



BRIGHT MINDS,
BRIGHT LIGHTS.

**Exterior Lighting
for AD (Autonomous Driving)**
自动驾驶的外部照明
2019 DVN China Workshop
2019 DVN 中国研讨会
Andreas Nix 张安龙
April 24-25, 2019





ZKW 2019:

- >1,6 billion USD Revenue 超16亿美元营业额
- >10.000 Employees 超一万名员工

Locations 分布





Passenger Car main market focus in all segments – Motorcycle and truck secondary market 细分市场中乘用车占据主要市场 - 摩托车和卡车占据次级市场

„Secondary“ market
“次级”市场

Motorcycle 摩托车



Main market focus
主要市场

Passenger cars 乘用车



Small truck
小型乘用车



„Secondary“ market
“次级市场”
Truck 卡车



Market 市场

(representative examples)
(代表性例子)

Entry 入门级



Skoda Rapid

Mid 中级



Audi Q3

Premium 高级



BMW 5er

Luxury 豪华级



Porsche 911

Passenger car-
Segments
乘用车细分市场

(representative examples)
(代表性例子)

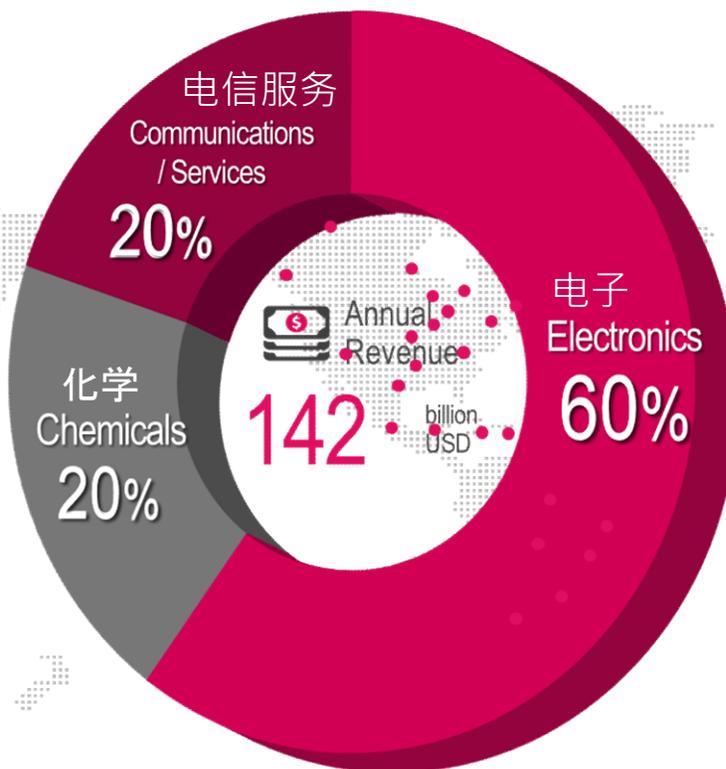


LG Global Business Status

LG全球业务现状

▶ 230,000 employees worldwide
全球员工230,000名

▶ 2017 Annual revenue by affiliates
2017年各分支业务营业额





LG Automotive Components Overview LG汽车零部件概述



▶ Automotive components for eco-friendly vehicles based on cumulative capacity over years in electric, electronics and components 环保汽车的零部件基于电气、电子和元件的多年生产累积产能。

