp curves, on icy or slippery roads, on city streets or on roads where traffic conditions are constantly changing and where bicycles and pedestrians are present or when weather conditions (such as heavy rain, snow, fog, etc.) may be obstructing the view from the camera / sensors.**

****STOP (LANE CHANGE)-**

- 1- Manually move the steering wheel,
- 2- Press the brake pedal,
- 3- Disengage the turn indicator before Model 3 crosses the markers on the existing lane.

****LIMITATIONS:**

- Unable to accurately determine lane markings. lane markings are excessively worn, construction, lanes branching off.
- Vehicle is detected in your blind spot.
- Road has sharp curves.
- Driving very close to a vehicle in front, which is blocking the view of the camera(s).
- Oncoming headlights or direct sunlight.

LANE ASSIST

To turn this warning on or off, touch **Controls > Autopilot > Settings > Lane Departure Warning. Your chosen setting is retained until you manually change it.



- **The cameras monitor the markers on the lane you are driving in and the ultrasonic sensors monitor the surrounding areas and the blind spot for the presence of a vehicle or other objects.
- **Lane Assist also warns you of undesired lane departures by vibrating the steering wheel slightly if a front wheel passes over a lane marking and the associated turn signal is off.
- **When an object is detected in your blind spot or close to the side of Model 3 (such as a vehicle, guard rail, etc.), colored lines radiate from the image of Model 3 on the touchscreen.
- **The location of the lines correspond to the location of the detected object.
- **The color of the lines (white, yellow, orange, or red) represents the object's proximity to Model 3, with white being the farthest and red being very close and requiring your immediate attention.
- **The colored lines do not display if Model 3 is at a standstill (for example, in heavy traffic).
- **If a fault occurs with the Lane Assist system, Model 3 displays an alert. Contact Tesla Service.

COLLISION AVOIDANCE ASSIST

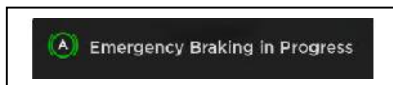
1- FORWARD COLLISION WARNING-

- **By default, Forward Collision Warning is turned on. To turn it off or adjust its sensitivity, touch **Controls > Autopilot > Settings > Forward Collision Warning**. Instead of the default warning level of **Medium**, you can turn the warning **Off**, or you can choose to be warned **Late** or **Early**. Your chosen setting for Forward Collision Warning is retained until you manually change it.
- **Provides visual and audible warnings (CHIME), in situations where there is a high risk of a frontal collision.
- **Warning are designed to monitor an approximate area of up to 525 feet in your driving path.
- **Forward Collision Warning is designed to sound a chime and highlight the vehicle in front of you in red on the touchscreen.
- **Forward Collision Warning does not provide a warning when the driver is already applying the brake.



2- AUTOMATIC EMERGENCY BRAKING-

- **If immediate action is not taken when Model 3 issues a Forward Collision Warning, Automatic Emergency Braking applies braking to reduce the impact of a frontal collision and is not designed to prevent a collision. At best, it can minimize the impact of a frontal collision by attempting to reduce your driving speed.
- **When Automatic Emergency Braking applies the brakes, the touchscreen displays a visual warning and sounds a chime. The brake lights turn on to alert other road users that you are slowing down.



**Automatic Emergency Braking CANCELS when:

- You turn the steering wheel sharply.
- You press and release the brake pedal while Automatic Emergency Braking is applying the brakes.
- You accelerate hard (i.e., accelerator pedal)
- The object is no longer detected ahead.

AUTOPARK-

- ** **(PARALLEL)**- Autopark detects parallel parking locations when driving below 15 mph. Autopark detects parallel parking spaces that are at least 20 feet, but less than 30 feet long.
- ** **(PERPENDICULAR)**- Autopark detects perpendicular parking locations when driving below 10 mph and the spaces that are at least 9.5 feet wide with a vehicle parked on each side.
- ** **(ANGLED)**- Autopark does not operate on angled parking spaces.

- ** **ICON (P)** When Autopark detects a potential parking space, and determine a driving path, the touchscreen displays an icon.



START (AUTOPARK)

- 1- Pull forward and stop approximately a car length ahead of the parking space (as you normally would when parallel parking or when backing into a perpendicular parking space).
 - 2- Release the steering wheel, shift Model 3 into Reverse, then touch **Start Autopark** on the touchscreen.
 - 3- When parking is complete, Autopark displays the "Complete" message.
- NOTE- If you press the **brake** when Autopark is actively parking Model 3, the parking process pauses until you touch **Resume** on the touchscreen.
- NOTE- Do not interfere with the movement of the steering wheel. Doing so cancels Autopark.

