



BlueCruise

Future Networked Car Symposium

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Levels of Driving Automation

Ford's Adaptive Cruise Control with Stop&Go and Lane Centring Assist



L2a
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



Ford's BlueCruise a Level 2 Driver Assist Technology

When the feature requests,
you must drive



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



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





Lane Centring with BlueCruise

- Ford Level-2 assisted driving feature that uses a camera-based driver monitoring system.
- Extends the scope of ACC S&G with Lane Centring on pre-identified sections of motorway (BlueZones) where driver can remove the hands from the steering wheel.
- A driver facing camera is added to the system to assess awareness of the driver based on direction of gaze.
- If the driver is not looking at the road a warning escalation is started to get the drivers attention back on the road. This is done during hands Lane Centring and BlueCruise driving.
- Introduced in 2021 in the US and Canada.
- April 2023 the system was approved for use in Great Britain, followed by Germany in August and by Spain in September 2023.

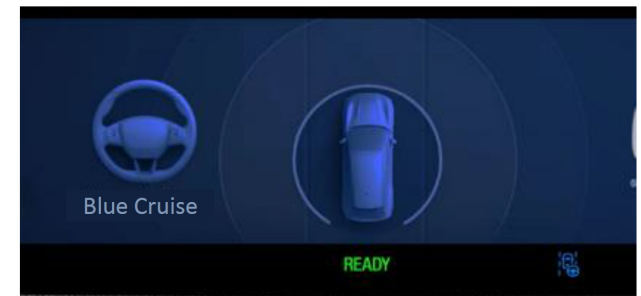
Lane Centring

- Functionally is equivalent to our production feature: Adaptive Cruise Control + Lane Centring Assist with added driver gaze monitoring
- Operational Speed: 0 – 180km/ 200km/h
- HMI will inform the driver if system detects that the driver is not looking at the road or the hands are not detected to be on the steering wheel.
- Driver can override the system at anytime by applying torque to the steering wheel or cancel the system by use of the brake pedal.
- Driver is still responsible for the control of the vehicle as BlueCruise is a Driver Assistance Technology



BlueCruise

- Available on certain pre-qualified sections (“Blue Zones”) of divided highways
- Uses driver facing camera for driver engagement monitoring for BlueCruise driving
- The hands-off warnings based on hands-on-wheel torque will be suppressed and driver can remove the hands from the steering wheel
- Operational Speed: 0 km/h – 130km/h
- HMI will inform the driver that they can take advantage of BlueCruise
- HMI will inform the driver when transition to hands-on driving is required or if system detects that the driver is not looking at the road.
- Driver can override the system at anytime by applying torque to the steering wheel or cancel the system by use of the brake pedal.
- Driver is still responsible for the control of the vehicle



Lane Centring & BlueCruise Eyes-off Warning HMI

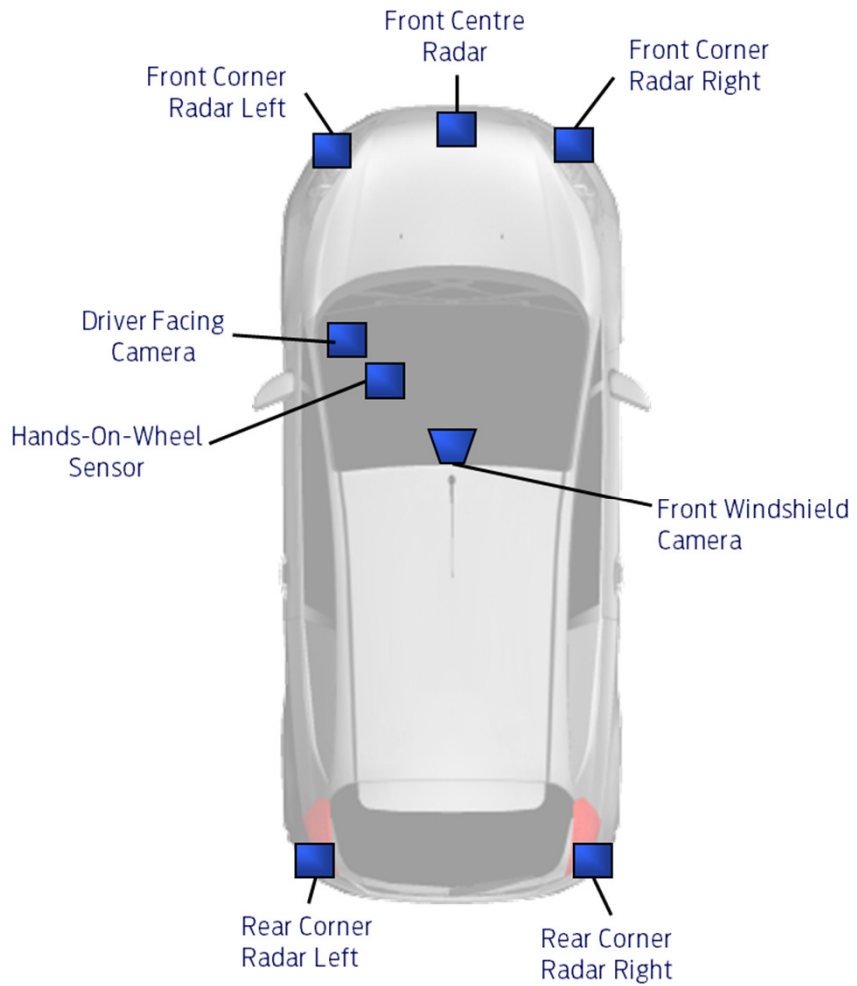
Condition	Base HMI	Eye Glance Away From Forward Road Scene Is Detected			
		Warning	Takeover Request 1	Takeover Request 2	Intervention
HMI			<p>same visual/audible for all 3 conditions</p>		
Driver looking away, but NOT at the instrument cluster		Visual warning with single audible alert	Visual warning with continuous audible alert	Haptic alert (brake pulses) with accelerator inhibit and visual warning with continuous audible alert	Haptic alert (braking to a complete stop) with visual warning with continuous audible alert

