

# Selvkørende? Førerløse? Autonome? biler

- Hvad kan teknikken i dag, og hvad kan vi forvente?

Hvad skal vi forstå ved selvkørende biler?



# Den delvist selvkørende bil

- Findes allerede i dag,



...for den rette pris.

## Den delvist selvkørende bil

- Man kan anse hvert system, som en Lego klods.

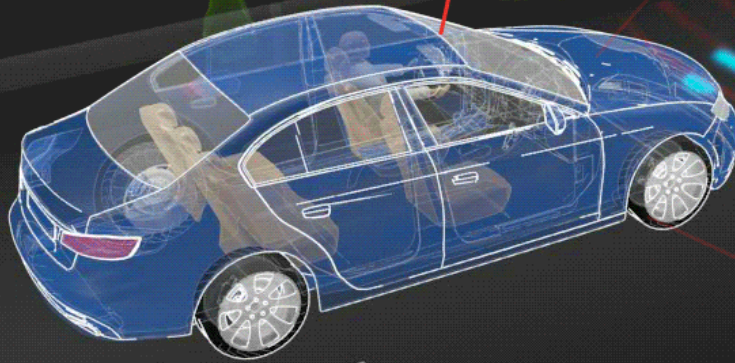
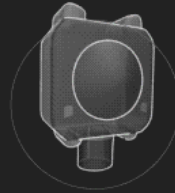


- Sammensat på den rette måde, kan bilen blive selvkørende.

# Adaptive cruise control (ACC)

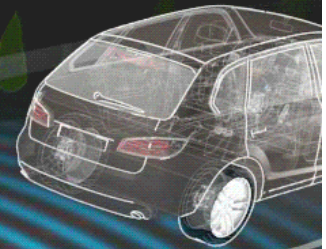
## Longitudinal control

ACC uses a **radar sensor**. The sensor transmits radar waves that are reflected by objects in front of the vehicle. Based on the reflected signals, ACC can calculate the distance, direction, and relative speed of the vehicle ahead.



## Automatic speed adjustment

While driving, ACC maintains the speed set by the driver and can **automatically adapt** this speed to **changing traffic conditions** by throttling back, braking, or accelerating.

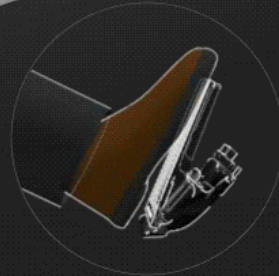


## Stop-and-go functionality

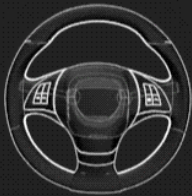
ACC can **maintain a set distance** to the vehicle in front even at very low speeds, and can decelerate to a complete standstill.

If the stopped vehicle in front accelerates again within a few seconds, the ACC **follows it automatically**.

If the vehicle remains **stopped for longer**, the driver only needs to reactivate the system. Briefly stepping on the gas pedal, for example, will return the vehicle to ACC mode.



# Lane-keeping support (Lateral control)

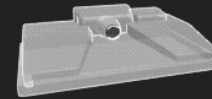
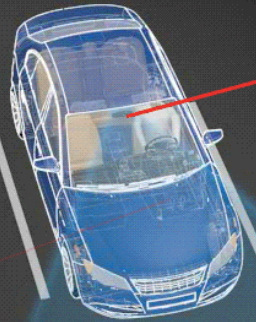


## Countersteering

If the vehicle gets too close to the side of its lane, the system gently but **noticeably countersteers** to keep the vehicle in its lane.

## Non-interfering

When the turn signal is activated, the system **does not intervene**, but allows the driver to **change lanes normally**.



An **onboard video camera** can detect up to three lanes, even when visibility is poor.

