



ACCELERATING THE RACE TO SELF-DRIVING CARS

Danny Shapiro, Sr. Director of Automotive | IEEE



IN THE BEGINNING

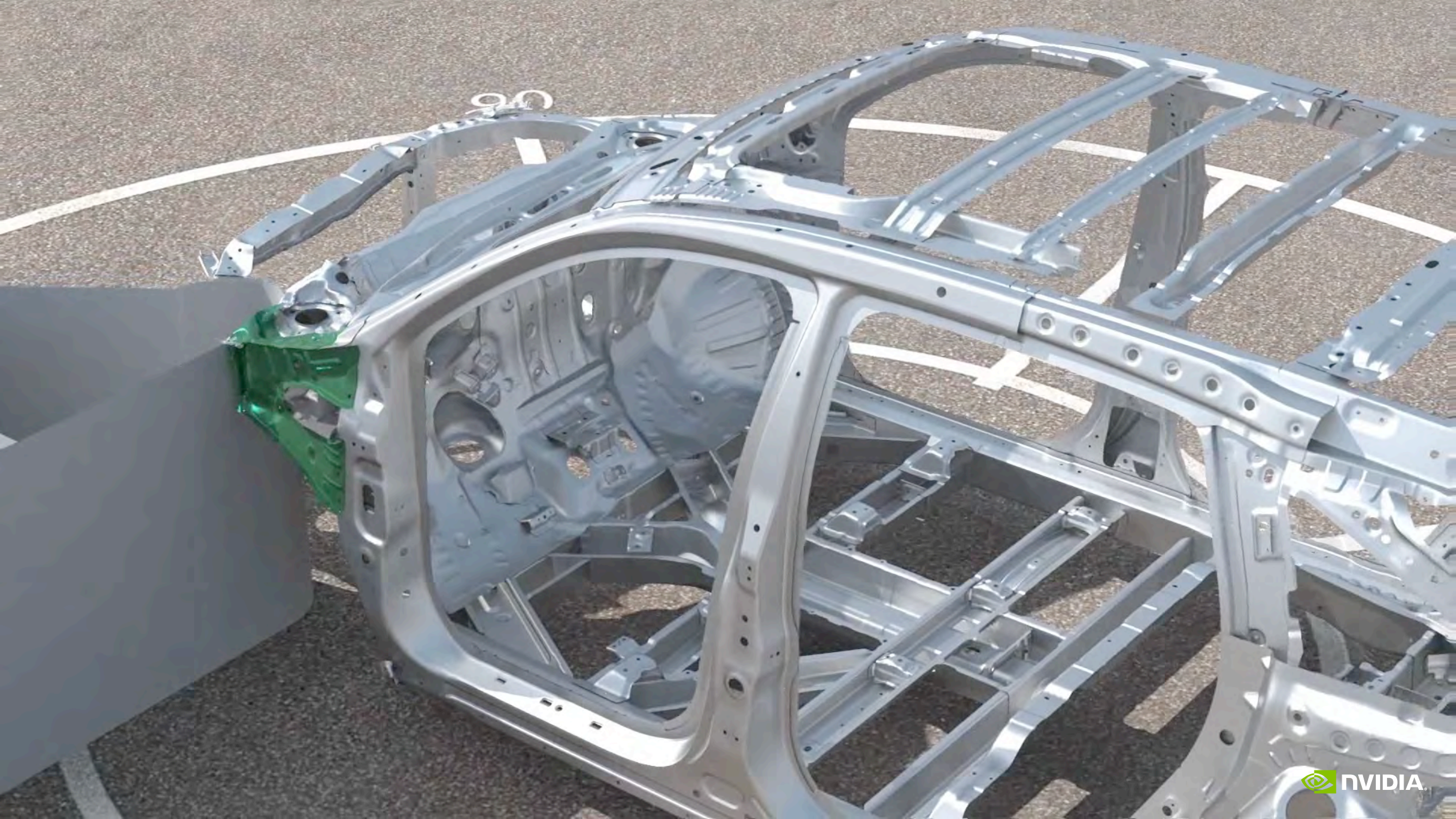




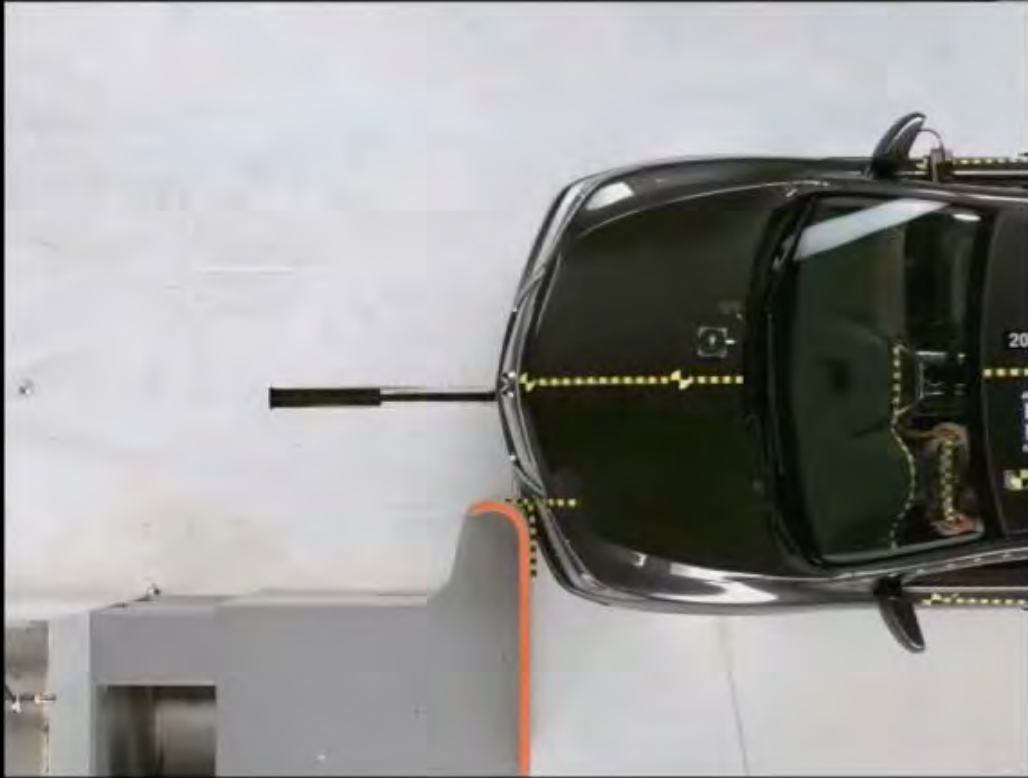
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P30/30 0:01.788
◆
L1/2

26 | 6.6









ACTUAL CRASH



SIMULATED CRASH

THE FUTURE OF CAR BUYING



ENABLING THE SOFTWARE-DEFINED CAR



ENABLING THE SOFTWARE-DEFINED CAR



ENABLING THE SOFTWARE-DEFINED CAR



ENABLING THE SOFTWARE-DEFINED CAR



ENABLING THE SOFTWARE-DEFINED CAR





Settings

⚡ CHARGING

ACCELERATION

STANDARD

SPORT

SPORT

LUDICROUS

Max Battery Ready!

START

to help free vehicle stuck in snow, sand, or mud

A NEW ERA OF COMPUTING



PC INTERNET

WinTel, Yahoo!
1 billion PC users

1995



MOBILE-CLOUD

iPhone, Amazon AWS
2.5 billion mobile users

2005



AI & IOT

Deep Learning, GPU
