

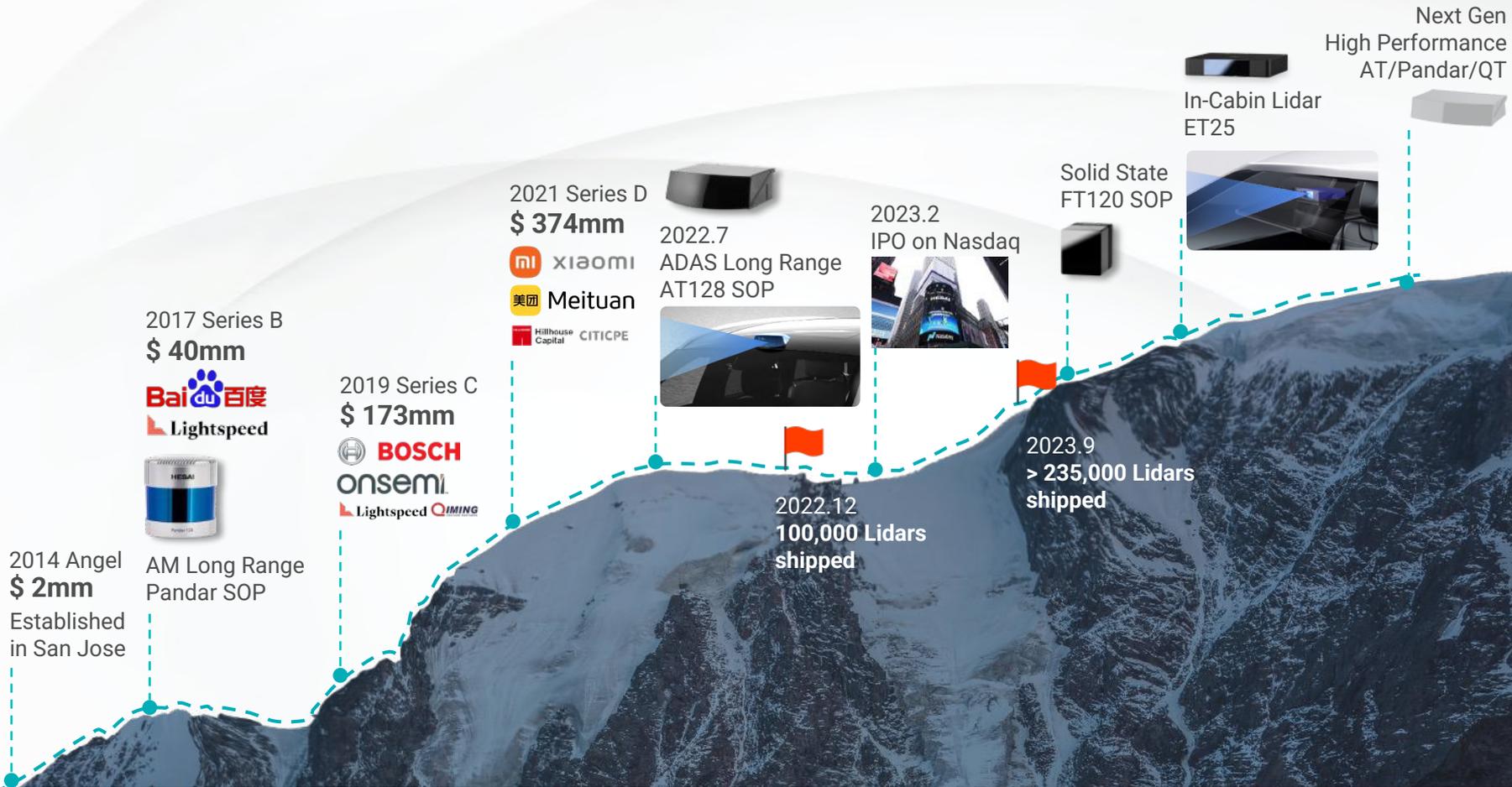
# HESAI

Nasdaq: HSAI

## From Autonomous Mobility to ADAS Lidar Enters the Mass Production Era

Bob in den Bosch  
SVP of Global Business

*November 30<sup>th</sup>, 2023*



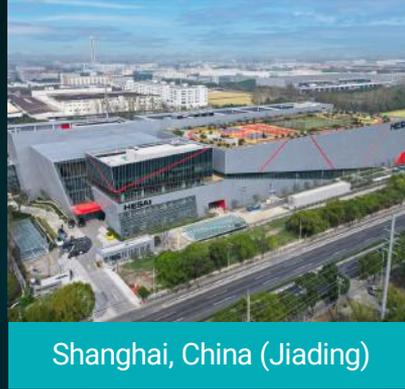
Autonomous Mobility (Robotaxi)



ADAS (Production Cars)

# Fast-Growing Team and Strong R&D Capability

**HESAI**



**1000+**

Employees

**70%+**

R&D and Manufacturing Engineers

**1300+**

Patents Deployed Globally

**Nasdaq**

Listed Since Feb 2023

\*All numbers on this slide are as of November, 2023. Including 442 granted patents and 903 pending patents.

