

ADS INTENT COMMUNICATION

Integrated Safety Mark, Speed Behaviour, Text components to significantly improve system transparency, security, and user trust.



Slowing down to keep distance



Slowing down to stop

Portfolio section 02

ADS Intent Communication

How a self-driving system tells the driver what it is about to do before it does it.

ADS Intent Communication

Steering Wheel Lightbar · AR HUD · Driver Display · Center Display

Designing trust across multi surfaces,
about how a self-driving system tells the
driver what it is about to do before it
does it.

Lead UX Designer

Visual + Interaction

Shipped

IF Award

★ Shipped on Huawei Intelligent Driving Platform

★ IF Design Award Winner



As vehicles drive themselves more, trust becomes the core design problem.

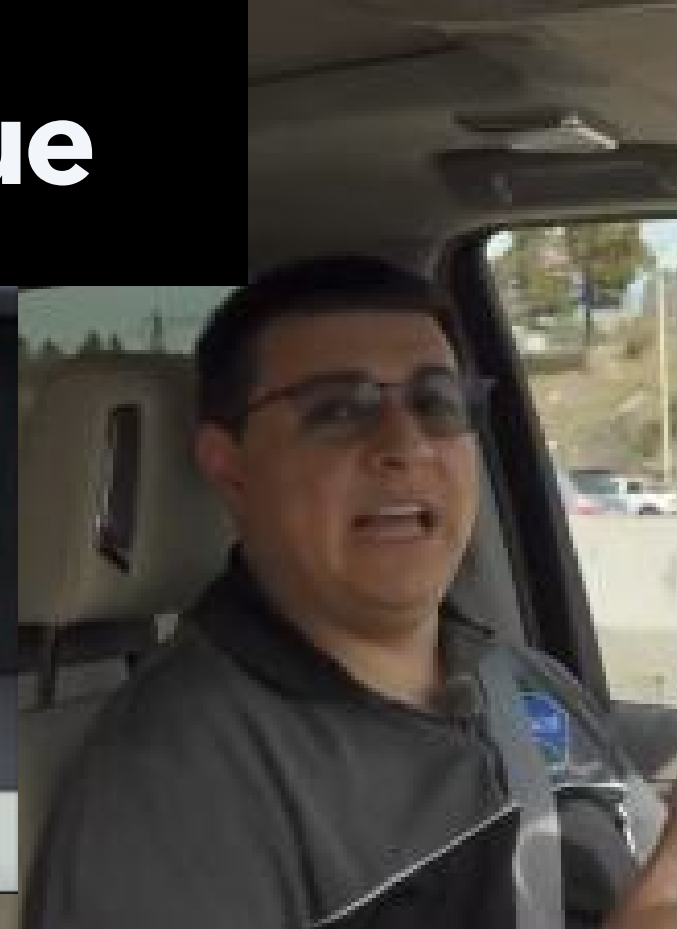
As driver assistance technology advances, cars are taking control of more driving scenarios for longer periods of time.

To build genuine trust, drivers need more than easy override control. They need to clearly understand **the vehicle's autonomous intent**, its **current assistance state**, and **what movement** is about to happen with enough information and time to decide whether to continue or intervene.

This project addresses two specific gaps: "Drivers don't know what the car is controlling, or what it can control" "Drivers don't know what the car is about to do, when it will start, or when it will end"



Footage & current technique



ID.Light
Take Over Steering + Emergency Assist



red light recognised
press SET on steering wheel to confirm



Competitive Analysis

Tesla Gap

Shows what the system detects:

- ✓ Road elements appear/disappear, vehicles turn blue.
- ✗ No indication of what the car will do next.

XPENG / LI AUTO

- ✓ Blue lane overlay + text notifications for lane change.
- ✗ No unified model. Each scenario is designed independently, creating inconsistent trust signals.

BMW / MERCEDES

- ✓ Strong HUD AR elements for navigation. Minimal ADS intent expression
- ✗ No predictive communication before movement happens.

OUR DESIGN OPPORTUNITY

Decomposable intent information model:
Origin + Destination + Plan + Spatial position
one architecture that covers every scenario across every surface.

How do you tell a driver what the car is thinking?

ADS can sense hundreds of objects, calculate thousands of variables, and make a driving decision in milliseconds. The driver sees none of that. They only experience the result — a movement they didn't expect.

01 Complex, unpredictable scenarios

How do you design for infinite variation without building an infinite number of solutions?

02 Clear enough to be understood instantly

How do you compress complex system state into something readable in under 200ms?

03 Trustworthy

How do you make design feel credible when it must be technically exact?

04 Not redundant. Not disruptive.

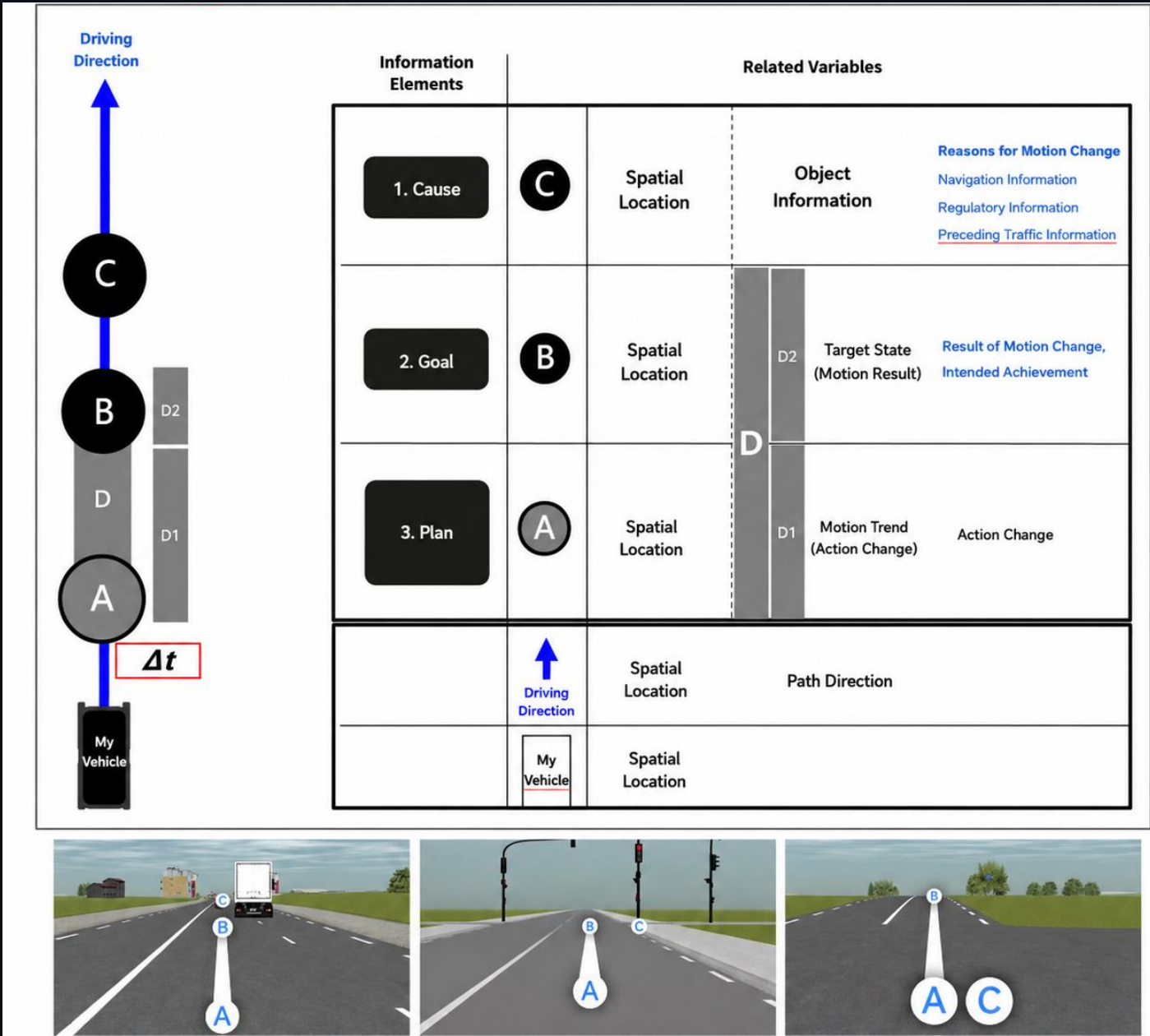
How do you decide when to communicate, and when silence is the right design choice?

One intent model. Three systems. Every scenario.