100s of billions of devices

2015

San Francisco Bay

Driven to the Valley

Many automotive companies are opening Silicon Valley research labs and offices as car technology, including self-driving systems, grows tantamount to the industry's future.

BELMONT

Volkswagen

FREMONT

Tesla

MENLO PARK

Hyundai

BMW

Google

General Motors

Ford

PALO ALTO

Delphi

Nissan

Continental

Tesla

Bosch

MOUNTAIN VIEW

Honda

SUNNYVALE

SANTA CLARA

Elektrobit

Denso

SAN JOSE

Mercedes-Benz

Toyota

NVIDIA

Apple



3 miles

CALIF.

San Francisco

Oakland

DETAIL

San Jose

Source: the companies

THE WALL STREET JOURNAL.

There's Now a Children's Book About Self-Driving Cars

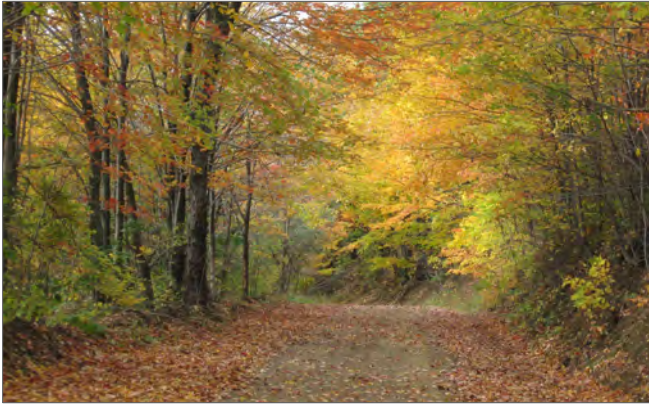
by Kirsten Korosec

@kirstenkorosec

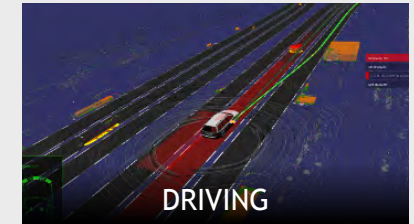
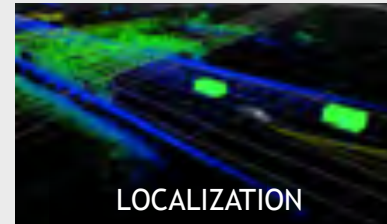
OCTOBER 18, 2016, 4:06 PM EDT



