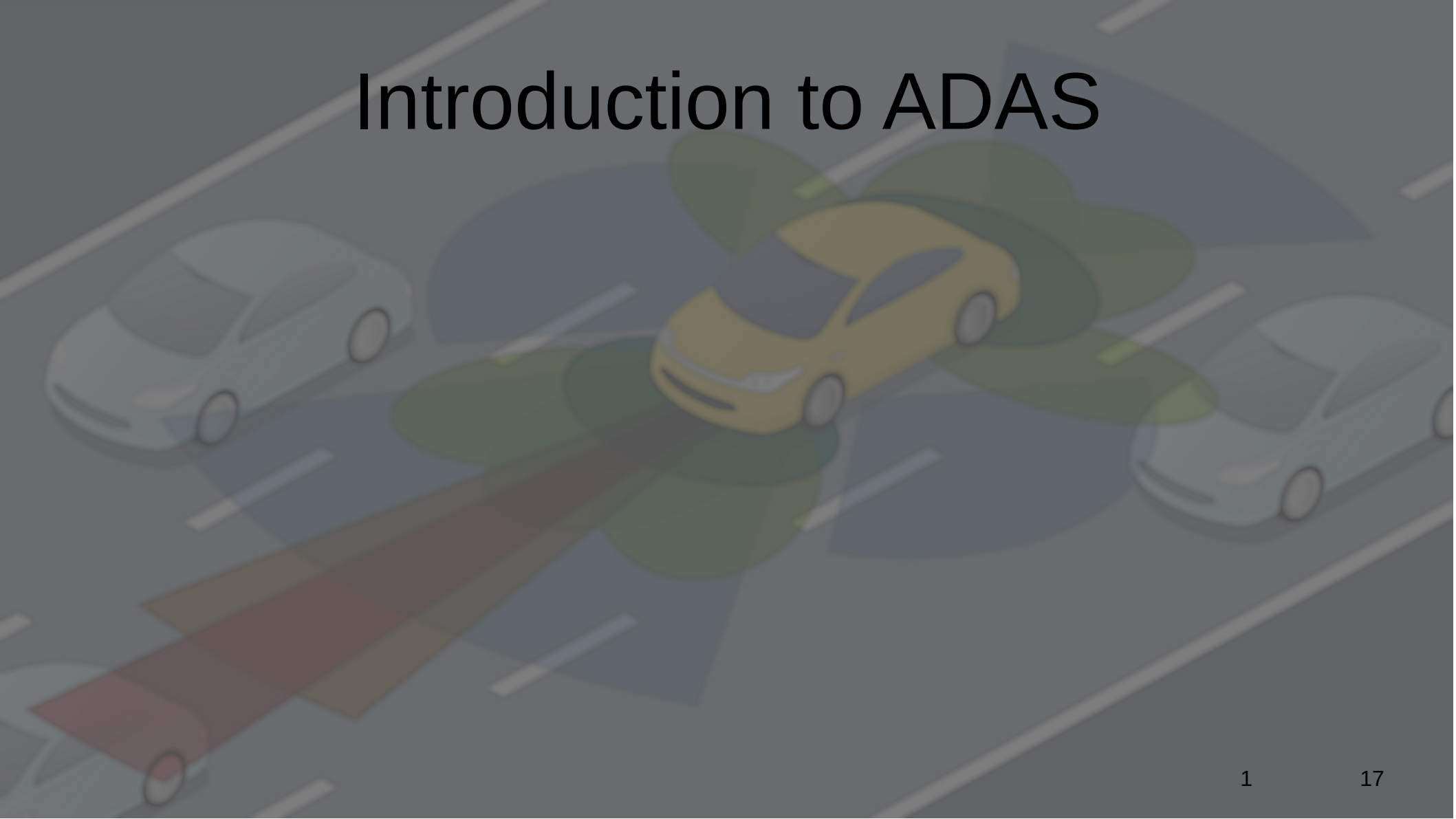


# Introduction to ADAS



# You should be able to:

- Pass ASE tests relating to ADAS. (L4)
- Understand the history behind ADAS.
  - The who, when, and why.
- Explain ADAS to laypersons.
- Be aware of the liability aspect of performing ADAS service.

# What is ADAS and what is it not?

- ADAS – Advanced Driver Assistance Systems.
  - Think of it as a “helping hand” for the vehicle driver.
    - Some may think of it as a crutch, but I digress.
- The systems are really intended to improve safety and assist the vehicle driver in traffic.