STOP (AUTOPARK)

- 1- Manually move the steering wheel, change gears, press **Cancel** on screen.
- 2- The parking sequence exceeds the maximum of seven moves.
- 3- The driver's seat belt is unbuckled.
- 4- A door is opened.
- 5- You press the brake pedal twice in quick succession.
- 6- You press the accelerator pedal.

SUMMON-

- ** Summon is designed and intended for use only on a private residential property.
- ** With Summon, you can move Model 3 in and out of a parking space from outside the vehicle using the mobile app.
- ** Summon has moved Model 3 the maximum distance of 39 feet.

Customizing Summon

- 1- Before operating Summon, use the touchscreen to enable it. Touch **Controls > Autopilot > Summon > ON**.

START (SUMMON):

- 1- FIRST TIME ONLY: Enable Summon and customize how it works (page 70).
- 2- Position Car for parking (see [Position the Vehicle for Parking](#) on page 71). Align Model 3 laterally with the parking space so Model 3 can move straight into the space in either Drive or Reverse. Use Summon on flat driveways only where a raised concrete edge does not exceed approximately 1 inch.

3- INITIATE SUMMON MANEUVER BY USING:

A- MOBILE APP-

Start Summon by holding down the forward or reverse button to move Model 3 into the parking space. If **Require Continuous Press** is set to **NO**, you do not need to hold down the button- touch/release.

B- DOUBLE PRESS- PARK GEAR.

C- INITIATE BEFORE LEAVING VEHICLE-

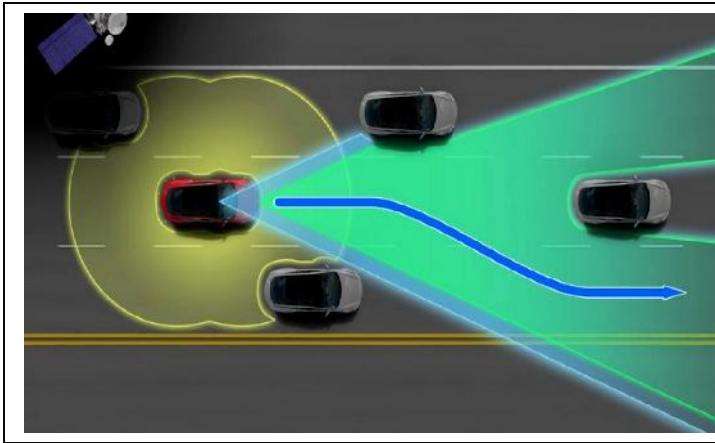
- 1- Require Continuous Press- Must be set to NO.
- 2- Double Press- PARK GEAR.
- 3- On Touchscreen- Select (Direction Of Travel).
- 4- Exit Model 3 and Close the Door.
- 5- Model 3 will now drive into the parking space by direction you gave.

- **You can summon Model 3 back to its original position if you previously auto parked it and the vehicle has remained in the Park gear. Then, using the mobile app, simply specify the opposite direction. Summon moves the vehicle along the original path provided the environment has not changed

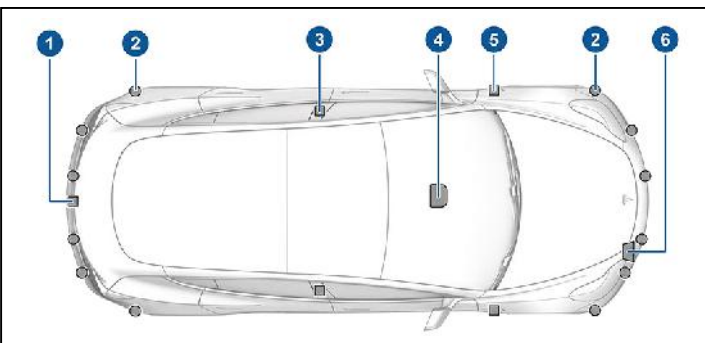
STOP (SUMMON)-

- 1- Use the mobile app.
- 2- Door Handle Pressed.
- 3- Has moved 39 Feet, or obstacle detected and cannot move forward for more than approximately two seconds.
- 4- Interact with the steering wheel, brake pedal, acc pedal, or gear stalk.