01

Intent information model

Universal decomposable architecture



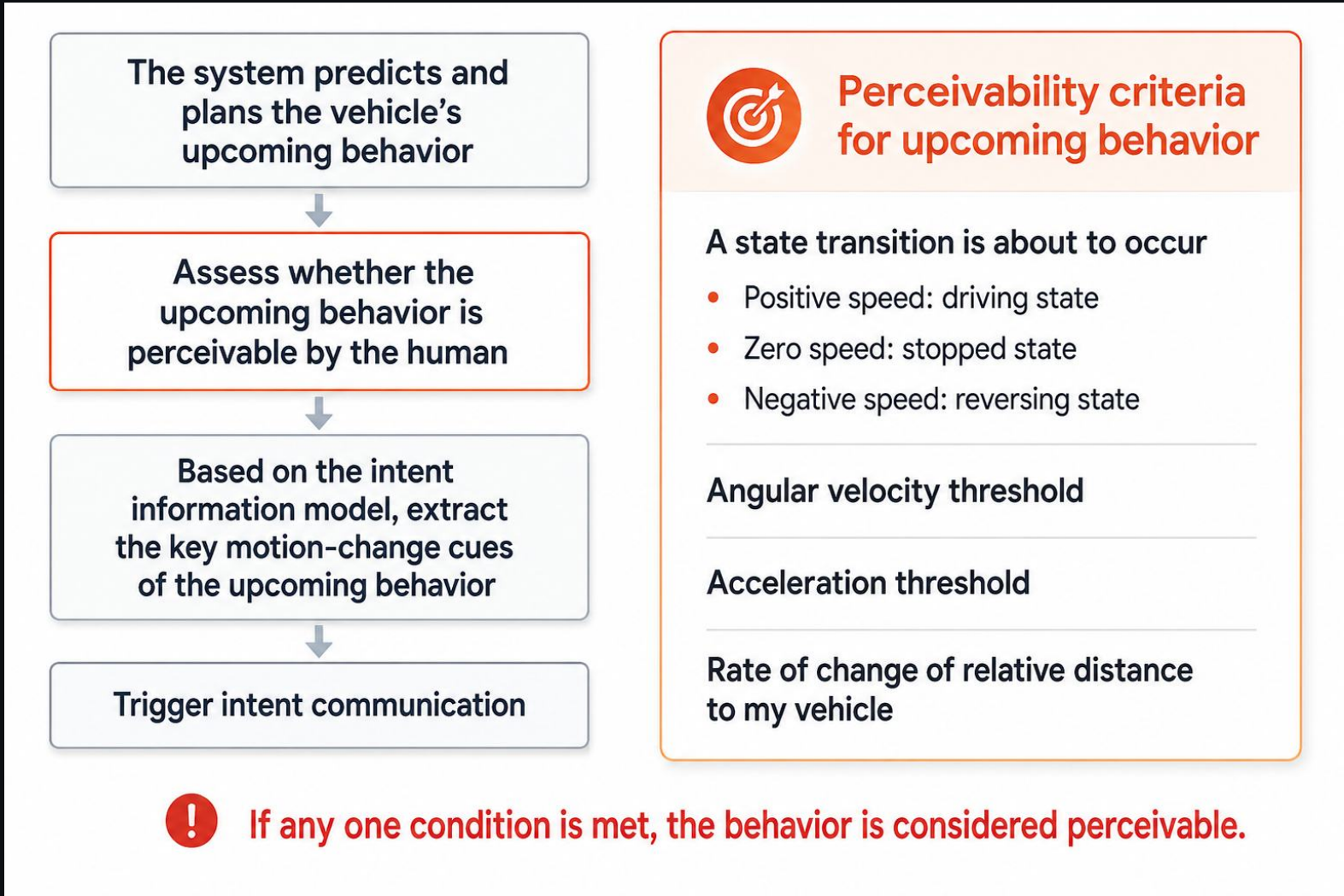
Why it matters

One model connects to all scenarios: car following, traffic light, lane change without redesigning from scratch.

02

Dynamic trigger mechanism

When to speak, when to stay silent



Why it matters

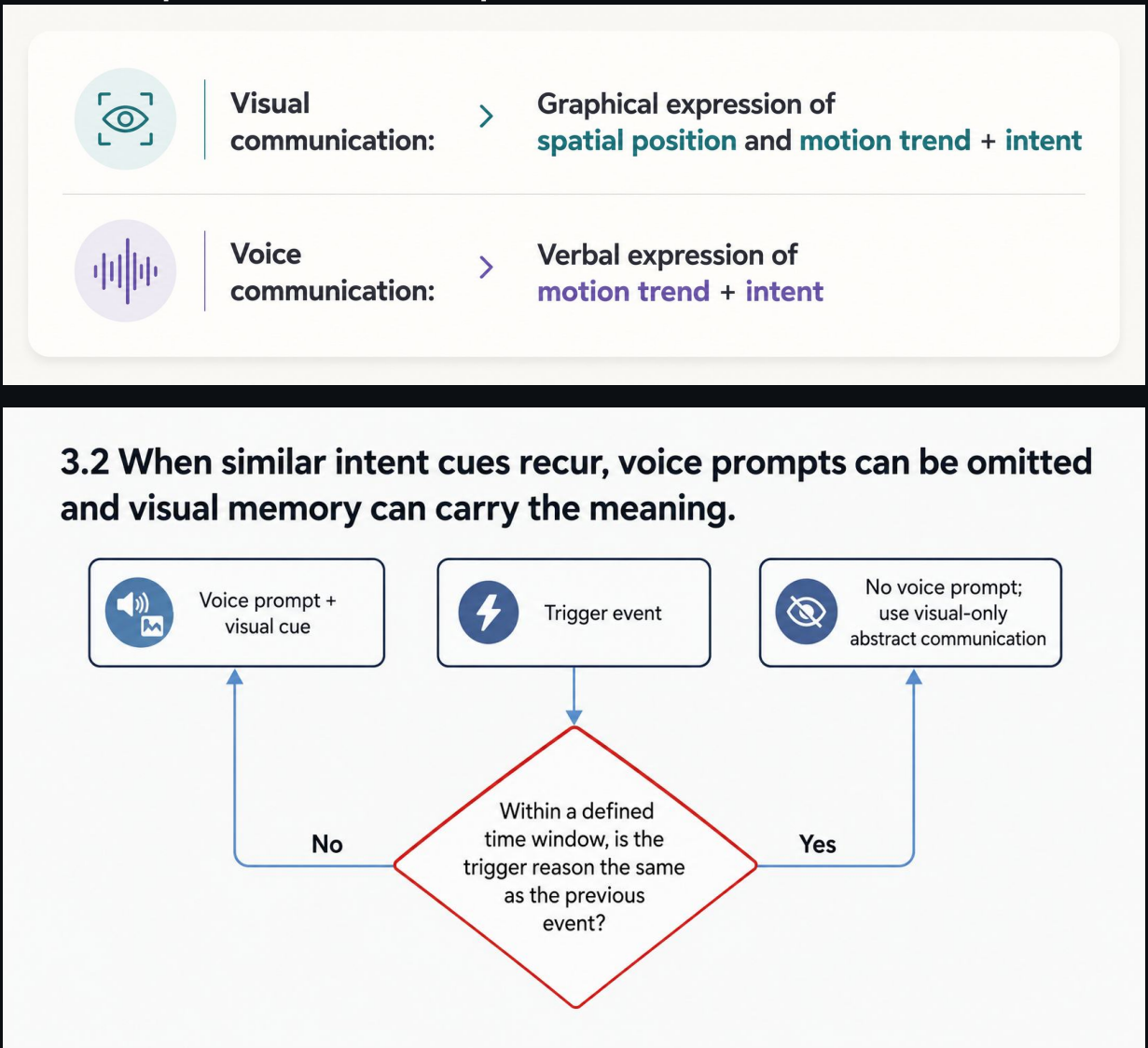
Avoids notification fatigue. The system speaks only when the movement is perceptible to the driver.

03

Visual + Voice graphic memory

Adaptive frequency by scenario type

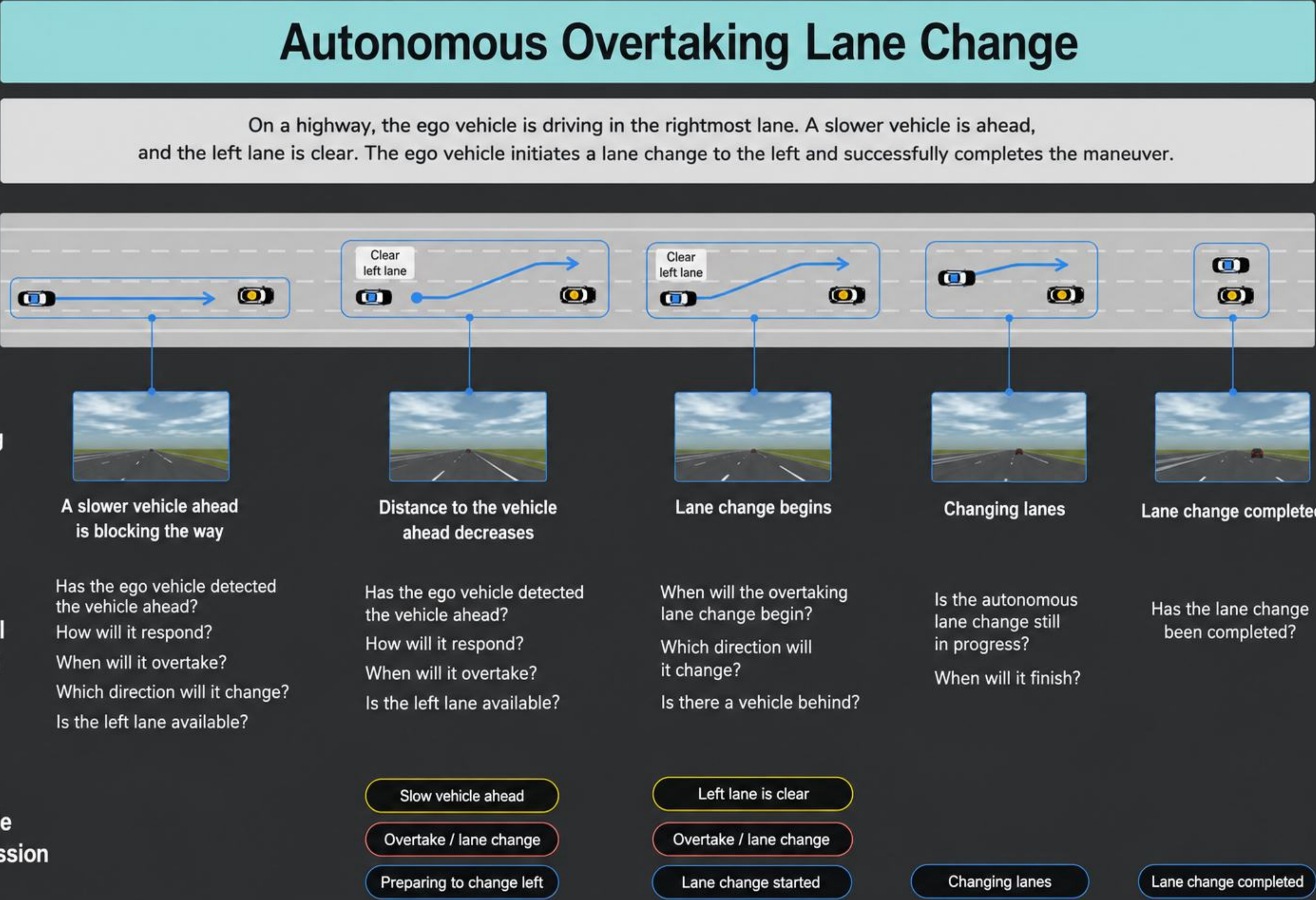
- Repeated similar intent → visual only
- Adapts to HUD, display, lightbar