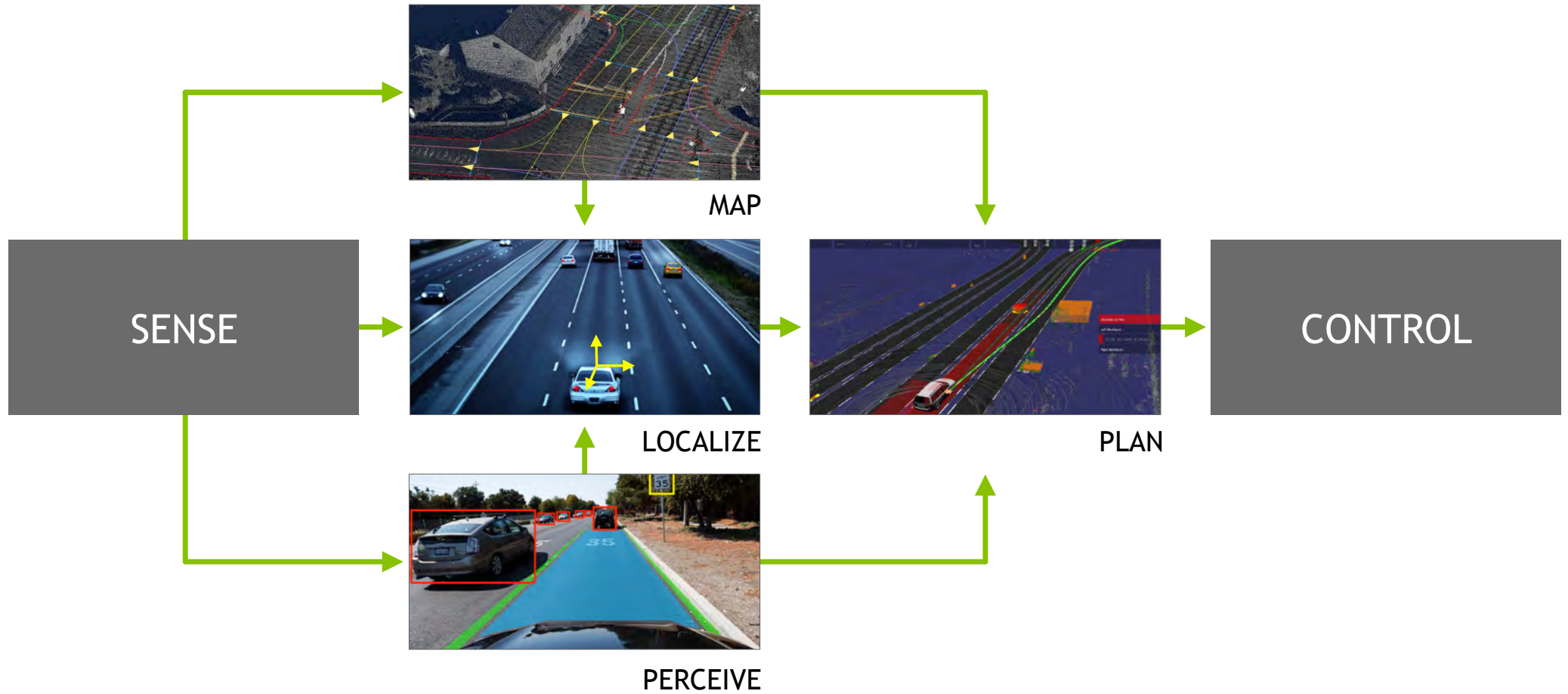
MANY THINGS TO LEARN



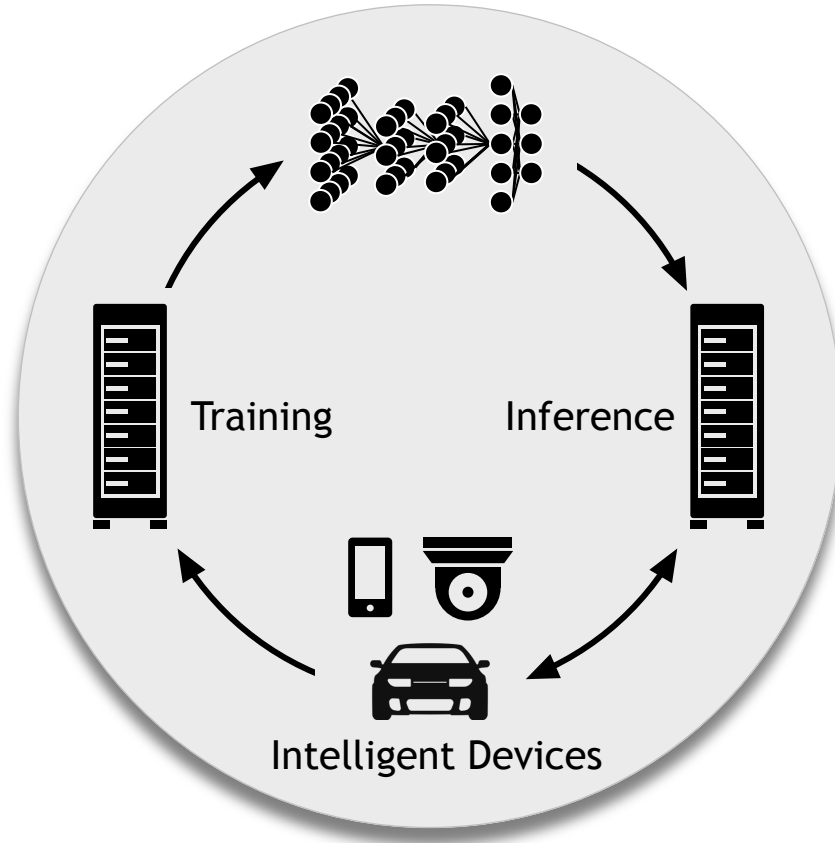
AI TRANSPORTATION – \$10T INDUSTRY