# Trusted by Leading Autonomous Mobility, ADAS, and Last-Mile Delivery Companies

**HESAI**

## Autonomous Mobility Partners



**NVIDIA**



**Aurora**



**ZOOX amazon**



**pony.ai**



**DiDi**



**Baidu 百度**



**WeRide**



**OCRAFT**



**autoX**

## ADAS OEM Partners (1)



**Li Auto**



**SAIC**



**FAW GROUP HONGQI**



**GEELY LOTUS**



**CHANGAN**



**GWM**



**LEAPMOTOR**



**HiPhi**



**SERES**



**AITO**



**Polestone**



**SAIC UTOPILOT**



**NETA**



## Robotics Partners



**nuro**



**Meituan**



**SEGWAY ROBOTICS**



**HAOMO.AI**



**NEOLIX**



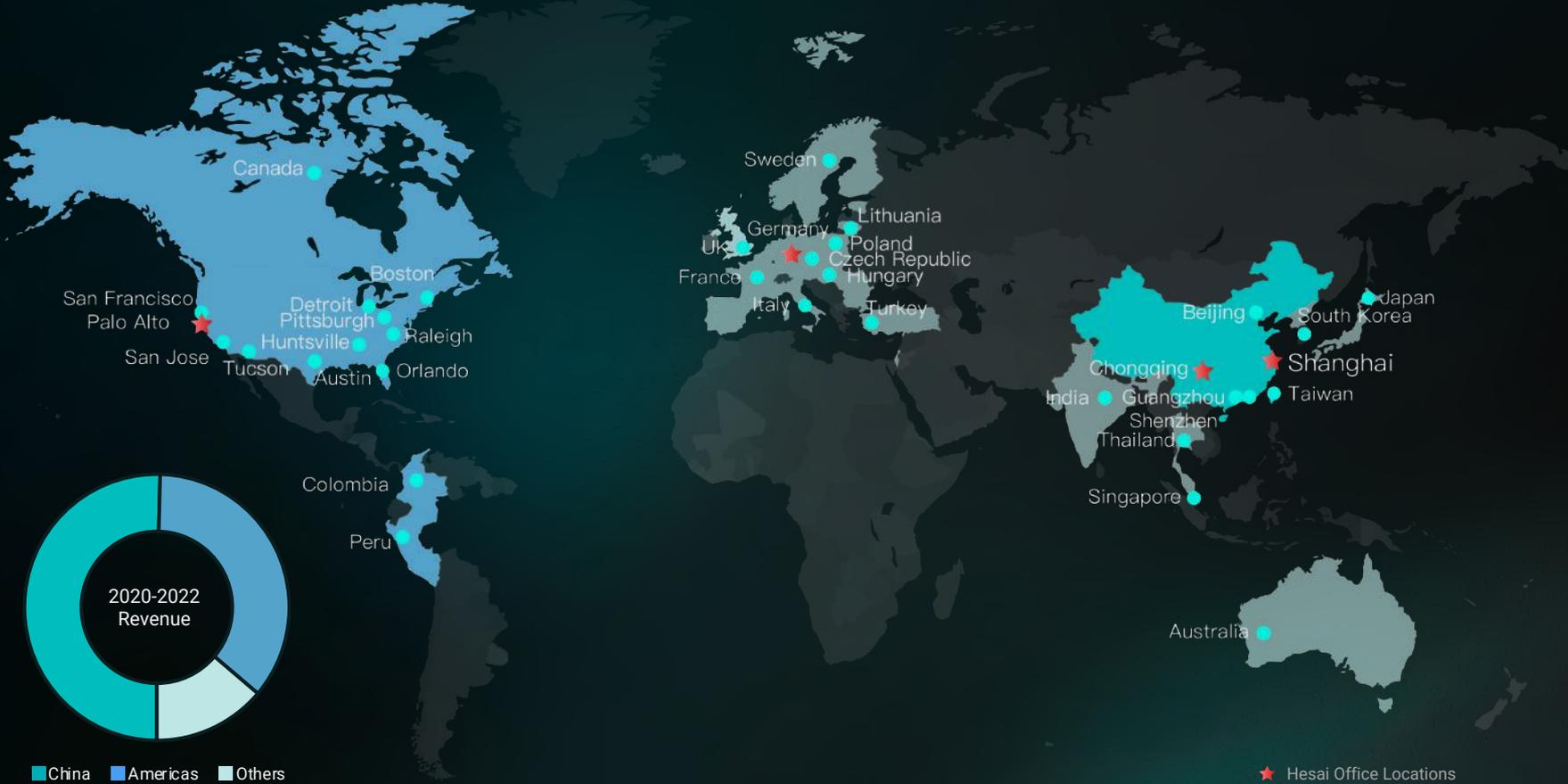
**AW**



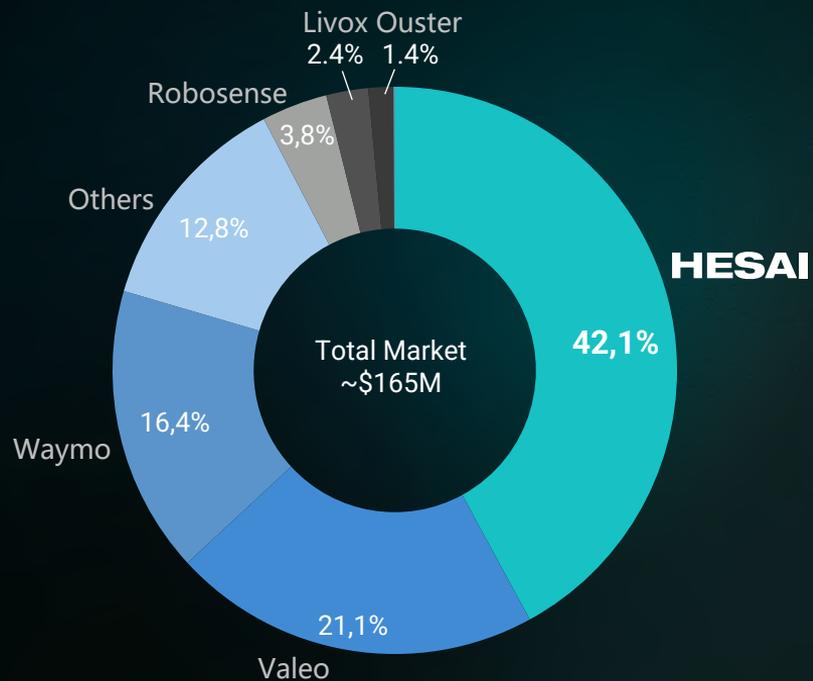
**W**

(1) Vehicles shown for SAIC Rising, Changan, SAIC Utopilot, FAW Hongqi, NETA, GWM are not the actual production models to feature Hesai Lidar

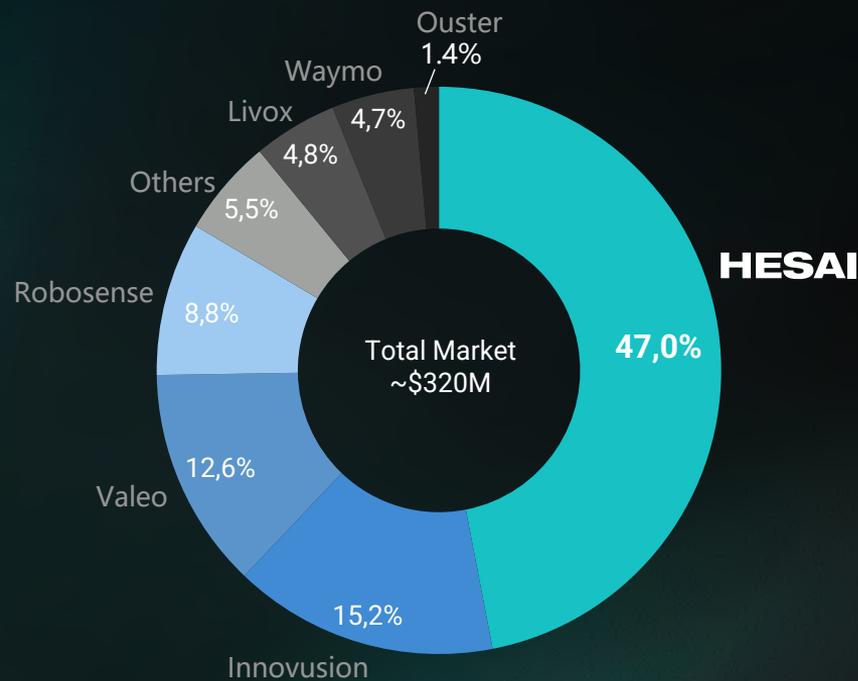
# Global Customer Base – Global Support Team



## Market Share by Revenue: 2021



## Market Share by Revenue: 2022



# Advocating Lidar Standards and Functional Safety

Chairs the China National Standards Drafting Committee