Why it matters

Reduces distraction for experienced users while maintaining clarity for new scenarios.

One message. Four rendering environments.



Timing

A slower vehicle ahead is blocking the way

Distance to the vehicle ahead decreases

Lane change begins

Changing lanes

Lane change completed

User mental model

Has the ego vehicle detected the vehicle ahead?
How will it respond?
When will it overtake?
Which direction will it change?
Is the left lane available?

Has the ego vehicle detected the vehicle ahead?
How will it respond?
When will it overtake?
Is the left lane available?

When will the overtaking lane change begin?
Which direction will it change?
Is there a vehicle behind?

Is the autonomous lane change still in progress?
When will it finish?

Has the lane change been completed?

Vehicle expression

Slow vehicle ahead

Overtake / lane change

Preparing to change left

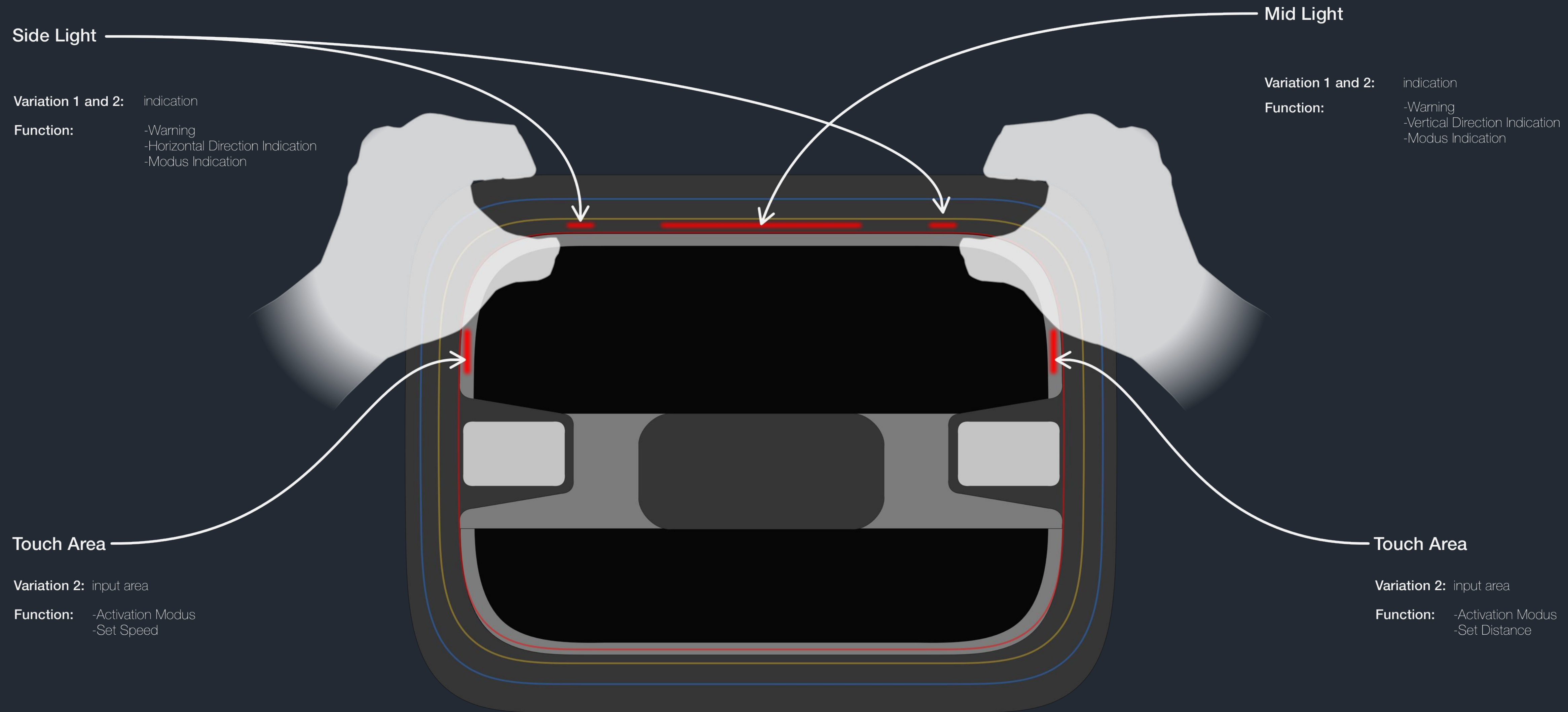
Left lane is clear

Overtake / lane change

Lane change started

Changing lanes

Lane change completed



Color + rhythm. No glance needed. Subconscious.