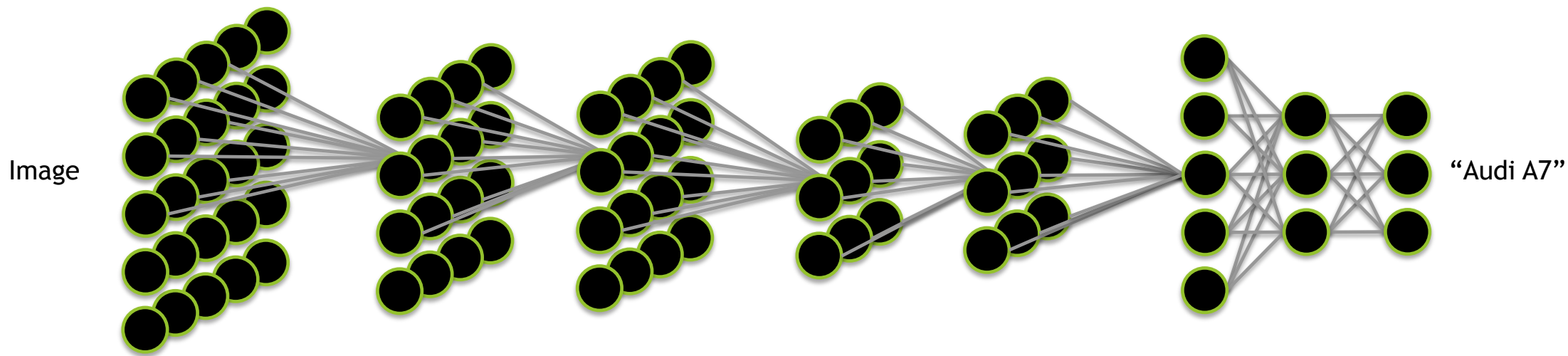
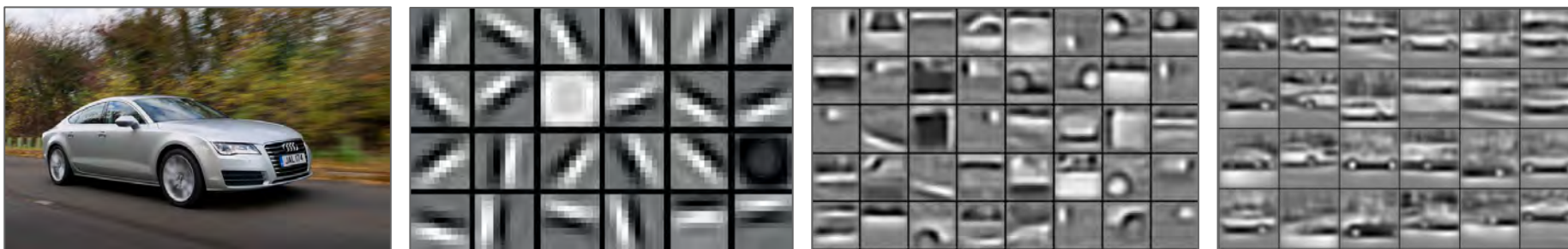
THE BASIC SELF-DRIVING LOOP