LG Electronics LG电子

Telematics
AVN*
HVAC**
EV components
Rearlamps



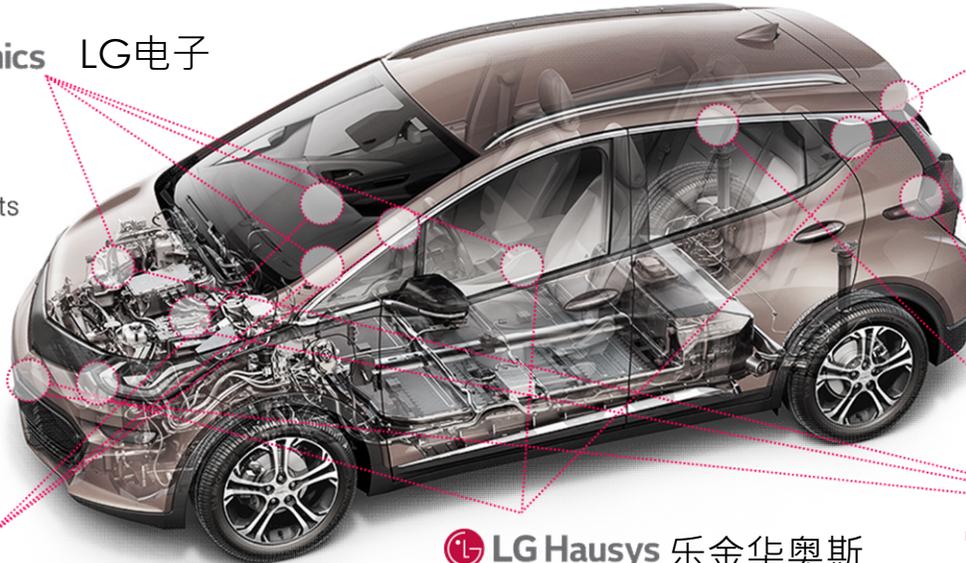
乐金显示

LG Display

In-vehicle Display
OLED for Rearlamps



*AVN : Audio, Video, Navigation
** HVAC : Heating, Ventilation, Air Conditioning



LG Chem LG化学

EV battery
Engineering Plastic



LG Hausys 乐金华奥斯

Automotive skin
Lightweight components



LG Innotek LG伊诺特

EV components
High-power LED





LG Science Park LG科技园



▶ Center of R&D innovation to prepare for next 100 years

为未来100年准备的研发中心

- Open on October, 2017

- Max capacity : 23,000 researchers

- Floor area : 1,108,430 m²

- Investment : \$3.5 billion

- 2017年10月启用

- 最多容纳：23,000名研究员

- 占地面积：1,108,430m²

- 投资：35亿美元





History of Car Lighting >> towards Safer, Smaller, Smarter Lighting Technologies

汽车照明的历史>>趋向更安全，更小巧，更智能的照明技术

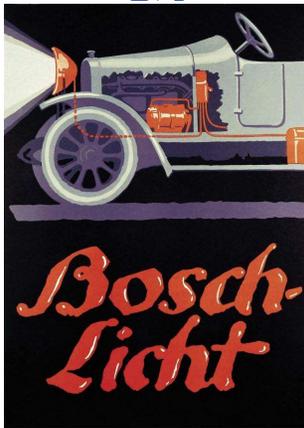
Candles/
Carbid Lamp
蜡烛/硬质合金灯



1886

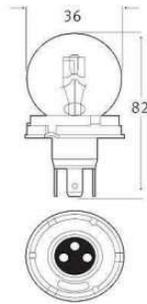
Gottlieb Daimler
戈特利布戴姆勒

Electric
Lamp
电灯



1913

Bosch Electric
Light
博世电灯



1936
Bilux
Light
双丝灯



1971
Halogen
Light
卤素灯



1991
Xenon
Light
氙气灯



2002
Adaptive
Front
Light
自适应
前灯



2007
LED
Head
Lamp
LED头灯



2014
Laser
Light
激光
大灯

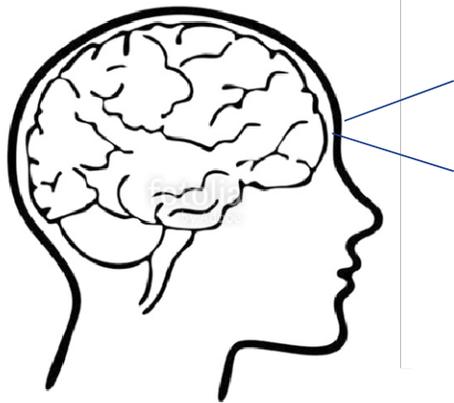
Today
Projection
DLP
LCD
Micro
Matrix
Laser
Scanner
OLED
MLA
Sensor
Integration
Light



