Unit-1 **DRIVER ASSISTANCE SYSYTEMS**

driver support systems

driver support systems, such as advanced emergency brake systems, lane departure warning systems, and vehicle-to-x communication systems. The use of driver assistance systems is becoming increasingly popular. These systems offer drivers increased safety and convenience, as they help to reduce the chances of accidents on the road. Driver assistance systems include a variety of technologies, such as advanced emergency brakes, lane departure warning systems, and vehicle-to-x communication systems. Advanced emergency brakes can detect obstacles in the road and apply the brakes automatically, reducing the chances of a collision. Lane departure warning systems alert drivers when their car is drifting out of its lane, helping to prevent collisions from occurring due to lane drifting. Vehicle-to-x communication systems allow vehicles to communicate with other vehicles and traffic signals, providing drivers with real-time information about traffic conditions, road closures, and other important data. With these systems, drivers can avoid dangerous situations and drive more safely and efficiently.

driver information,

driver model Driver model is a set of rules and specifications that a computer hardware device must follow to interact with a computer's operating system. It is typically used for hardware devices such as printers, scanners, keyboards, and mice. The driver model provides a common set of commands, which the hardware device can use to communicate with the operating system. This helps to ensure that the hardware device is compatible with the operating system, and the operating system is able to properly recognize the hardware device.

driver perception

Driver perception is the ability of a driver to interpret the environment and situation around them, including other vehicles, pedestrians, and traffic signs, in order to make informed decisions while driving. It includes the ability to anticipate, recognize, and respond to potential hazards, as well as the ability to understand and use relevant traffic laws.

driver convenience

performance,’safety features. driver monitoring system

A driver monitoring system is a system that monitors the behavior of a driver while driving a vehicle. It is typically used in commercial fleets and other applications where safety is a priority. The system typically consists of a dashboard-mounted camera and/or other sensors that detect and record the driver’s behavior. This data can then be used to identify trends and potentially dangerous behavior, allowing fleet managers to intervene and improve safety. In some cases, the system may also issue alerts to the driver, reminding them to take necessary safety precautions.

Vehicle support systems

Vehicle support systems are a range of technologies that are used to support and enhance the performance of vehicles. This includes systems such as navigation and GPS systems, collision avoidance systems, surveillance and tracking systems, and driver

assistance systems. These systems are designed to provide drivers with greater control and safety, as well as improved fuel efficiency and driver comfort.

general vehicle

control General vehicle control is the process of controlling and monitoring a vehicle's speed, direction, braking, and other functions to ensure safe and efficient operation. This can be done either manually, using mechanical and electrical components, or through a computer-controlled system. In some cases, general vehicle control may also include features such as navigation and communication systems.

collision avoidance

Collision avoidance is a set of strategies used to prevent collisions between two or more objects. This can refer to physical objects, such as cars or ships, but can also be applied to virtual objects, such as computer networks. Collision avoidance strategies include maintaining distance between objects, using sensors to detect objects in the vicinity, and using algorithms to calculate the safest course of action.

vehicle status monitoring.

Vehicle status monitoring is a process that uses sensors, telematics, and other technologies to collect data about the performance, location, and condition of a vehicle. This data is then used to analyze the vehicle's performance, identify potential issues, and take proactive measures to ensure the vehicle operates efficiently. By monitoring the status of a vehicle, businesses can reduce maintenance costs, improve driver safety, and extend the life of the vehicle.

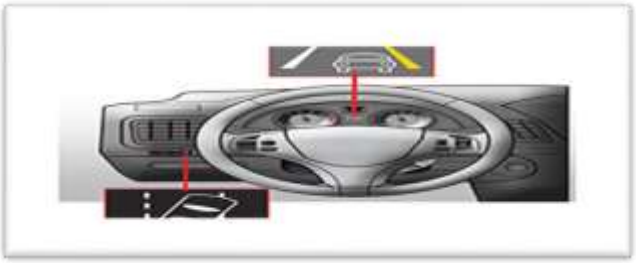
1. **Explain the types of driver support system and what the advantages of it are.**

Lane departure detection

Lane departure warning is designed to help you avoid crashes due to drifting or departing your lane. The system detects lane markers and alerts you when a tire touches a lane marker. The warning is usually a flashing indicator and/or it beeps from the corresponding side. In some systems, the steering wheel or driver’s seat vibrates gently.

Generally, lane departure warning systems will not alert you when your turn signal is on.