GPU DEEP LEARNING IS A NEW COMPUTING MODEL



HOW A DEEP NEURAL NETWORK SEES



NVIDIA & BAIDU PARTNER ON AI SELF-DRIVING CARS



INSIDE THE SELF-DRIVING BRAIN



FREE SPACE DETECTION

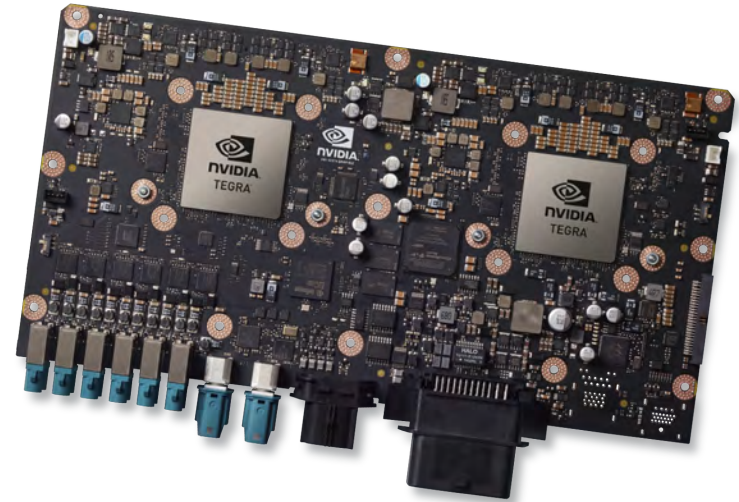


CAR 3D DETECTION

INSIDE THE SELF-DRIVING BRAIN