Approved ODD

- Great Britain, Germany, Spain
 - Divided highways according definition of ECER79 for ACSF C (paragraph 5.6.4.2.3)
 - No Tunnels
 - No toll area
 - No tight curves
 - Countries can be geofenced (included/ excluded)
- ~94% of highways (61.000 km of 65.000 km)



Sensor System and Components



Location of Driver Facing Camera



Equivalent Level of Safety to ECE-R79

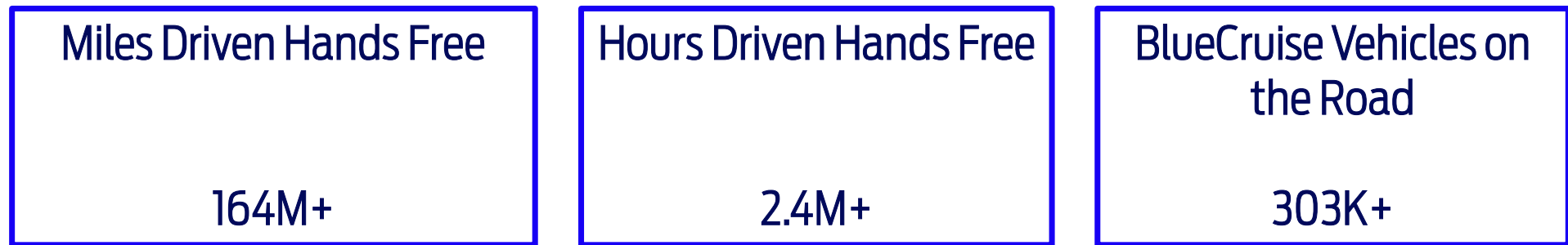
- Torque-based hands-off detection + driver gaze monitoring
- Driver gaze monitoring forces the driver to always to look at the road to be aware of the driving situation.
- Timing to provide a first warning is shortened compared to ACSF-B1 to ensure driver remains engaged, whilst offering a higher level of comfort.
- Always combined with longitudinal control (ACC) and with an AEBS including forward collision alert.
- Timing selected for eyes-off warning is derived from natural driving behaviour.
- Emphasis in communication on Driver Assistance feature only and not a L3 ADAS.
- Reinforced by the feature name (explicitly chosen to avoid any reference to Autonomous Driving); and an information message upon first activation in a drive cycle is provided.

Development Activities

- Several HMI Clinics in Simulator and on road
 - Mode Confusion
 - Effectiveness of Warning Cascade
 - Understanding of Limitations
- Extended development drives
 - 400.000 km in USA/Canada pre-launch 2021
 - 225.000 km in USA/ Canada since launch in 2021
 - 85.000 km in China
 - 7.000 km in Europe
- Continuous improvements since launch in 2021



North American Customer Experience BlueCruise





Thank You!