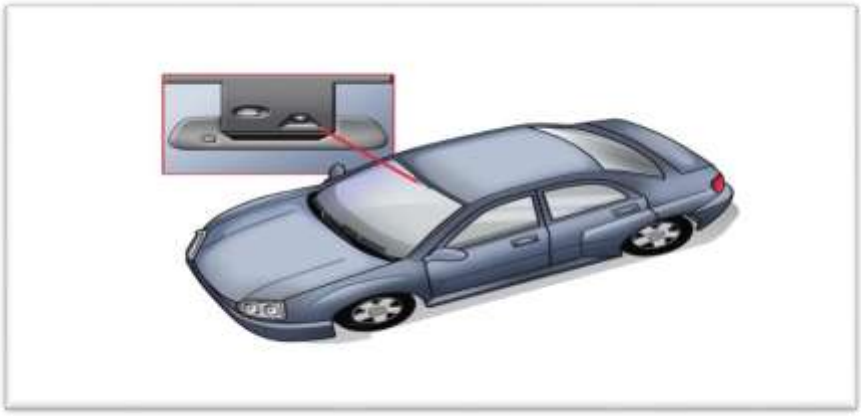
HOW TO USE IT?



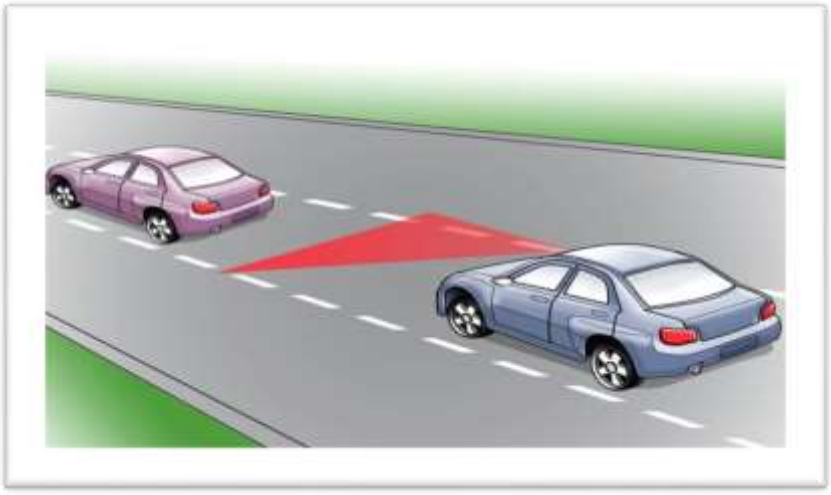
- Some lane departure warning/lane keeping assist systems are activated by pressing a button, while others areautomatically activated when you turn on your car. This button will have an indicator light to show when the system is active.
- The lane departure warning system searches for lane markings when your car is on a straight or slightly curved road and your turn signals are off. When you use your turn signals or turn your steering wheel quickly, the system will not alert you.
- Most lane departure warning/lane keeping assist systems function best on highways, and some systems onlyoperate at speeds over 35 mph.

HOW DOES IT WORK?

The lane departure system uses a camera located near the rearview mirror to recognize lane markers. To function properly, there needs to be clearly visible paint stripes on both sides of the vehicle. It will NOT recognize curbs. If the system detects that your car is too close to the left or right side lane markings, and your turn signal is not on, a warning light, a vibration, and/or sound will be activated.



In addition to the camera, lane keeping assist has a steering input assist. Lane keeping assist will gently turn the steering wheel to keep your vehicle between the left and right lane lines, gently steering your vehicle in the opposite direction of the lane boundary. In some systems, the tugging on your steering wheel will become stronger the closer your vehicle gets to the lane markers.



Blind Spot Information

The BLIS function is intended to help the driver detect vehicles diagonally behind and to the side of the carso as to provide assistance in heavy traffic on roads with several lanes in the same direction.

BLIS is a driver aid intended to give a warning of:

- ❖ vehicles in the car's blind spot
- ❖ Quickly approaching vehicles in the left and right lanes closest to the car.

The BLIS function is active at speeds above 10 km/h (6 mph).The system is designed to react when:

- ➢ your car is overtaken by other vehicles
- ➢ Another vehicle is quickly approaching your car.