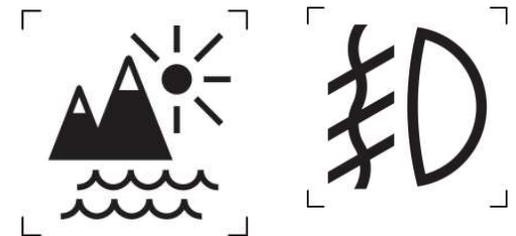
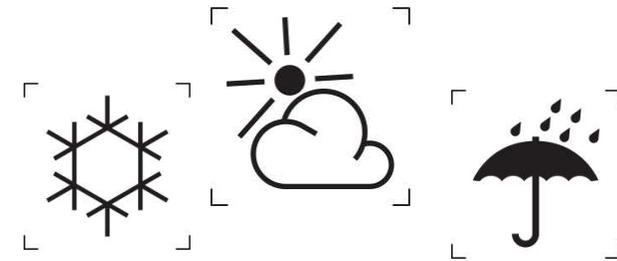
Manual Driving Architecture 手动驾驶架构

2 visual sensors
2个视觉传感器
(eyes 眼睛)
+
brain 大脑

Lighting 光



ALL WEATHER
Capability 全天候可适用





ADAS Driving Architecture 高级驾驶员辅助系统架构

SMARTER更智能 >> towards AI 趋向人工智能

Visual Sensors视觉传感器

Radar 雷达

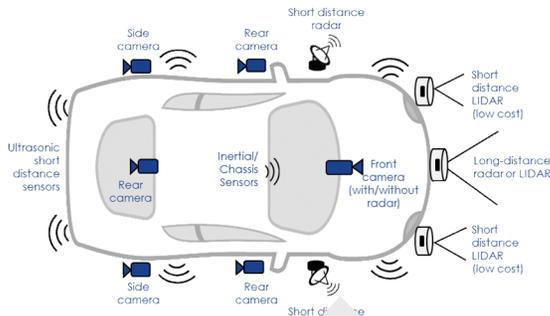
LIDAR激光探测与测量

IR红外光谱, MS质谱, ..

+

Artificial Intelligence (AI)

人工智能

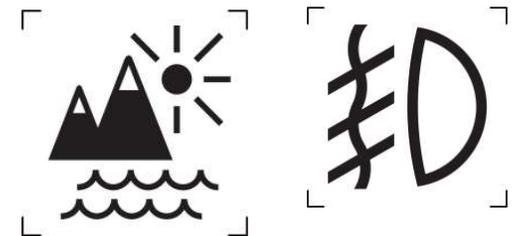
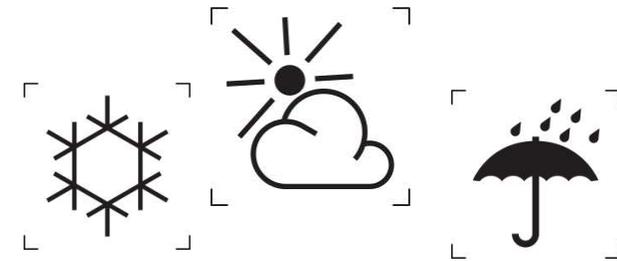