GB/T Automotive Lidar Performance Requirements and Testing Methods

Chair 

Co-Chair 



National Standards Drafting Committee

Chair to Draft the ISO International Standards

ISO/PWI 13228 Road Vehicles – Test Method for Automotive Lidar







Participates in International Laser Safety Standardization Committees

IEC TC76 WG1/WG3/WG8 Launched UL4700 as Part of American National Standards National Optical Radiation Safety Technology Committee SAC TC284



 Changes within IEC - TC 76/WG 1, IEC - TC 76/WG 3, IEC - TC 76/WG 8

World's First Functional Safety Certified Lidar

Pandar128 and QT128 received the ISO 26262 ASIL B functional safety product certification from SGS-TÜV



China's 1<sup>st</sup> publication on Automotive Functional Safety

Director of Hesai's Safety and Quality Engineering as Chief Editor and co-edited with industry experts



## Autonomous Mobility

### Pandar Series High-Performance Long-Range



**Pandar40**  
2017



**Pandar64**  
2019



**Pandar128**  
2020

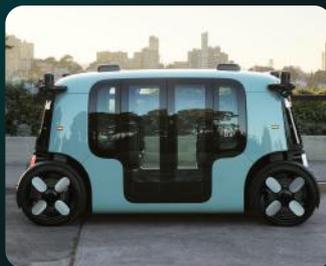
### QT Series Ultra-Wide View Short-Range