When BLIS detects a vehicle in Zone 1 or a quickly approaching vehicle in Zone 2, the indicator lamp on the door mirror on the affected side illuminates with a constant glow. If the driver activates the direction indicator on the same side as the warning, the indicator lamp will change over from a constant glow to flashing with a more intense light

Adaptive cruise control

- The adaptive cruise control (ACC) helps the driver to maintain an even speed combined with a pre-selected time interval to the vehicle ahead.
- An adaptive cruise control can provide a more relaxing driving experience on long journeys onmotorways and long straight main roads in smooth traffic flows.

The camera and radar unit measures the distance to the vehicle ahead.

The driver selects the desired speed and a time interval to the vehicle ahead. If the camera and radar unit detects a slower vehicle in front of the car, the speed is adapted automatically via the preset time interval to the vehicle. When the road is clear again the car returns to the selected speed.

Adaptive Cruise Control regulates the speed with acceleration and braking. It is normal for thebrakes to emit a low sound when they are being used to adjust the speed.

The adaptive cruise control aims to control the speed in a smooth way. In situations that demand sudden braking the driver must brake himself/herself. This applies in cases

of large speed differences or if thevehicle in front brakes suddenly. Due to the limitations of the radar unit, braking may come unexpectedly or not at all.

The adaptive cruise control aims to follow the vehicle ahead in the same lane at a time interval setby the driver. If the radar unit cannot see any vehicle in front then the car will instead maintain the speed set and stored by the driver. This also takes place if the speed of the vehicle ahead increases and exceeds the stored speed.

Distance Warning

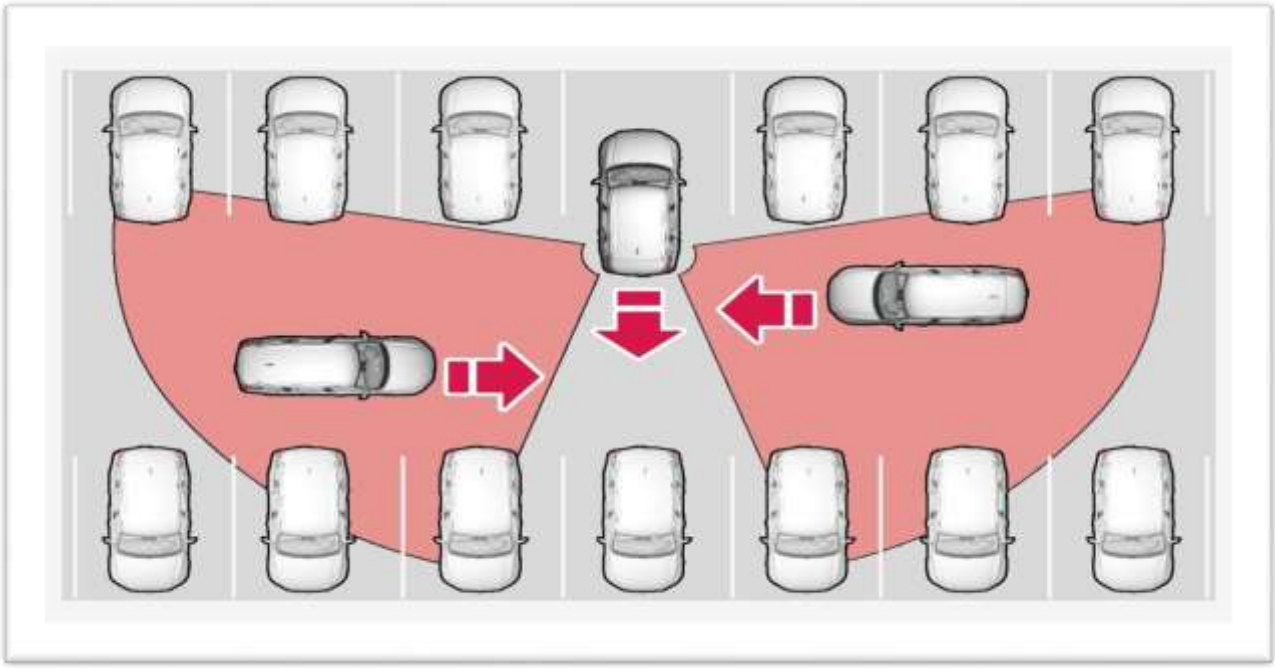
The Distance Warning function can assist the driver to notice that the time interval to the vehicle ahead maybe too short. This requires the car to be equipped with a head-up display to be able to display Distance Warning.