Digital Lighting

数码照明



ALL WEATHER
Capability 全天候可适用



ADAS Level 4/5
高级驾驶员辅助系统 等级4/5

Σ 28-50 Sensors
 Σ 28-50个传感器



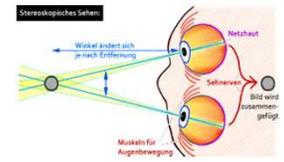
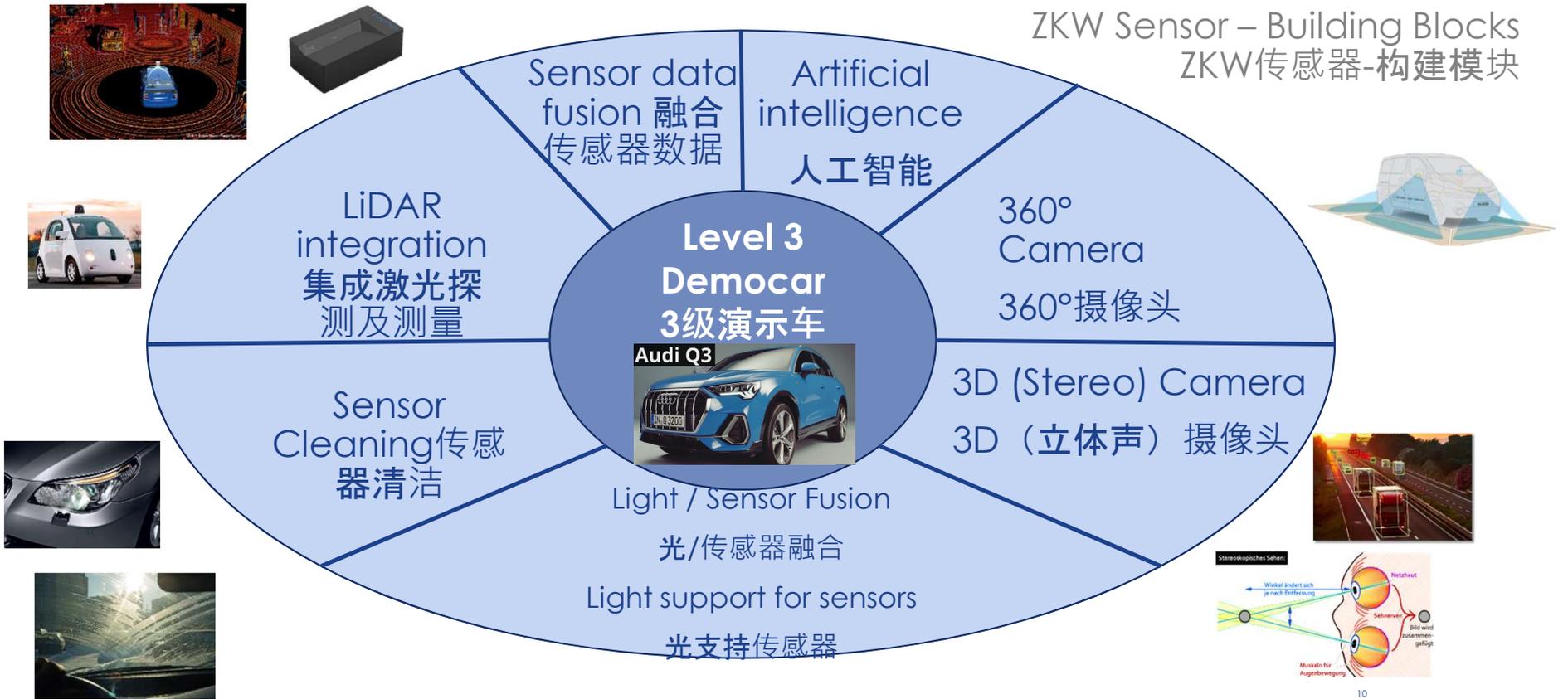
ZKW covering Autonomous Driving & Sensor Integration