**QT64**  
2020



**QT128**  
2022



**BOSCH**



**ZOOX**

**nuro**

**Aurora**



**WeRide**



**轻舟 QCRAFT**



## 2022: Market Demands Shifting from Robotaxi to ADAS



# Difference Between Autonomous Mobility and ADAS



## Autonomous Mobility Lidar



Mounted on the top for 360 degree surrounding view



Limited cost sensitivity: \$\$\$\$\$



Small volume : ~10K units/year



## ADAS Lidar



Embedded into the vehicle, only for directional view



Very sensitive to cost: \$



Large volume : ~1M units/year

# What It Takes to Win in the ADAS Market

**HESAI**



## Performance

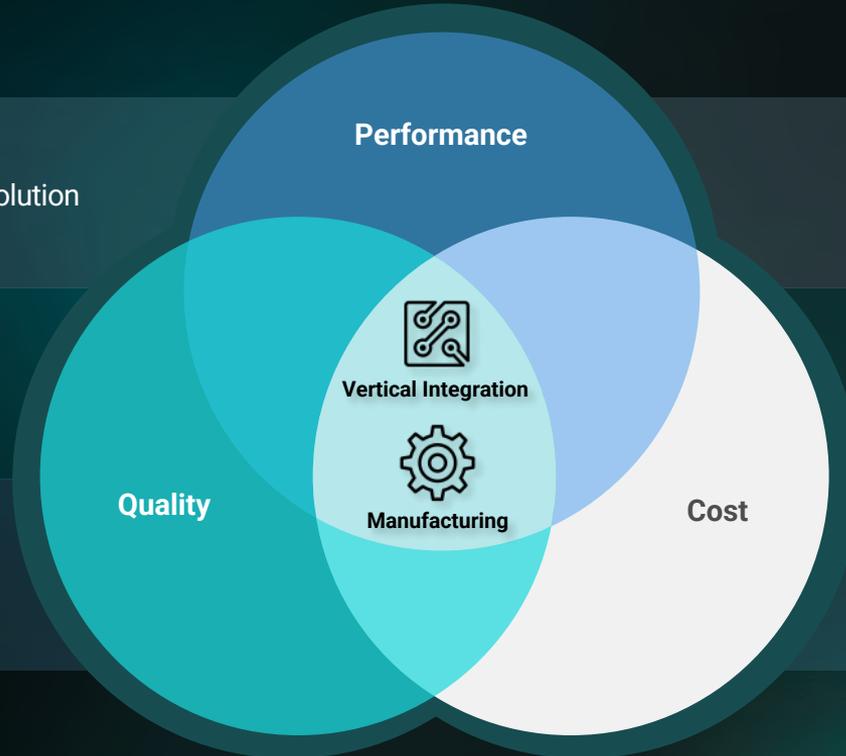
>250 m, 0.05° x 0.05° Resolution

## Quality

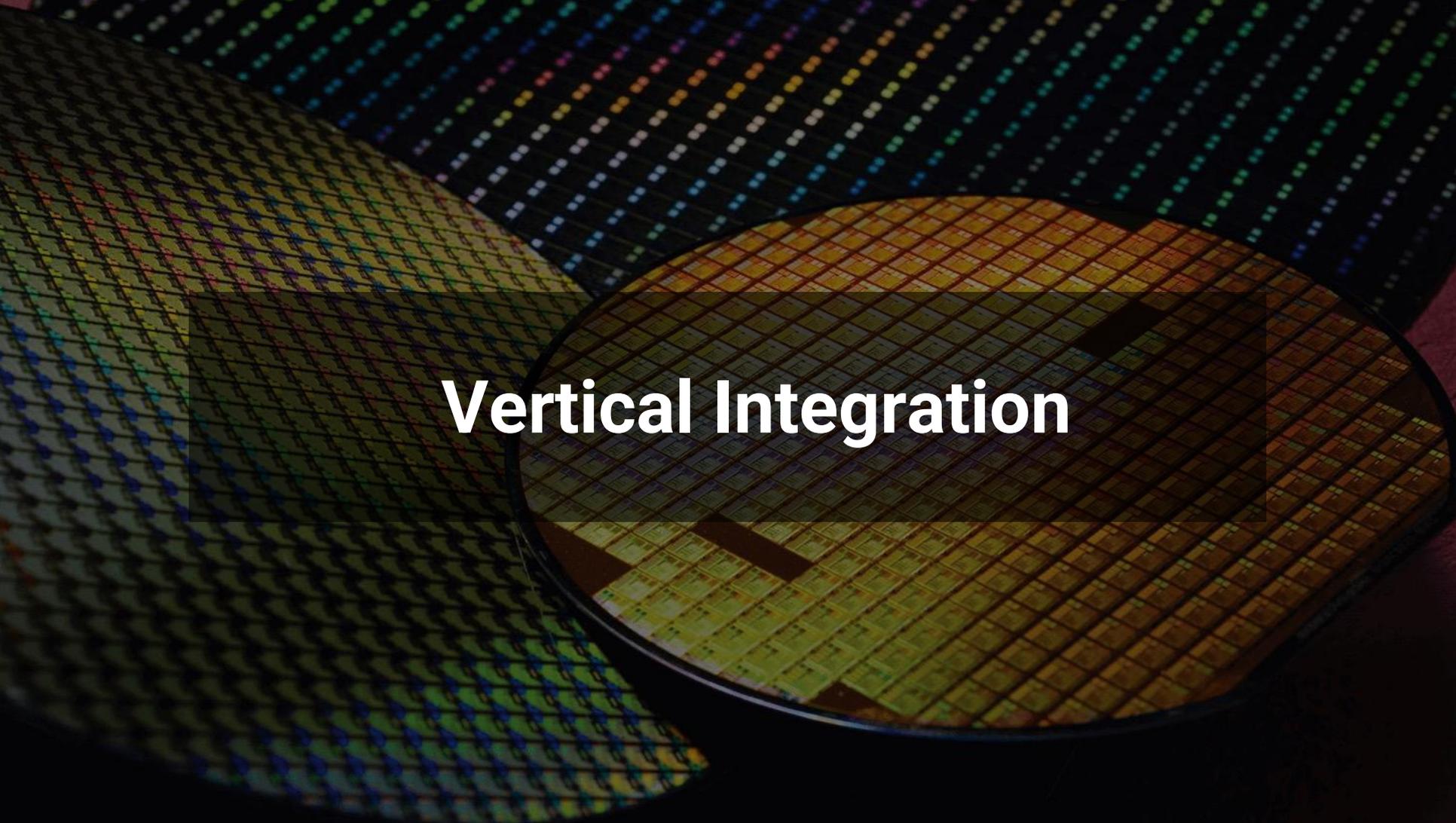
Millions per year with consistent quality