AUTO PILOT (Hardware & Software)



HARDWARE 2.0-



- 1- Camera is mounted above the rear license plate.
 2. **360 Degree Long Range Ultrasonic Sonar** sensors in the front and rear bumpers.
 3. A camera is mounted in each door pillar.
 4. Three cameras Forward Facing with Image Recognition above the rear view mirror.
 5. A camera is mounted to each front fender.
 6. **Forward Facing Long Range Radar** behind the front bumper on the side.
- ***GPS Location + Real Time Traffic
- ***Tesla vehicles produced with the new set of hardware will be capable of Level 5 autonomy or fully self-driving.

CAMERAS - 8 cameras, to cover 360 degrees visibility around the car at a range of up to 250 meters. Snow or ice is not a problem since the cameras are equipped with heaters.

A- **3 cameras are front-facing**, , The cameras and the related electronics are in the housing in front of the rear-view mirror.

- **THE MAIN 50° field of view** camera is used to detect objects, traffic sign recognition, adaptive high-beam assist, lanes, traffic lights, path delimiters, and lateral control assist. Max 150m.
- **THE NARROW 25 degree** camera is used to also detect objects, lanes, traffic lights, and pedestrian and cyclist detection, debris further ahead than the 50 degree camera.
- **The narrow and main cameras** also provide some redundancy to each other in case of an issue with either camera or interference with the visibility of one camera. Max distance 250m.
- **The 150 degree fisheye camera** is used for cars cutting in detection, lane detection on tight curves, pedestrian/cyclists/large animal detection, and 1st-in row traffic light detection. Max distance 60m

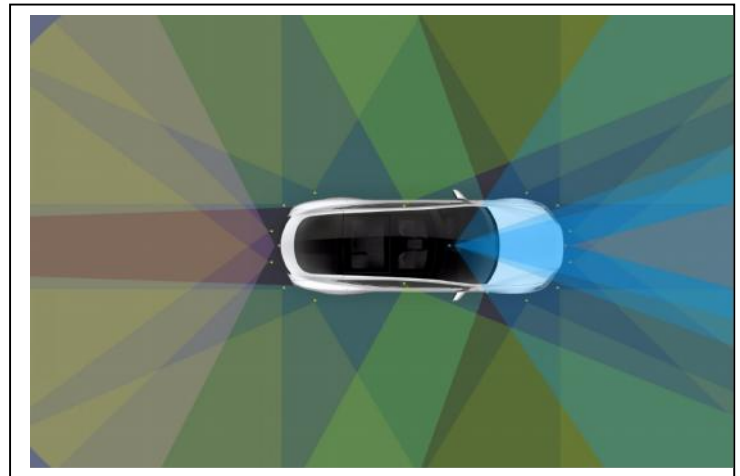
B- **2 cameras inside the B-pillars**, Tesla made a small indentation in the center pillars between the doors.

C- **2 cameras in front fenders hidden inside the Tesla badges**

D- **1 camera rear-facing**.

RADAR- 1 radar, forward-facing radar gets a processing upgrade and a new redundant wave length that provides additional data that is capable of working in extreme weather conditions, This allows the system to see through rain, fog, dust, and even the car in front. Radars produce electromagnetic waves (more specifically low frequencies of light that we can't see) and detect the reflection of those waves off of physical objects to determine the distance, angle, and velocity of those objects (i.e. where they are and how they are moving).

ULTRASONIC SENSORS- 12 ultrasonic short range (about 16 feet) sensors all around, allowing for detection of both hard and soft objects at nearly twice the distance of the prior system. The 12 long range ultrasonic sensors are positioned to sense 16 feet around the car, which renders the vehicle blind past 16 feet on the sides and the back.



SOFTWARE-

8.1 March 2017

Improved Autosteer up to 90 mph
Traffic-Aware Cruise Control
Summon (Beta)
Auto Lane Change
Lane Departure Warning
Automatic Emergency Braking
Automatic High Beams
Parallel Autopark
Perpendicular Autopark
Blind Spot Detection
Speed Assist

Limited Self-Driving Automation (Level 3): Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions and in those conditions to rely heavily on the vehicle to monitor for changes in those conditions requiring transition back to driver control. The driver is expected to be available for occasional control, but with sufficiently comfortable transition time. The Google car is an example of limited self-driving automation.

Full Self-Driving Automation (Level 4): The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip. This includes both occupied and unoccupied vehicles.

Fully-autonomous (Level 5): Ssystem that expects the vehicle's performance to equal that of a human driver, in every driving scenario—including extreme environments like dirt roads that are unlikely to be navigated by driverless vehicles in the near future, ("steering wheel optional"): No human intervention is required.