ZKW 涵盖自动驾驶和传感器集成



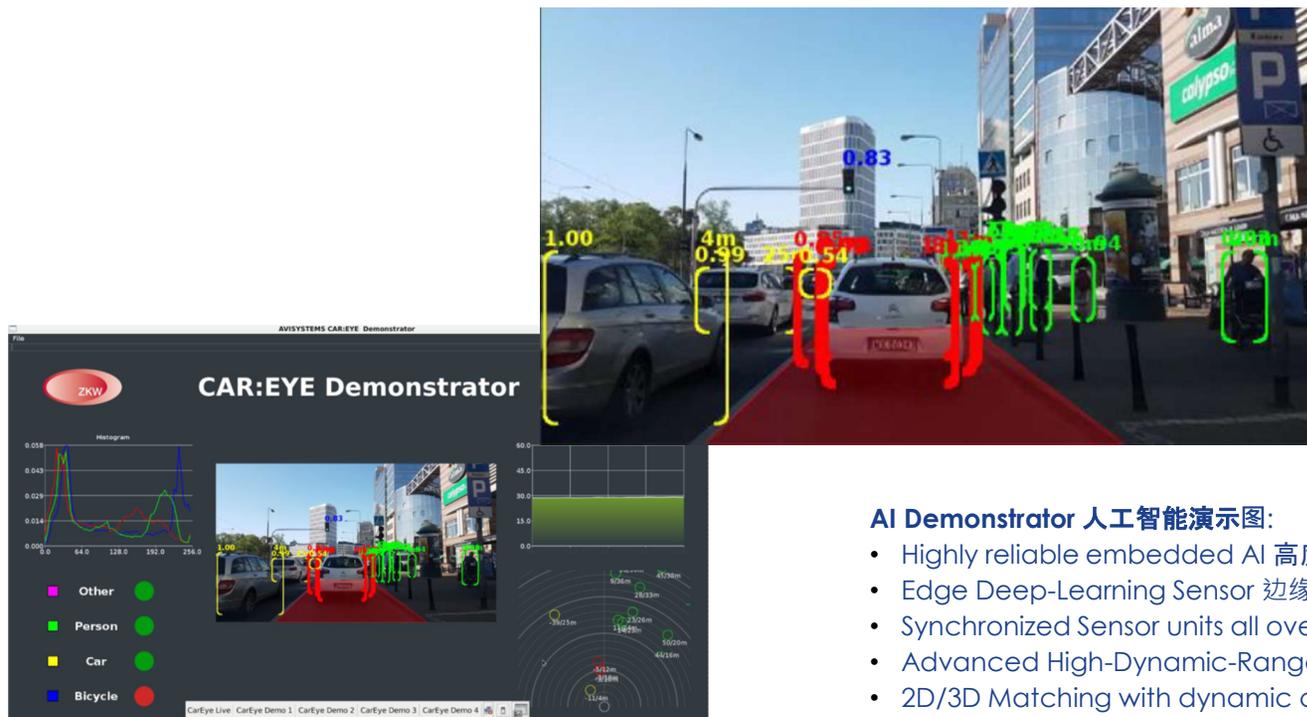
IAV – ZKW System Partner
 艾尔维-ZKW系统合作伙伴

ZKW Sensor – Building Blocks
 ZKW传感器-构建模块





AI (Artificial Intelligence) 人工智能



AI Demonstrator 人工智能演示图:

- Highly reliable embedded AI 高度可靠的嵌入式人工智能
- Edge Deep-Learning Sensor 边缘深度学习传感器
- Synchronized Sensor units all over the car 整车同步传感器单元
- Advanced High-Dynamic-Range 先进的高动态范围
- 2D/3D Matching with dynamic calibration 2D/3D匹配动态校准



Smarter AI Automotive Lighting - Sensor Setup

更智能的人工智能汽车照明 - 传感器设置

-  Camera 摄像头
-  Radar 雷达
-  LiDAR 激光探测与测量
-  USS 通讯接口
-  IR/MS Camera 红外光谱/质谱摄像头
-  Series Audi 奥迪系列
-  ZKW Sensors ZKW传感器
-  Add. Sensors for Redundancy 基于安全考虑的备用传感器





ZKW & LG Strategic focus ZKW & LG 战略重点



SYSTEM Ground Control Center 系统地面控制中心



SYSTEM系统

System Partner & LG

系统合作伙伴和LG

- Operation Control Center
运行控制中心
- Communication Network LTE & 5G
通信网络LTE和5G



System Partner & LG

系统合作伙伴和LG

- ADAS – Advanced Driver Assistance System 高级驾驶员辅助系统
- AD – Autonomous Driving System (Driving & Parking) 自动驾驶系统(驾驶和泊车)

ZKW

- Light / Sensor System
光/传感器系统

SUBSYSTEM 子系统

ZKW & LG

- Innovative Digital Light / Sensor subsystem 创新的数字灯/传感器子系统
- Exterior Lighting incl. Sensor (Camera, IR/MS, LiDAR, Radar,...) – V2X 外部照明包括传感器(摄像头, 红外光谱, 激光探测与测量, 雷达等)-V2X
- Electronics, ECU, Event Recorder Rear Lights incl. Sensor 电子件, ECU, 事件记录仪尾灯包括传感器