## Cost

\$



We believe advanced vertical integration architecture + highly automated production is the only viable way to achieve this

The image shows a close-up of a silicon wafer with a grid of microprocessors. The wafer is circular and has a dark, textured surface. The microprocessors are arranged in a regular grid pattern. The colors of the microprocessors vary, with some appearing yellow, green, and blue. The background is dark, and the lighting highlights the intricate patterns of the wafer.

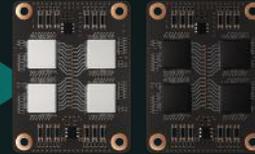
# Vertical Integration

# Vertical Integration Brings Higher Performance, Lower Cost, Higher Quality

**HESAI**



**Integrated**



**Maximized  
Performance**



**Optimized Cost**

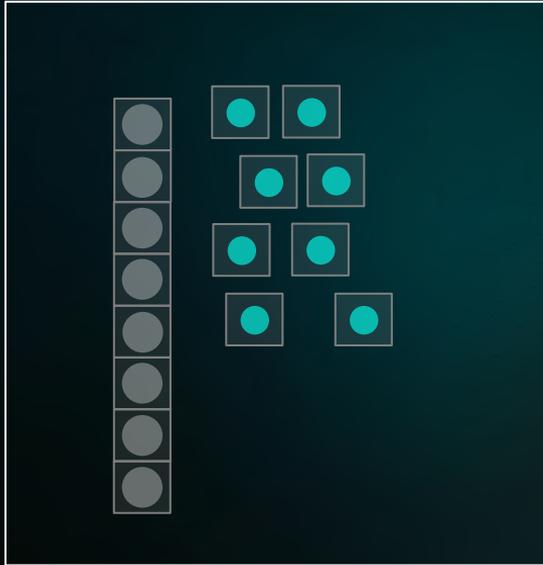


**Enhanced Quality**



**Robust Supply Chain**

## Discrete Components, Manual Adjustment

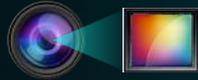


## Integrated, Adjustment by Semiconductor Equipment



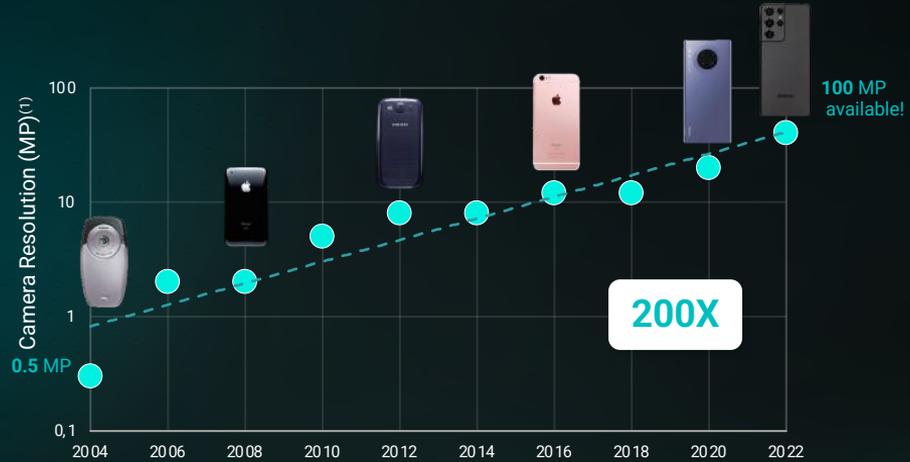
● Receiver FOV      ● Transmitter FOV

# Camera's Resolution Doubles Every Two Years. Lidar Follows the Same Path



Camera 2D (X, Y)

CIS<sup>(1)</sup> camera resolution has doubled every 2 years in the last two decades



This is the power of Moore's Law!