# Benefits of ADAS.

- Improved occupant, other traffic, and pedestrian safety.
  - The systems “pay attention” even if the driver is not.
- Collision reduction.
  - Same reason as above.
- Traffic flow improvement.
  - More even speed, reduction of “stop and go”.

# Benefits of ADAS. (cont)

- The onboard computer systems are capable of reacting much faster than a human can.
  - Also often much more decisive.
    - Example: Emergency braking, when initiated by the ADAS system, tends to stop the vehicle extremely quickly. (May come as quite the surprise to the vehicle driver)

# Drawbacks of ADAS.

- Purchase cost.
  - Adds cost to the vehicle price.
- Repair cost.
  - Expensive parts and the necessity of performing calibrations using expensive equipment and skilled technicians.

# Drawbacks of ADAS. (cont)

- Standardization is presently lacking.
  - Manufacturers use different names for the same equipment.
- May be difficult to identify exactly what the vehicle is equipped with and the capabilities.
  - What is the difference between Lane Keeping Assistance and Lane Departure Warning for example.



# Drawbacks of ADAS (cont)

- Perception.
  - Do drivers trust the systems?
- Technology.
  - Media tends to emphasize failures and not successes.
- Driving experience.
  - Some people like to drive.
  - Driving ability may dwindle.



# Active Safety

- Anti-lock Braking Systems.(ABS)
- Electronic Stability Control.(ESC)
- Electric Power Steering.(EPS)
  - These are active safety systems and part of the vehicle fundamental systems.

# Active Safety. (cont)

- Electronic Throttle Control.(ETC)
- Electronically Controlled Transmissions.(ECT)
  - **The presence of these and other systems does not automatically imply that the vehicle is equipped with ADAS, however.**

# Autonomous levels.

- ADAS in non-autonomous vehicles.
  - The dividing line is really who is doing the driving.
    - SAE J3016, which deals with vehicle autonomy considers level 0, 1, and 2 to be levels where the person in the driver's seat actually does the driving and the level of support the various systems provide.
      - The next slide is a more detailed breakdown of the various autonomous levels identified.

# SAE J3016™ LEVELS OF DRIVING AUTOMATION

What does the human in the driver's seat have to do?

## SAE LEVEL 0

You **are** driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering

You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety

## SAE LEVEL 1

## SAE LEVEL 2

## SAE LEVEL 3

## SAE LEVEL 4

## SAE LEVEL 5

You **are not** driving when these automated driving features are engaged – even if you are seated in “the driver's seat”

When the feature requests,  
you must drive

These automated driving features will not require you to take over driving

### These are driver support features

### These are automated driving features

What do these features do?

These features are limited to providing warnings and momentary assistance

These features provide steering **OR** brake/acceleration support to the driver

These features provide steering **AND** brake/acceleration support to the driver

These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met

This feature can drive the vehicle under all conditions

Example Features

- automatic emergency braking
- blind spot warning
- lane departure warning

- lane centering **OR**
- adaptive cruise control

- lane centering **AND**
- adaptive cruise control at the same time

- traffic jam chauffeur

- local driverless taxi
- pedals/steering wheel may or may not be installed

- same as level 4, but feature can drive everywhere in all conditions

For a more complete description, please download a free copy of SAE J3016: [https://www.sae.org/standards/content/J3016\\_201806/](https://www.sae.org/standards/content/J3016_201806/)

# Autonomous levels. (cont)

- Notice the difference between level 2 and 3.
  - 2 is one feature.
    - Steering **or** braking. Lane centering **or** adaptive cruise control.
  - 3 is one or more features.
    - Steering **and** braking. Lane centering **and** adaptive cruise control.



# Development.

- ADAS and autonomous features are in rapid development.
  - More demand is placed on hardware and software.
    - Computers and sensors.

# Summary.

- ADAS intention is to assist drivers for improved safety, vehicle comfort, and efficiency.
- Universal naming conventions are being implemented via SAE (Society of Automotive Engineers), to avoid existing naming confusion.
- Active safety systems depend on a driver whereas autonomous systems are capable of operating independently.



# Summary. (cont)

- ADAS systems are likely to have superior reaction times compared to humans and when they do take an action, it can be very decisive.
- ADAS systems are still fairly expensive and the public's perception may be more of a wait and see approach.

# The end.

- Please do the Introduction to Advanced Driver Assistance Systems home work on Brightspace.
- The due date listed there.