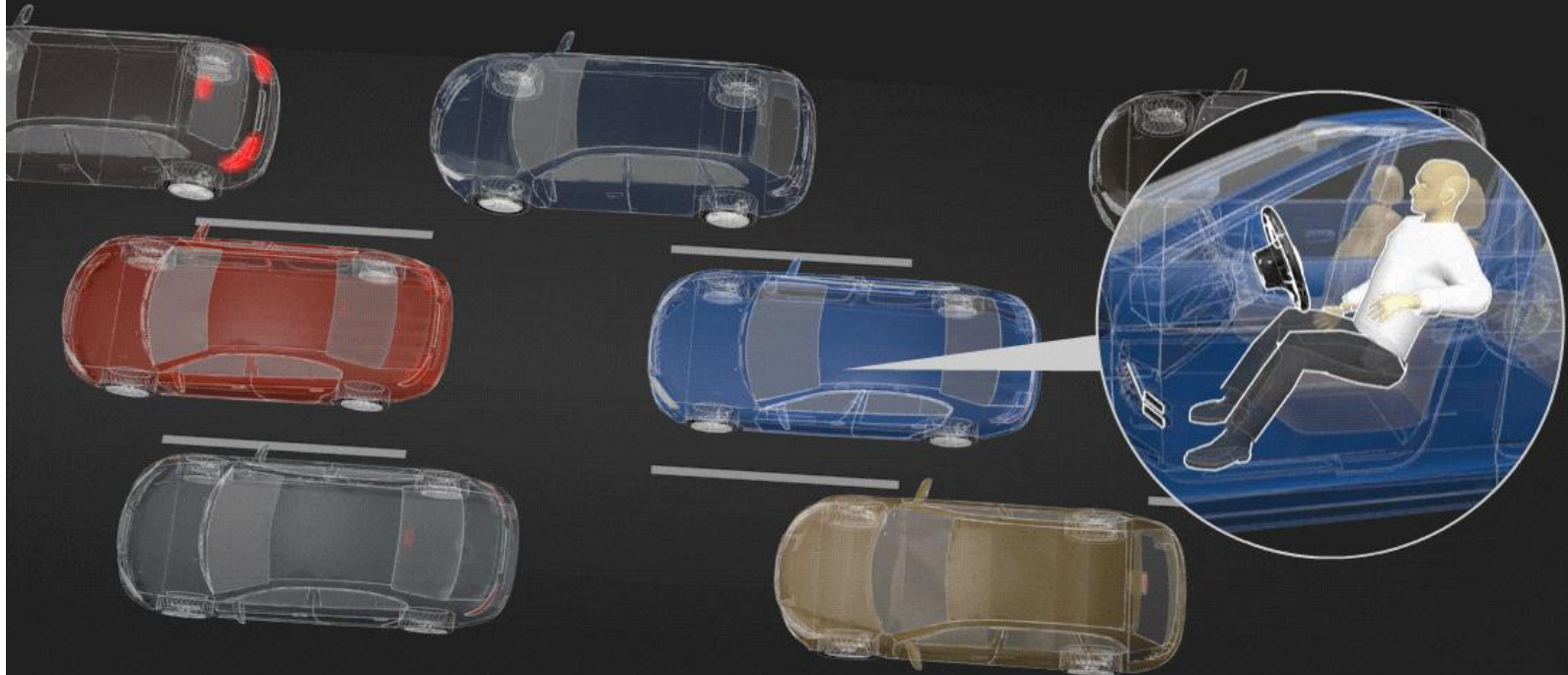
## Lane detection

The camera **detects lane markings** ahead of the vehicle (e.g. white, yellow, or blue), and functions properly **even when one side of the lane markings disappears**.

## Traffic jam assist (Longitudinal and lateral control combined)

**A calm and relaxed driving experience, even in heavy traffic**

The vehicle automatically follows the vehicle in front – starting, accelerating, braking, and steering in its own lane.



This partially-automated system requires permanent driver supervision.  
The driver can take over complete control of the system at any time.

In the future, this system will be expanded to work at higher speeds and in more complex driving situations – including automatic lane changes. It's the next step toward realizing fully automated driving.