# Hesai's Vertical Integration Validated through Volume Shipment

**HESAI**

**2026** Next Generation Products (e.g. ET/AT)

**20,000+** XT shipped



2017 – 2020

**V1.0**

Proprietary Driver Platform

**170,000+** AT128 shipped



2018 – 2022

**V2.0**

Proprietary Integration Platform

**2023** Fully Solid-State FT120 SOP



2019 – 2023

**V3.0**

Fully Solid-State Platform



2020 – 2026

**V4.0**

Full Integration (3D Stacking) Platform

Each generation is a step closer to full vertical integration



# Manufacturing

# Manufacturing Has to Be Part of R&D for Rapidly Changing Industries

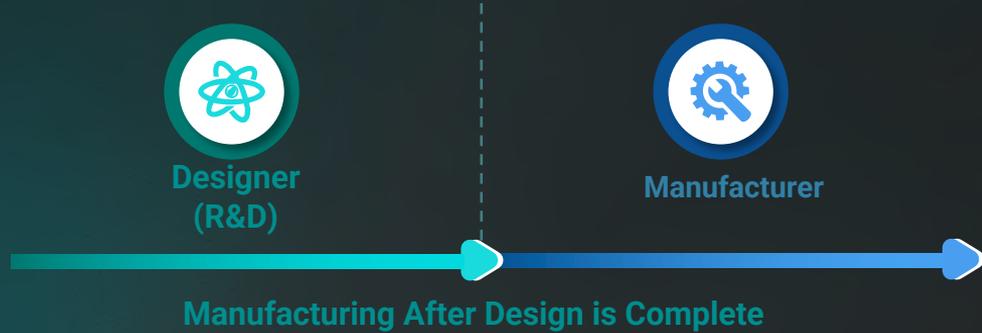
In-house manufacturing is not required for mature industries



Designer (R&D)



Manufacturer



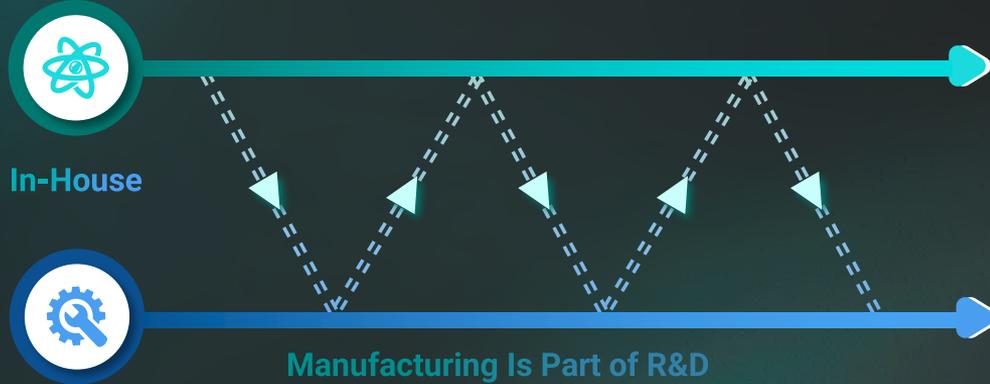
...but is critical for products that need rapid iteration