150 MACBOOK PROS IN YOUR TRUNK



DEEP LEARNING AUTOMOTIVE PARTNERS



AdasWorks

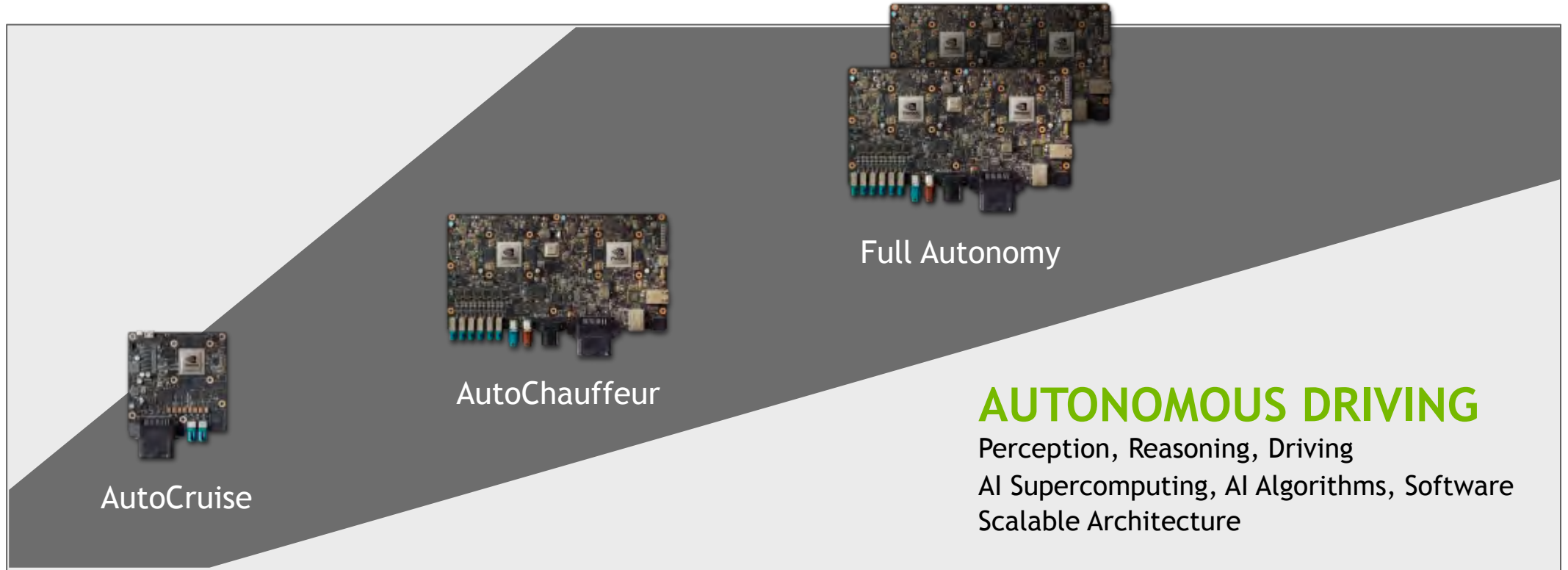


drive.ai



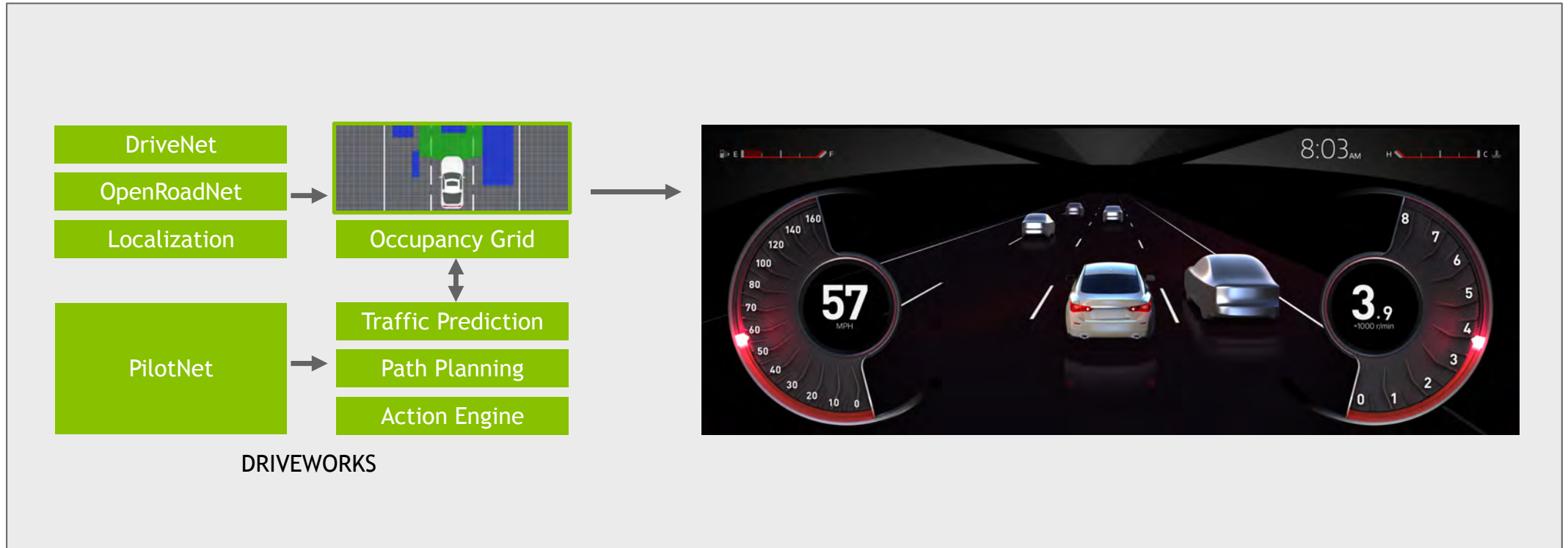
NVIDIA DRIVE PX 2

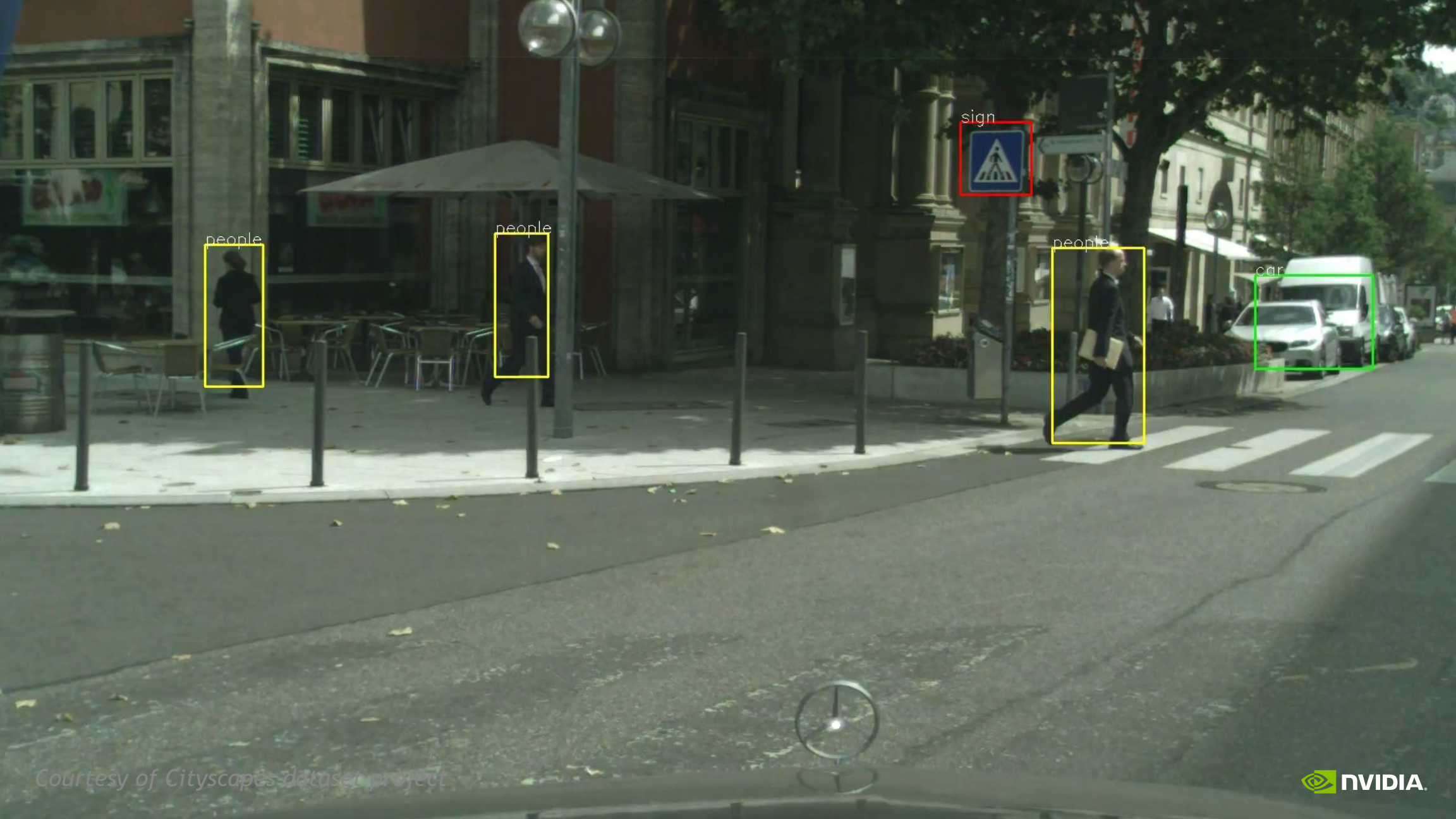
AutoCruise to Full Autonomy – One Architecture