PERIPHERAL / AMBIENT

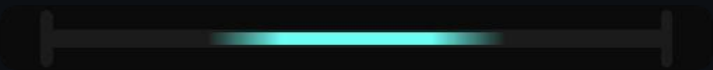
Surface 01_ Steering Wheel Lightbar



Activation



Manual Driving



Latitude Control activated

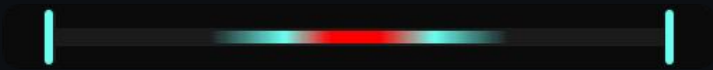


Longitude Control available

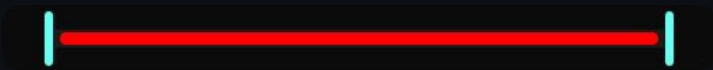


Longitude Control activated

Acceleration / Deceleration



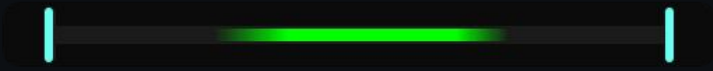
Detected obstacles or traffic light



Holding



Traffic Light with Timer

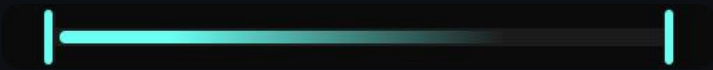


Ready to go / Green light



Max. Acceleration Rate

Lane Change



Forecast Lane Change Intention

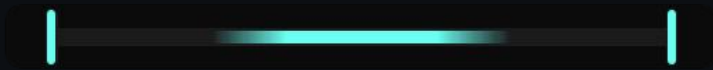


Start of Lane Change



Forecast "Next Action" Intention

Hands Back Warning



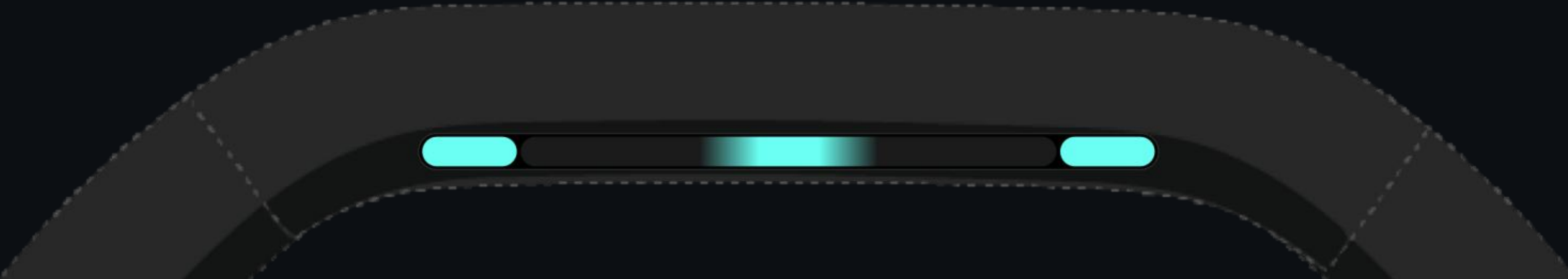
Warning Level 1: Hand Back



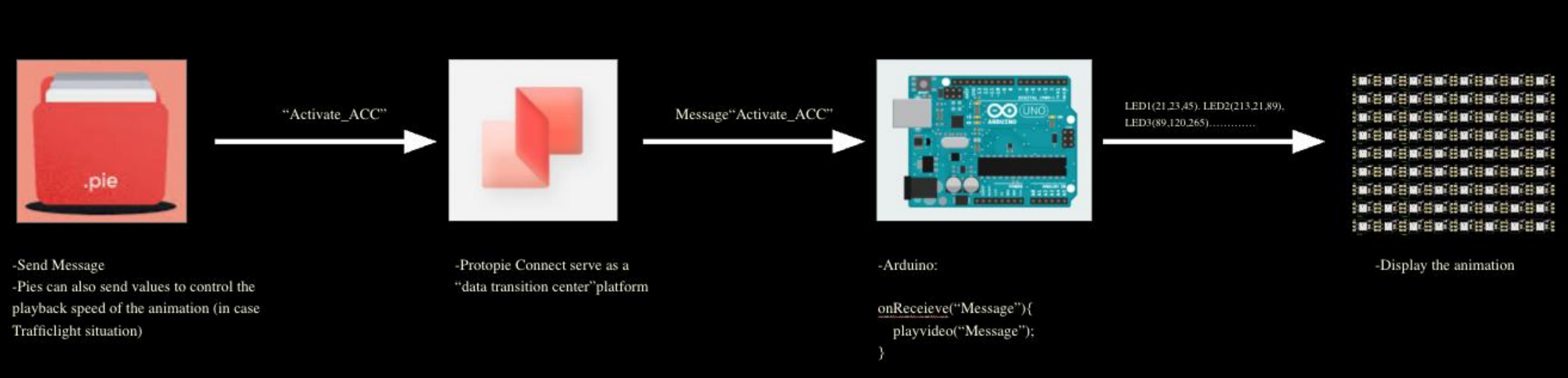
Warning Level 2: Put hands back immediately



Warning Level 3: Complete Stop





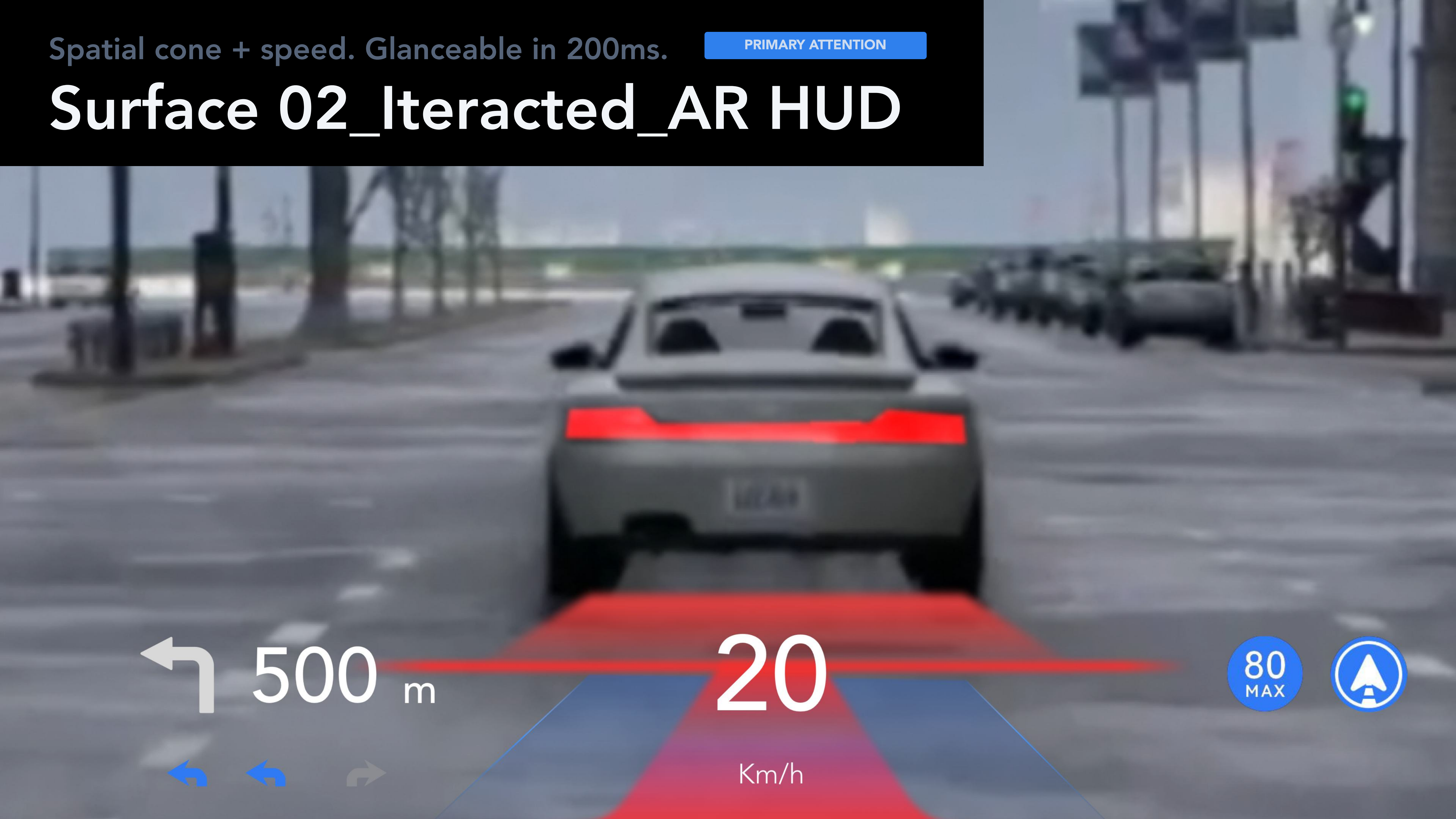




Spatial cone + speed. Glanceable in 200ms.

PRIMARY ATTENTION

Surface 02_Iteracted_AR HUD



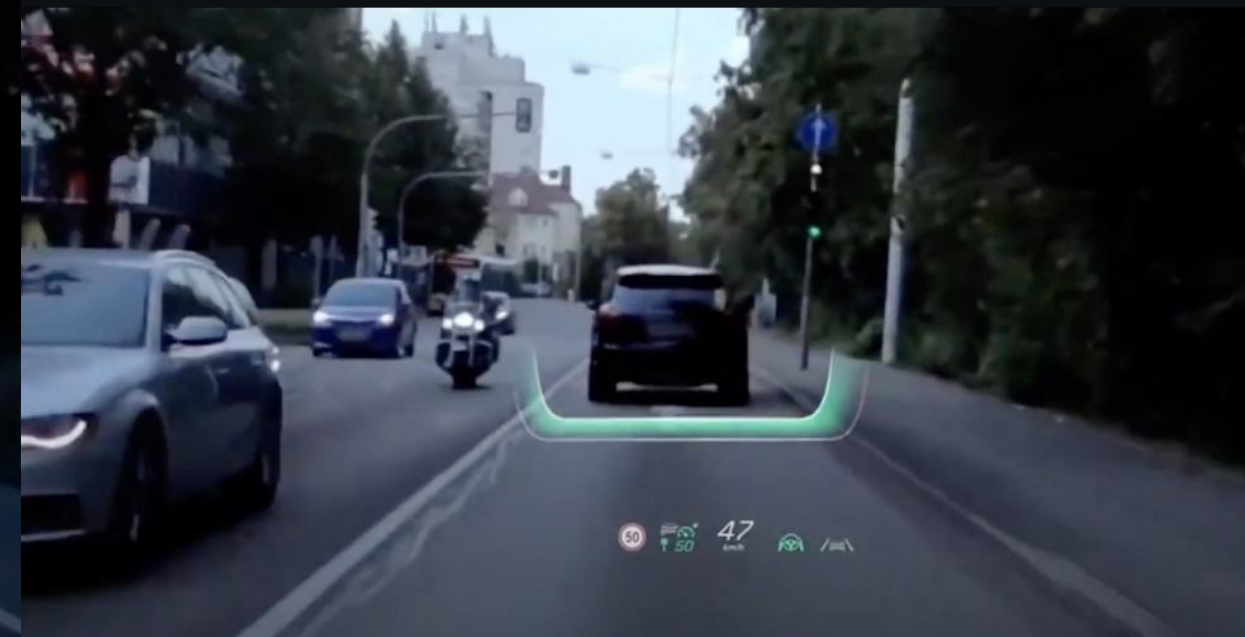
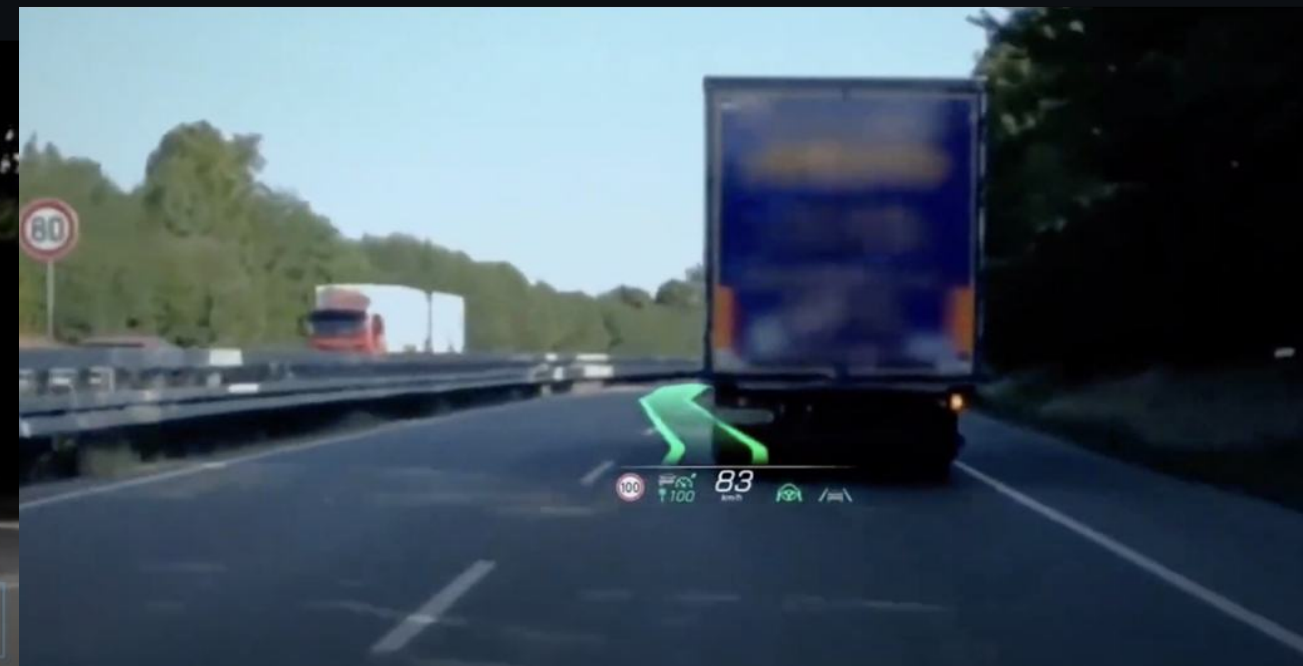
500 m