In-House

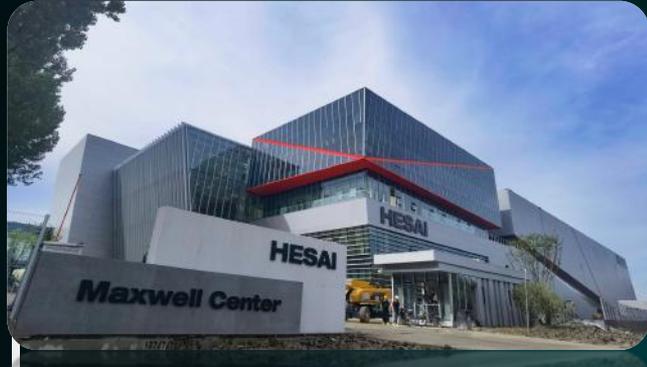


Manufacturing Is Part of R&D



# Hesai's Strong In-House Manufacturing Capability

**HESAI**



**Maxwell (Shanghai)**  
R&D + Manufacturing

**90+**

Functionality and Performance Tests

**50+**

Automotive Grade Tests

**200 m**

Indoor Full-Range Testing Capability

**52,000 m<sup>2</sup>**

Floor Area



**Hertz (Hangzhou)**  
Highly-Automated Factory

**90%+**

Automation Rate

**45 sec**

Per Unit with Tens of Workers

**1.5M**

Annual Capacity

**28,000 m<sup>2</sup>**

Floor Area

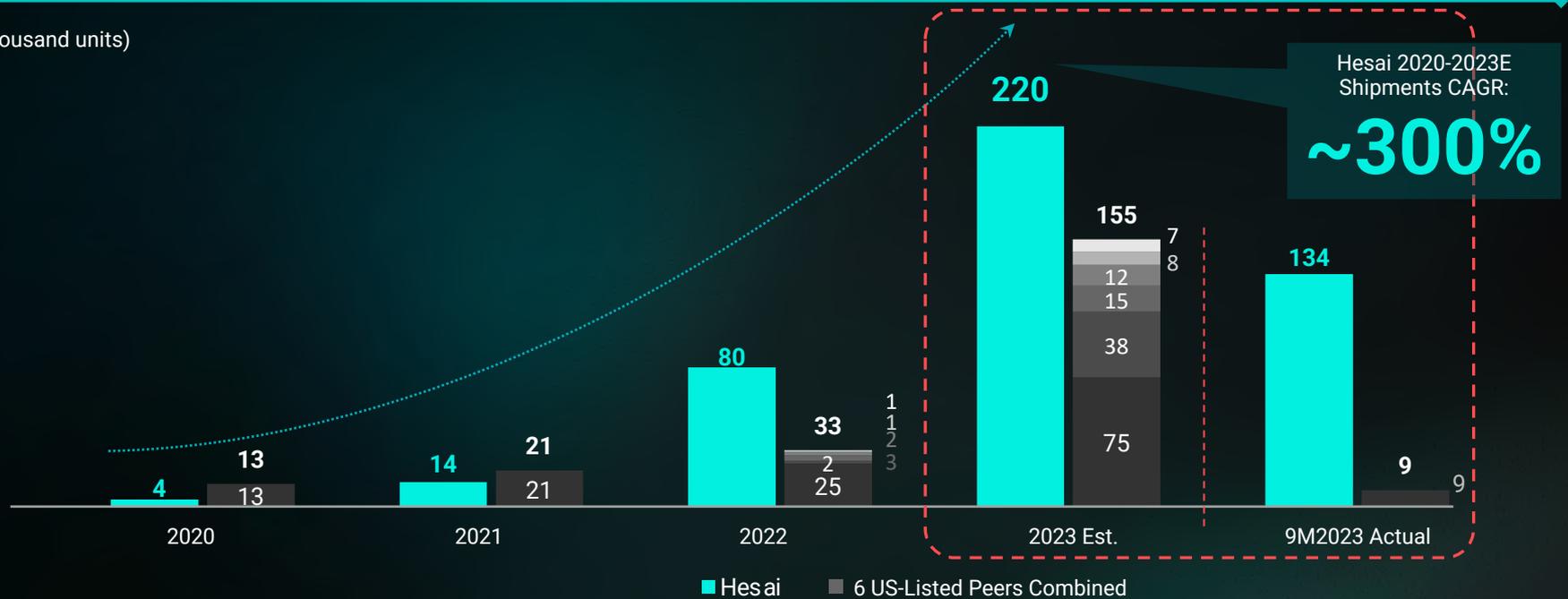


# Hesai Automated Lidar Production Line

# Hesai's Lidar Shipments Double of Our 6 US-Listed Peers Combined

### Lidar Shipments (2020 - 2023E)

(Thousand units)



A futuristic city street at night, viewed from the perspective of a car's dashboard. The street is illuminated by a glowing blue light that forms a path leading towards the horizon. Tall, modern buildings line the street, and several cars are visible in the distance. The overall atmosphere is dark and high-tech.