# Den delvist selvkørende bil

- Udviklingen af klodserne/systemerne gør, at de kan udnyttes i bilproducenternes øvrige biler.





# Men hvad er udfordringerne?

- Lovgivning
- Ansvar
- Hvornår må vi slippe rattet?
- Kørsel i al slags vejr
- Overgangsperiode



# Lovgivning

- Wienerkonventionen
  - Chaufføren skal have kontrol over sit køretøj eller sine dyr.
- Internationalt arbejdes der på en fælles fortolkning, der endeligt tillader selvkørende biler.



# Ansvarsplacering i tilfælde af ulykker

- Omkring 90 % af ulykker i bil i dag skyldes den menneskelige faktor.
- Hvem skal bære ansvaret for en ulykke med en selvkørende bil?
- På hvilket grundlag skal en selvkørende bil agere, hvis en ulykke er uundgåelig?
- Vælger den at køre ind i bilen på venstre side, cyklisten foran eller fodgængere til højre?



Skal vi have lov til at foretage os noget andet, mens vi kører?



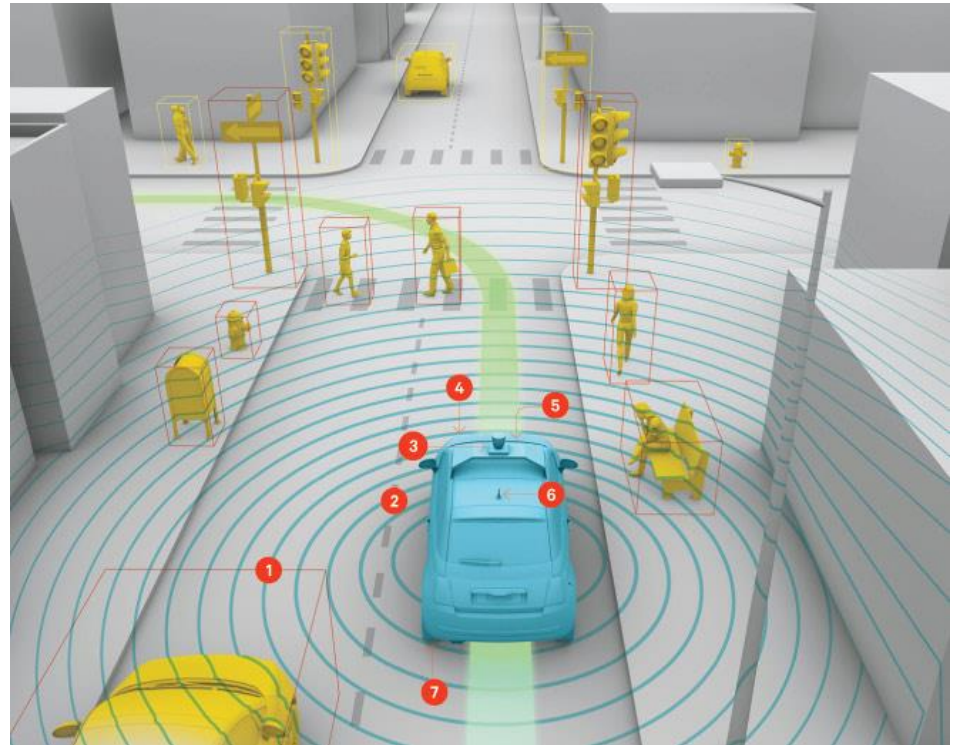
# Selvkørende i al slags vejr

- En af de væsentligst udfordringer, der endnu gør sig gældende for selvkørende biler er vejrforholdene.
- Dette gælder både regn og sne.



# Overgangsperiode

- I takt med, at delvist selvkørende biler bliver mere udbredt, vil der komme en længere periode med både traditionelle trafikanter og selvkørende biler.
- Selvkørende biler vil umiddelbart køre mere forsigtigt, ved at holde fartgrænserne og bremseafstand.
- Skal selvkørende biler have en trafikmæssige fordel?



# Transportkasserne kommer, men hvornår?