DRIVEWORKS ALPHA 1

OS For Self-Driving Cars





people



people



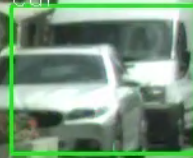
sign



people

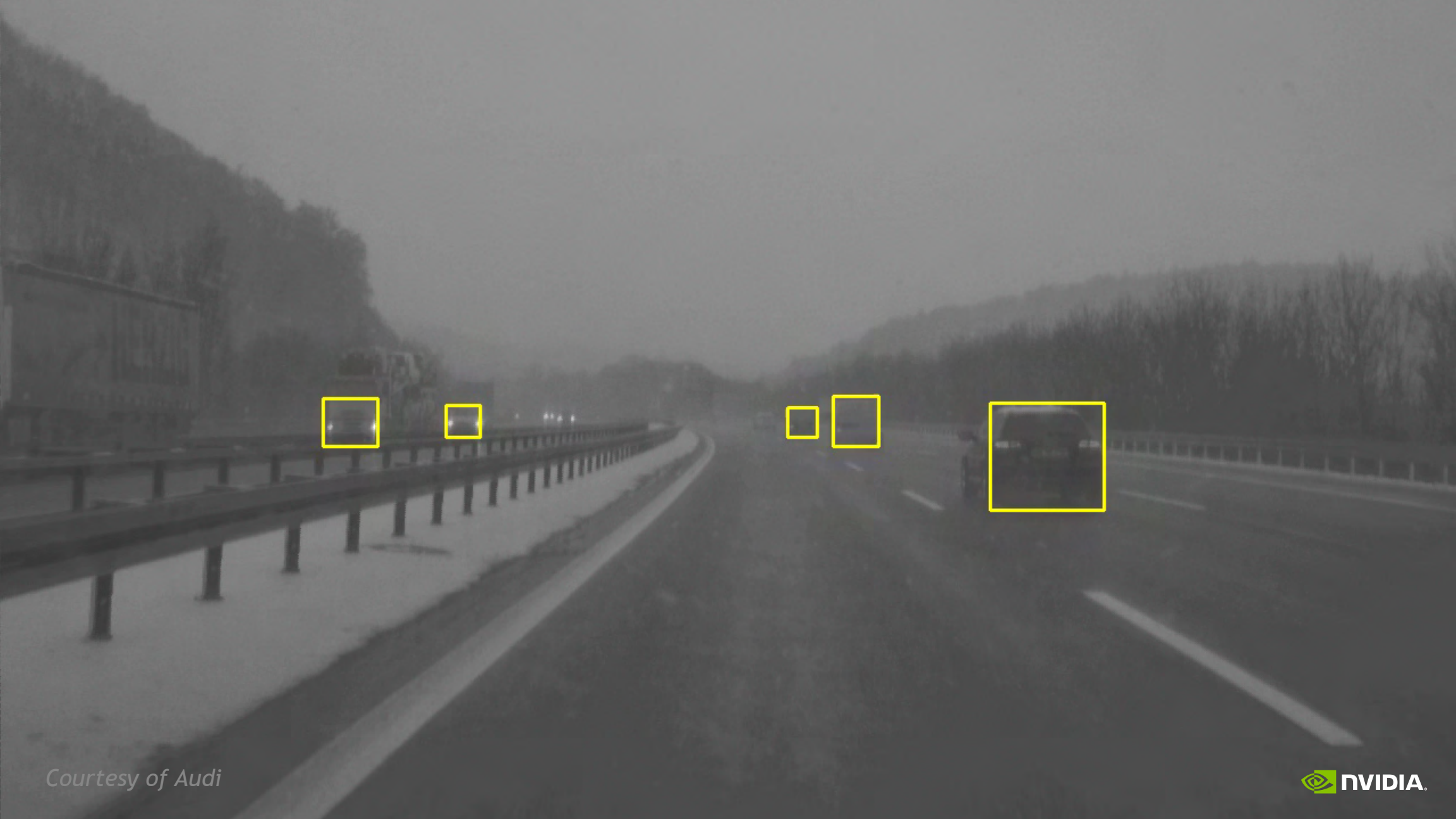


car





Courtesy of Cityscapes dataset project



“Using NVIDIA’s deep learning platform, in less than four hours we achieved over 96% accuracy using Ruhr University Bochum’s traffic sign database. While others invested years of development to achieve similar levels of perception with classical computer vision algorithms, we have been able to do it at the speed of light.”