20

Km/h

80
MAX









SLOWER
TRAFFIC
KEEP
RIGHT



5 km



80

Km/h

80
MAX



50

Km/h

920 m



80
MAX



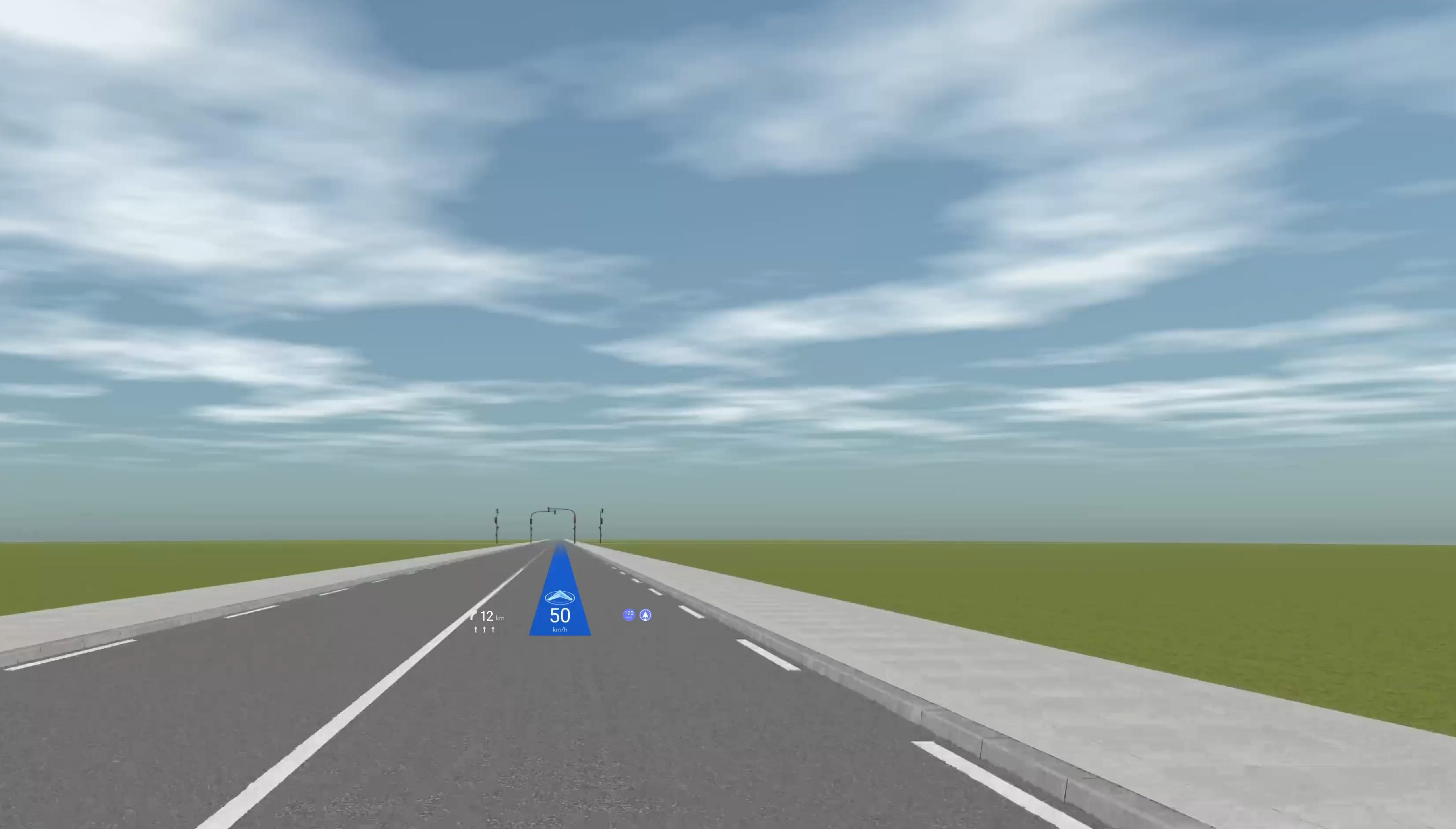


12 km
↑ ↑ ↑

80
km/h

120
km/h





12 km
↑ ↑ ↑

50
km/h

120
km/h



Intent card + progress. 2-3 second window.