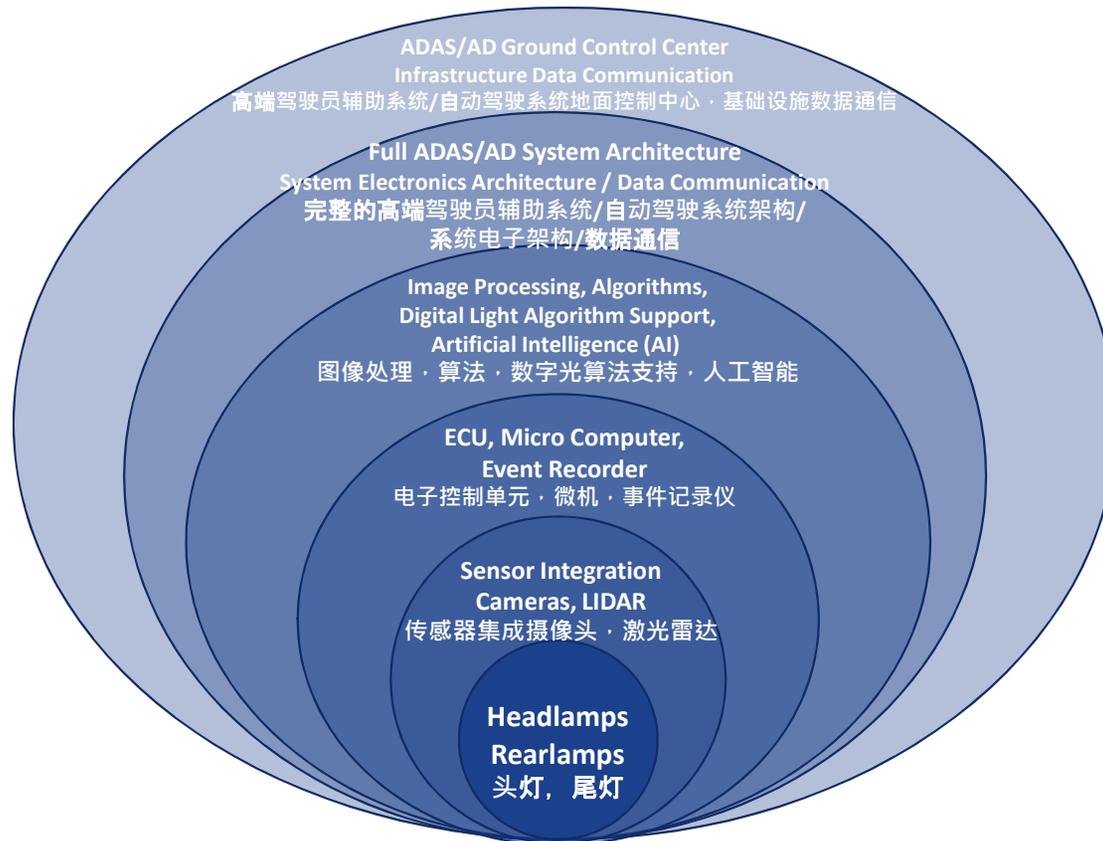
External Partners & LG

- Sensors & Artificial Intelligence & sensor fusion algorithms 传感器&人工智能&传感器融合算法
- Ethernet Bus, Communication (V2X, 5G), Cyber Security, Embedded System, AD Simulation & Validation,以太网总线, 通信(V2X,5G), 网络安全, 嵌入式系统, 自动驾驶模拟和验证...



ZKW Portfolio Element Offering to Customers – ADAS/AD

ZKW向客户提供的产品组合元素-高端驾驶员辅助系统/自动驾驶



高级驾驶员辅助系统



BRIGHT MINDS,
BRIGHT LIGHTS.

THANK YOU !
谢谢 !