*Matthias Rudolph, Director of Architecture,
Driver Assistance Systems, Audi*



Audi

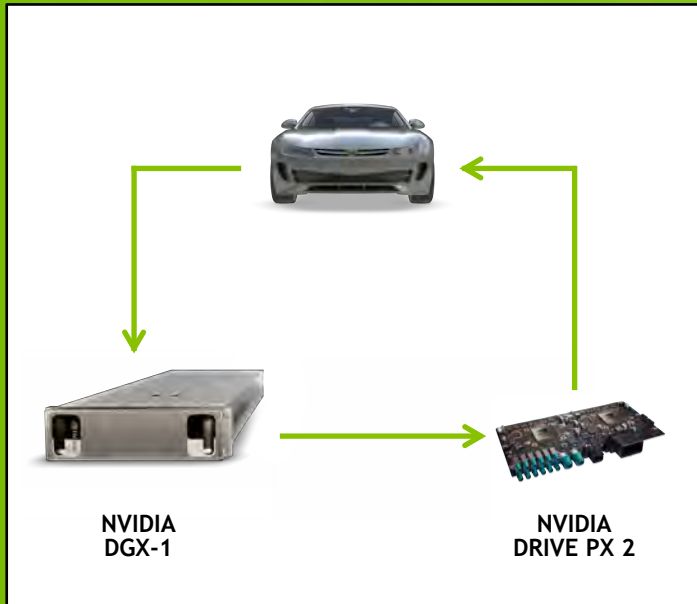
NVIDIA DRIVE



NVIDIA AI SYSTEM FOR AUTONOMOUS DRIVING

Caffe
CNTK
KALDI
TensorFlow
theano
torch

Training on
DGX-1



MAPPING

LOCALIZATION

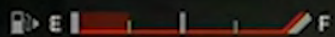
DRIVENET

Driving with
DriveWorks



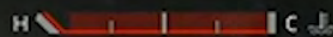


BB8 sees the construction cones



AUTOCRUISE ON

11:31 AM



 NVIDIA.

THE FAST AND THE CURIOUS

Udacity Self-Driving Engineer Nano-degree







DRIVE ME PROJECT



- Using public roads ~30 miles (highway)
- Highly autonomous vehicles in 2017
- 100 customer vehicles
- Unsupervised/ SAE level 4 ; secondary tasks allowed
- Co-operation with Swedish authorities



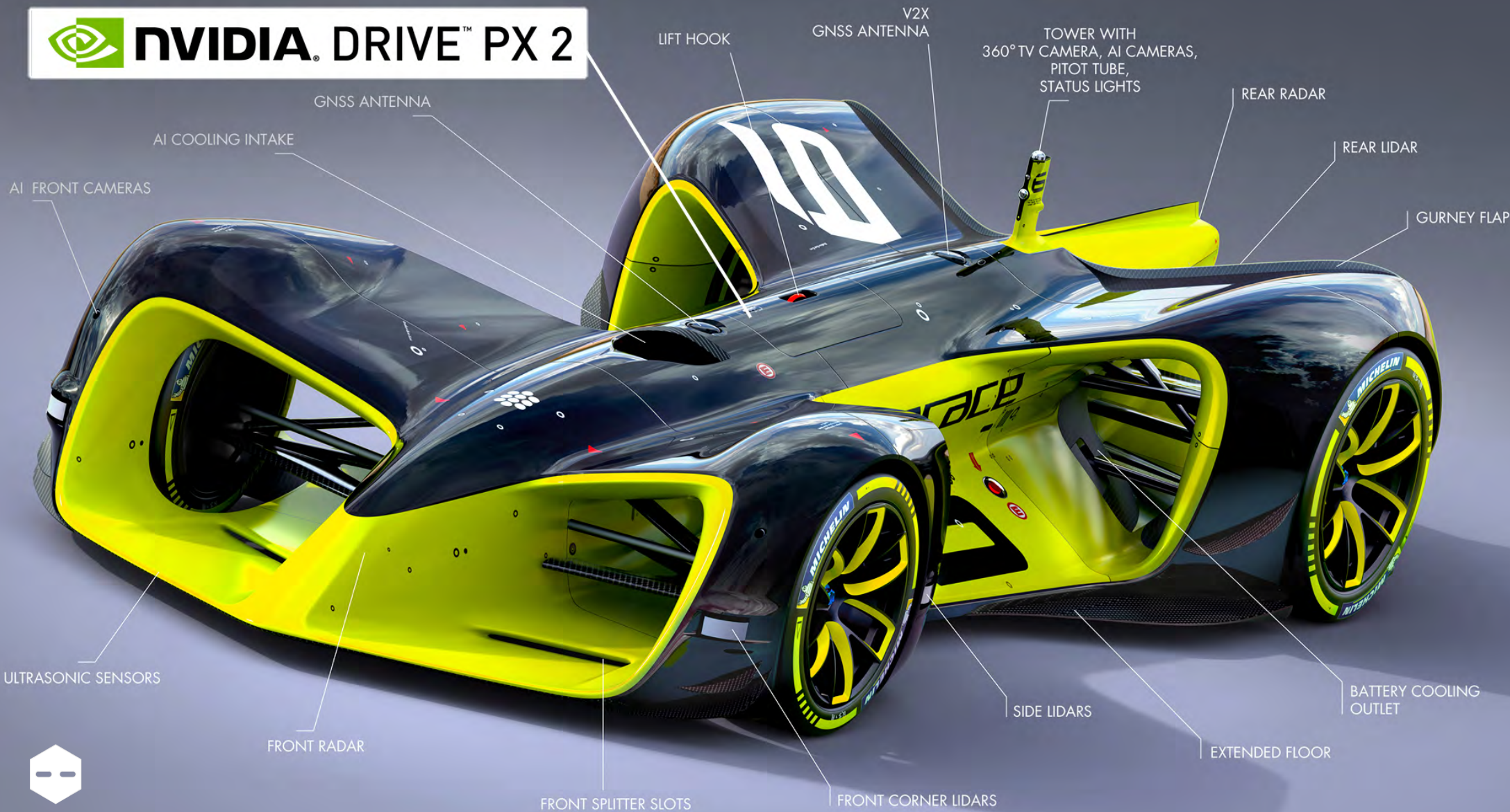


ROBORACE





DRIVE™ PX 2





*“Does your car have any idea why
my car pulled it over?”*



nVIDIA®