GLANCEABLE / CONFIRM

Surface 03_Driver Display



Direct Transform

Match SR



Hero Element

Blitz

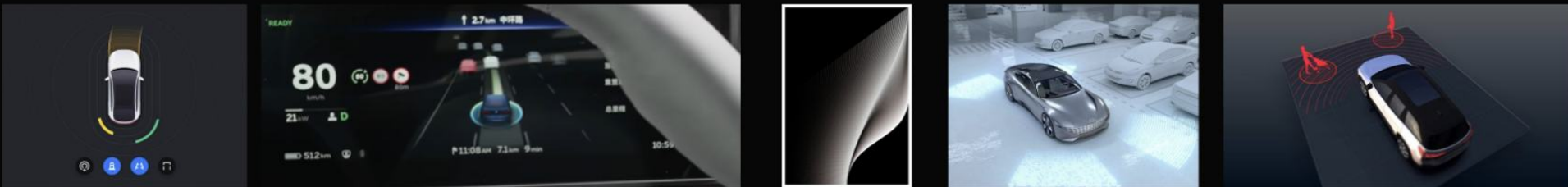


fire bug



Affects Around

Lines



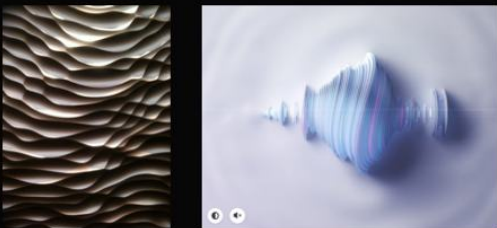
Particle



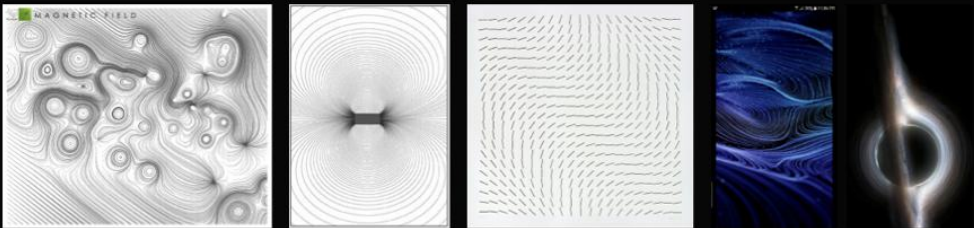
Metaball



Segments



Magnetic



Waves



Routes Effect



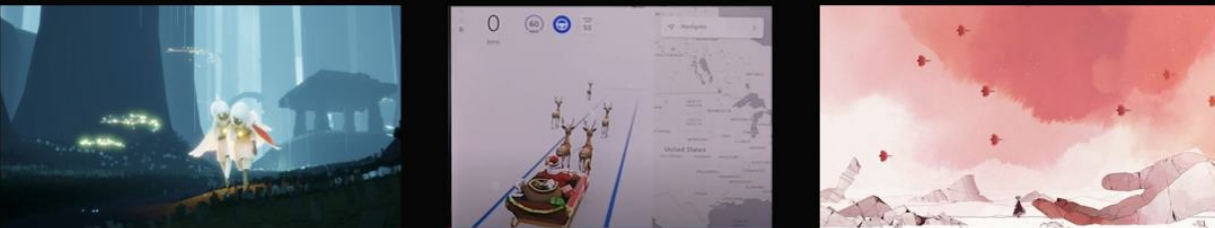
气的流动

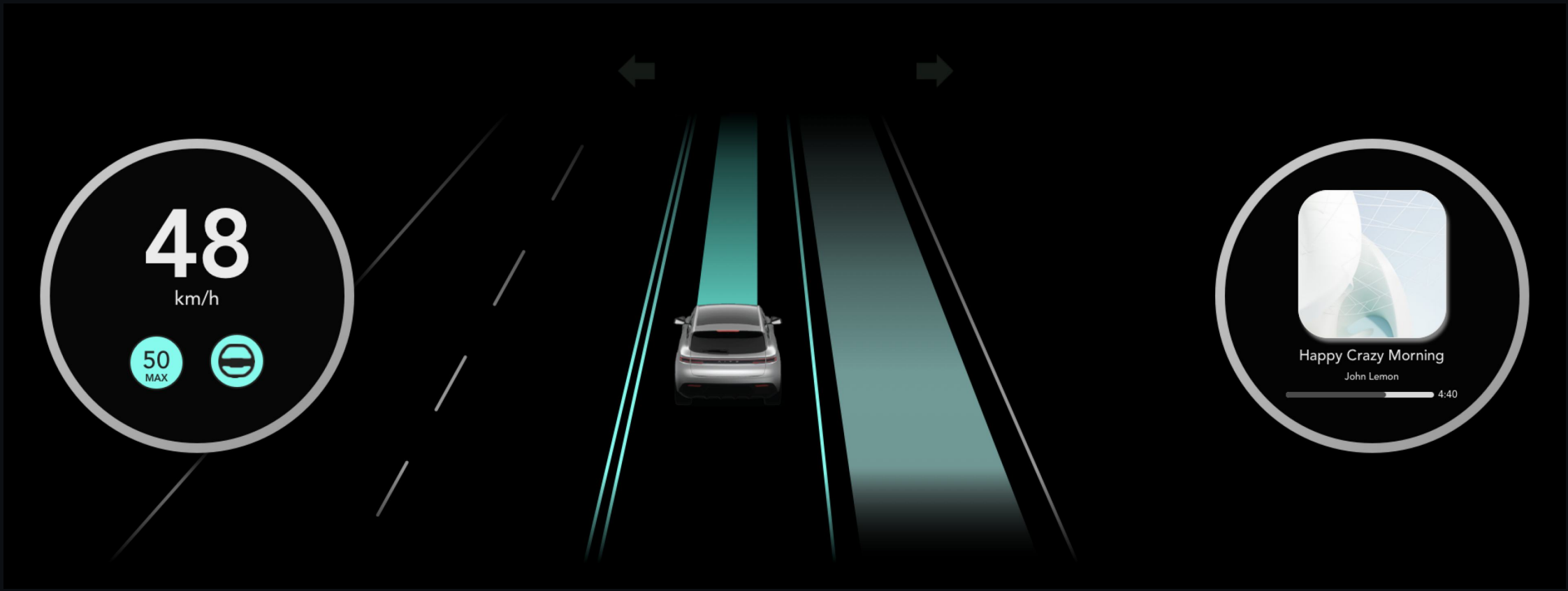
气的融合

Away

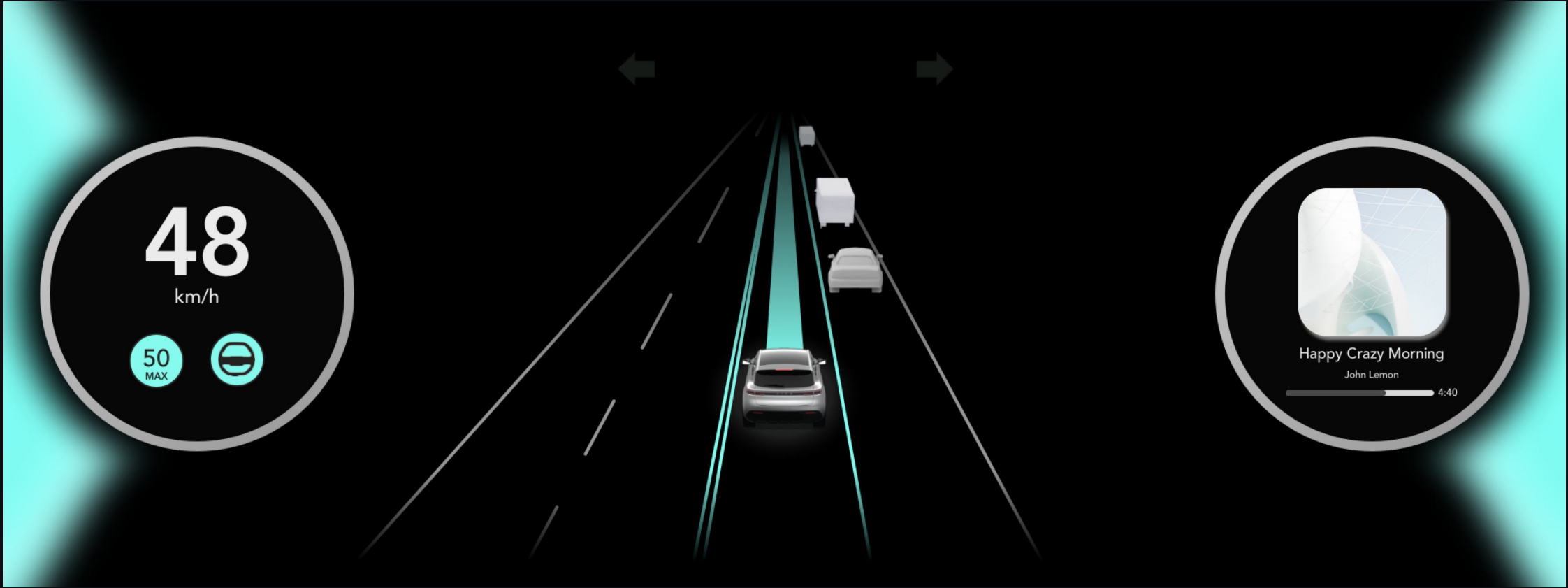


Attraction





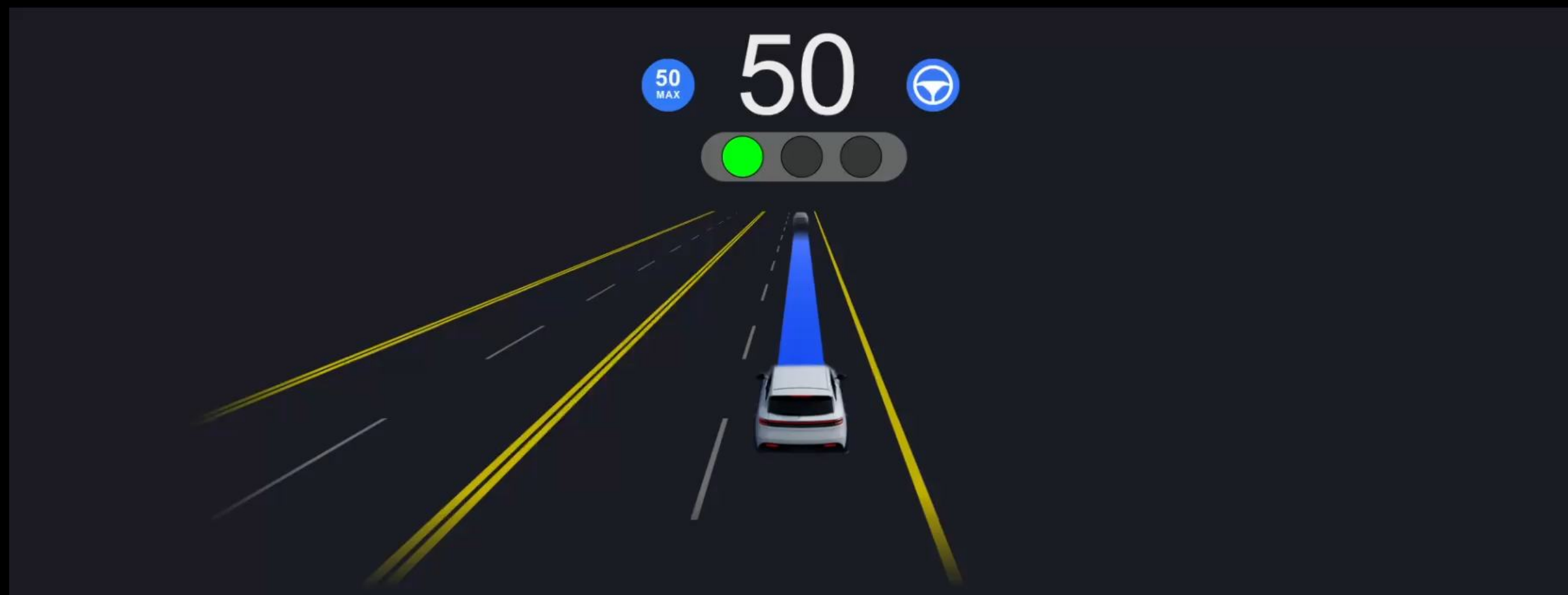
Expanded Sensor View

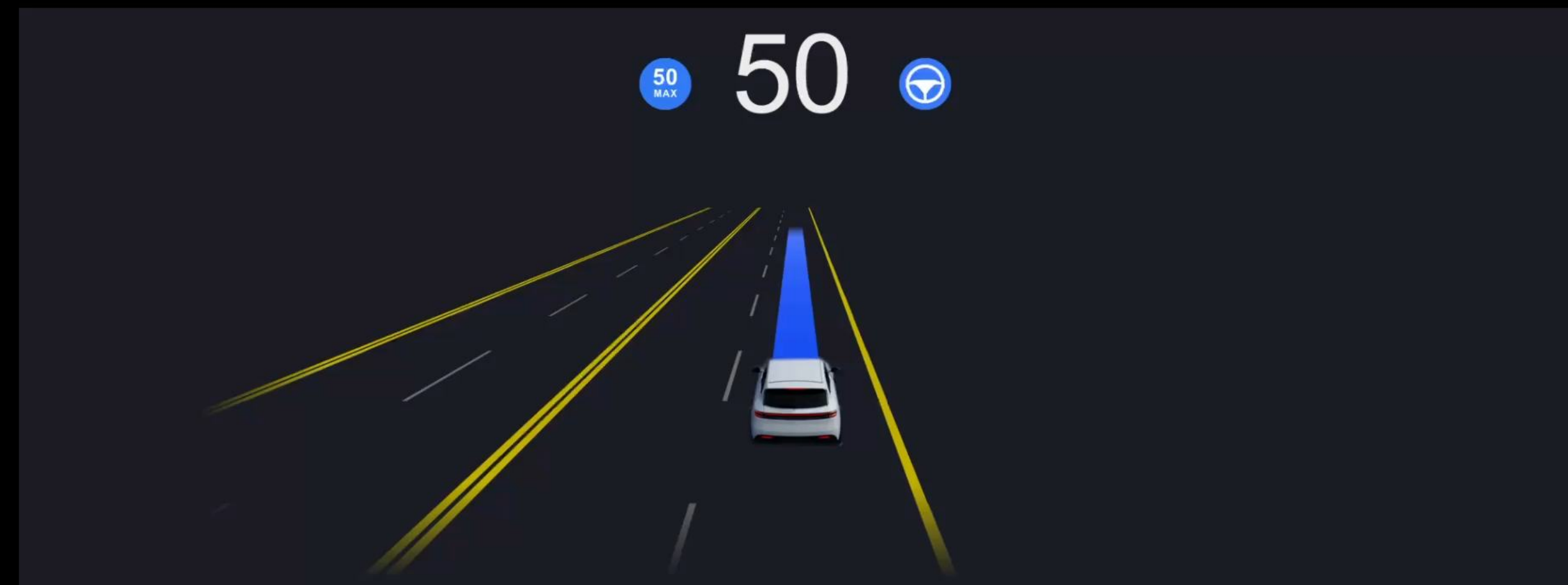
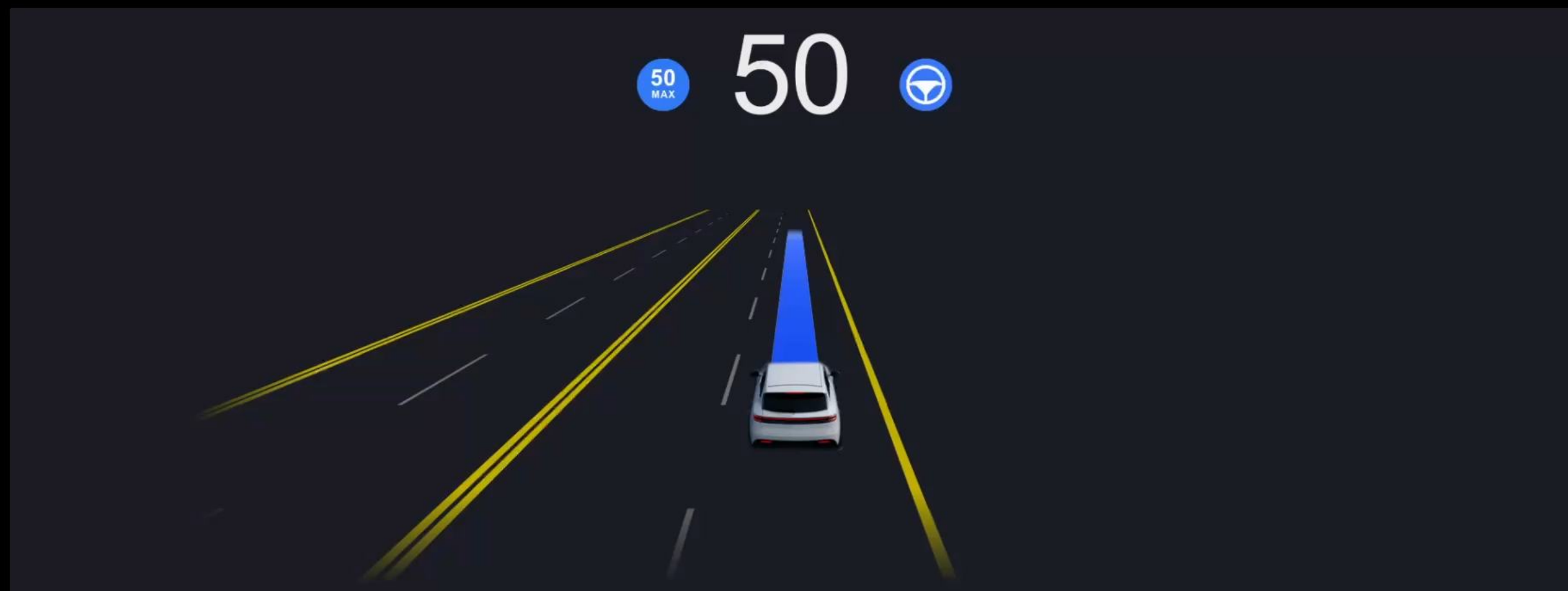


Left-Right Intent Zoning



Progress-Based Explanation





120
MAX

80
km/h



12 km

Exit 325 Highway



Havana

Camila Cabello

 160 km

SUM 274 km

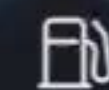


D



18:20

27.5 °C

 114 km

Multi-surface Coherence



One moment in time - four surfaces, one coherent intent.



Design Decision

Information should not be duplicated across screens.
Each display should carry a different level of meaning.

HUD

What needs to be perceived immediately

IC

What needs to be monitored while driving

Central GUI

What needs to be understood in more detail

Outcome

A layered communication model that balances clarity, attention, and safety.