In cars equipped with head-up display, a symbol is shown on the windscreen for as long as the time interval to the vehicle ahead is shorter than the preset value. However, this assumes that the **Show Driver Support** function is activated via the settings in the car's menu system.

Distance warning is active at speeds above 30 km/h (20 mph) and only reacts to the vehicle ahead travelling in the same direction. No distance information is provided for oncoming, slow or stationary vehicles.

Cross Traffic Alert

- Cross Traffic Alert (CTA) is a driver support that supplements BLIS and is designed to help thedriver detect traffic crossing behind the car when it is reversing.
- The **auto-brake** sub function can stop the car in the event of a risk of collision with an unobservedvehicle.



- CTA is Primarily designed to detect vehicles. In favorable conditions it may also be able to detectsmaller objects, such as cyclists and pedestrians.
- CTA is only active if the car rolls backwards or if reverse gear has been selected.
- If CTA senses that something is approaching from the side, this is also indicated with:
  - an acoustic signal - the sound is heard in the left-hand or right-hand speaker

according to thedirection from which the object approaches.

- an illuminated icon in the **Park Assist System** graphic on the screen.
- an icon on the Park assist camera top view.

Rear Collision Warning

- The Rear Collision Warning (RCW) function can help the driver to avoid being hit by a vehicle approaching from behind.
- This function is activated automatically each time the engine is started.
- Drivers in vehicles behind can be warned about an imminent collision by the function flashing intensively with the direction indicators.
- If, at a speed below 30 km/h (20 mph), the function detects that the car is in danger of being hit from behind, the seatbelt tensioners may tension the front seatbelts and activate the Whiplash Protection System safety system.
- Immediately before a collision from behind, this function may also activate the foot brake in order to reduce the forward acceleration of the car during the collision. However, the foot brake is only activated if the car is stationary. The foot brake releases immediately if the accelerator pedal is depressed.

2. Explain in detail about the Collision avoidance system

- A collision avoidance system is **a safety system designed to warn, alert, or assist drivers to avoid imminent collisions and reduce the risk of incidents**. Collision avoidance systems use a variety of technologies and sensors, such as radar, lasers, cameras, GPS, and artificial intelligence.
- A collision avoidance system (CAS), sometimes referred to as a collision prevention system, can help you prevent or reduce the severity of a car collision. The system may use artificial intelligence (AI), dash camera, and GPS technologies to help you identify an imminent collision. If a collision is aboutto occur, a CAS notifies you via sound, light, or both, so you can act quickly to prevent an Accident.

Types of Collision Avoidance Systems Are Available

1. Forward Collision Prevention System
2. Lane Departure Warning System
3. Automatic Braking System

Forward Collision Prevention System

A forward collision prevention system tracks three things: your car's speed, the speed of the vehicle infront of you, and the distance between both cars. If your vehicle gets too close to a car in front it, the forward collision prevention system alerts you about an impending crash.

Lane Departure Warning System

A lane departure warning system notifies you if your car starts to drift out of its lane. In addition, a lane departure warning system can provide real-time blind-spot detection to reduce your risk of a blind-spot collision.

Automatic Braking System

An automatic braking system automatically activates your car brakes if it senses an object near your vehicle. The system applies a small amount of braking power, and you can apply additional braking power as needed to slow down or stop your car.

3. **Is the driver perception is needed for the driver to drive the car.**

Perception means the way we try to understand the world around us.

Perception-Reaction Process

It can be done in four ways. They are

1. Perception
2. Identification
3. Emotion
4. Reaction (volition)

Perception

- ❖ Sees or hears situation

Identification

- ❖ Identify situation (realizes the real objects is in road)

Emotion

- ❖ Decides on course of action (swerve, stop, change lanes, etc)

Reaction (volition)

- ❖ Acts (time to start events in motion but not actually do action)
    - Foot begins to hit brake, not actual deceleration

Typical Perception-Reaction time range is: 0.5 to 7 seconds

Perception-Reaction can be affected by a number of factors.

1. Perception-Reaction Time Factors
   - Environment:
     - Urban vs. Rural
     - Night vs. Day
     - Wet vs. Dry
   - Age
   - Physical Condition:
     - Fatigue
     - Drugs/Alcohol
2. Distractions
3. Medical condition
4. Ability to see (lighting conditions, presence of fog, snow, etc)
5. Expected versus unexpected situation (traffic light turning red vs. dog darting into road)