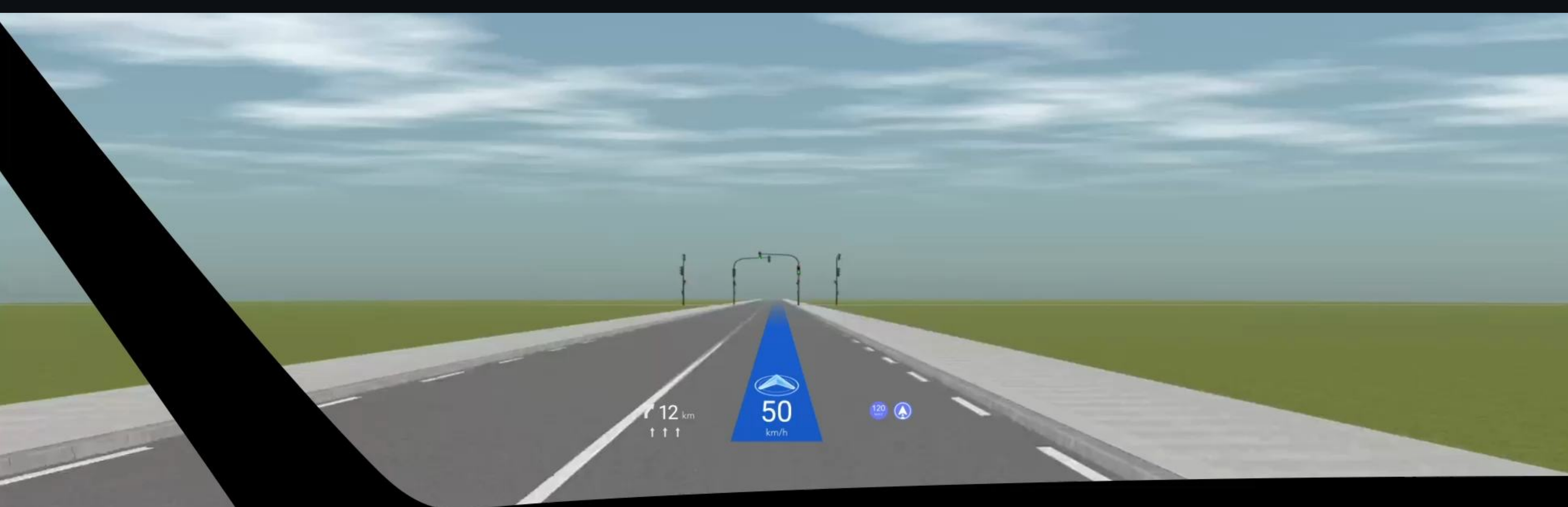
城市NCA意图表达_语音播报体验

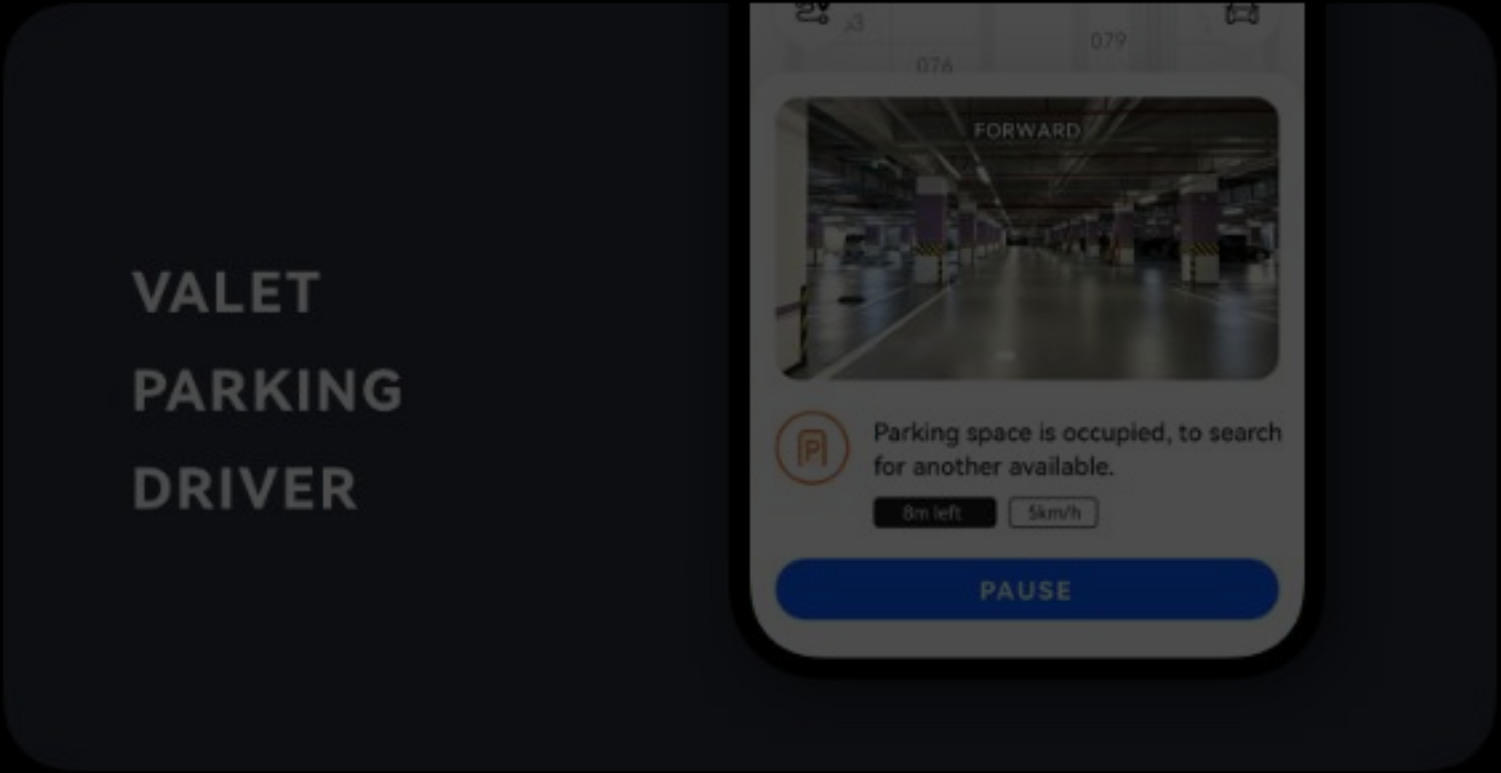
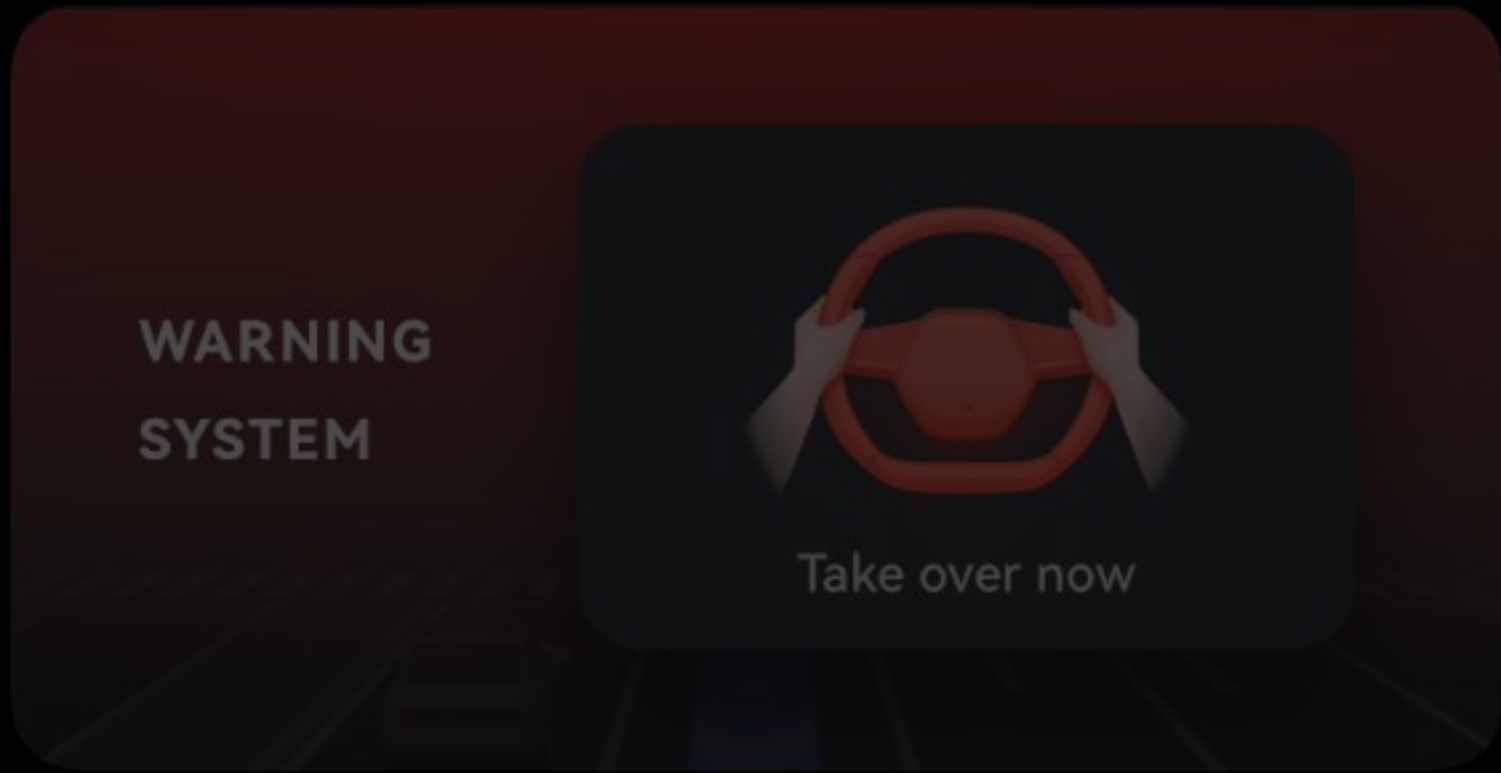
体验时长：3分18秒

词条种类：7个

播报次数：15次

词条	播报次数
“我在等待起步”	5
“我将刹停”	5
“我将减速跟车”	1
“我将减速进入弯道”	1
“我将减速避让”	1
“我将向右变道停车”	1
“我将进入左侧目标车道”	1





08

Design System & Tooling



Built the tools, not just the designs.

Scenario design kit	Intent component system	GUI reference library	Full ADS platform scope
Modular 3D road environment roads, vehicles, pedestrians, traffic lights, weather, lighting all composable. Built to enable frame-by-frame design decisions across every driving scenario.	Lightbar states, HUD variants, IC intent cards, text intent expressions All versioned and documented. Each component is parameterized by: scenario type, severity, direction, progress. Reused across NCA, AVM, Emergency features	HUD and IC base components speed displays, status indicators, navigation elements. All designed for glanceability constraints (200ms read time, peripheral visibility, night/day modes). Cross-team use: NCA, Active Safety, Parking	Sits within a broader ADS design covering Navigation Cruise Assist, Active Safety, Automated Valet Parking, Warning System, 3D Simulation, UI Components. IF Design Award

+ Trust

Trust is built by answering three questions in real time:

What is about to happen?

Why?

What should I do?

The design challenge is informational architecture: which signal reaches which surface, at which moment, with which level of urgency, without overwhelming the person in control of a moving vehicle.



READY 10:06 D 30°C

30 km/h

146米
右转江湾路

33.1公里 10:55到达

197km 84% 1022km 1219km CLTC 智驾辅助中 1% PWR 449

倍速播放

New Huawei Qiankun Intelligent Driving ADS 4 System September OTA