# Market Development

# Robotaxi Is Making Progress Towards Commercialization Globally

Baidu expands driverless robotaxi services in Wuhan



2023.01

Pony.ai receives permit for robotaxi services in Guangzhou



2023.04

Baidu wins license for driverless taxis in Shenzhen



2023.06

WeRide secures self-driving vehicle license in UAE



2023.07

2023.03



Beijing grants licenses to operate fully driverless robotaxi services

2023.05



Uber deploys Waymo self-driving cars in Phoenix

2023.06



Zoox deploys robotaxis in Las Vegas

2023.10

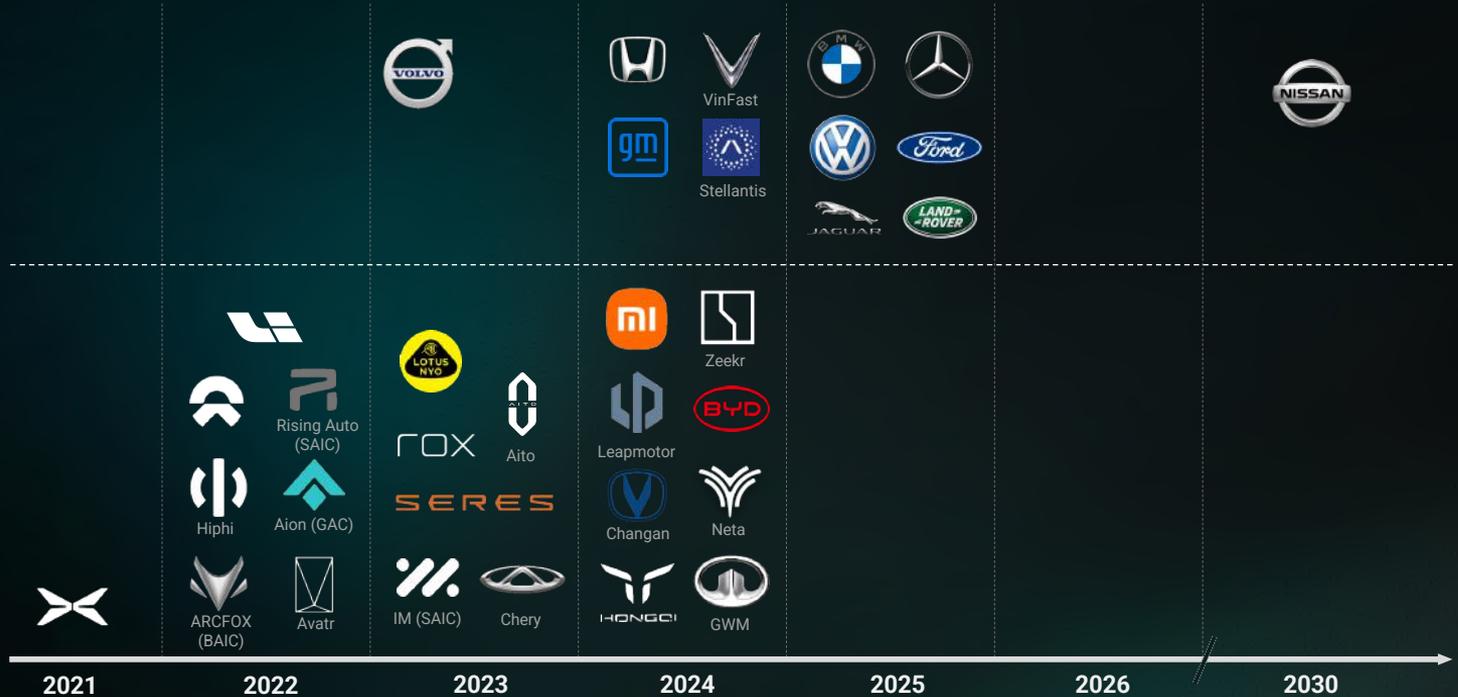


Tier IV robobus gets Level 4 certification for operating in Tokyo

# Lidar/ADAS Adoption - China EVs Are 2-3 Years Ahead of Most Global OEMs

Rest of the World

China



Source:  
Audi: <https://spectrum.ieee.org/the-audi-a8-the-worlds-first-production-car-to-achieve-level-3-autonomy>  
Mercedes: [https://group-media.mercedes-benz.com/marsMediaSite/en/instance/ko/The-new-Mercedes-Maybach-S-Class-DRIVE-PILOT\\_sherFud+50185911](https://group-media.mercedes-benz.com/marsMediaSite/en/instance/ko/The-new-Mercedes-Maybach-S-Class-DRIVE-PILOT_sherFud+50185911)  
<https://media.mercedes-benz.com/2023/02/2023-mercedes-adding-luxury-lidar-to-more-vehicles-in-mercedes-ehar-deal>  
GM: <https://www.theverge.com/2023/3/7/23627656/gm-ultra-cruise-sensor-radar-lidar-hands-free>  
Volvo: <https://www.emergentintell.com/story/2022/11/29/veon-lidar-2-quest-to-become-a-major-auto-supplier>  
BMW: <https://auto.tech.com/news/3-automotive-11-10-2022-10-2022>

VW: <https://www.thedrive.com/news/40549/vw-plans-to-build-level-4-self-driving-vans-by-2023>  
Ford: <https://www.zdnet.com/article/canada-phil-welch-reveals-lidar-aid-drive-with-quest-for-car-108664235/>  
Stellantis: <https://europe.autonews.com/supplier/stellantis-uses-radar-lidar-level-3-self-driving-cars-2024>  
Honda: <https://www.repairpal.com/news/2022/12/01/honda-says-it-will-add-honda-free-technology-to-all-models-sold-in-the-us-by-2030/>  
BYD: <https://www.autonews.com/2023/02/2023-mercedes-adding-luxury-lidar-to-more-vehicles-in-mercedes-ehar-deal>  
JLR: <https://www.repairpal.com/news/2022/11/29/veon-lidar-2-quest-to-become-a-major-auto-supplier>

(1) High-performance Lidar is defined by having 64 or more channel counts  
(2) Sorting based on the timing of Lidar vehicle model releases by brand

# Lidar has Become a “Must-Have” for City Assisted Driving Function (City NOA) in China **HESAI**

Chinese EV Makers Adopting City Assisted Driving Function				
OEM	Car Models with City Assisted Driving Function	with Lidar?	Time	Development Phase
 XPeng	P7i MAX G9 MAX G6 MAX	Yes	2023.8	Developing XNGP in Guangzhou, Shenzhen, Shanghai, Beijing, Foshan
 Li Auto	L7/L8/L9 MAX	Yes	2023 Q4	City NOA to cover 100 cities across China
 Nio	All Models	Yes	2023 Q3	NOP+ to cover highways and speedways in Beijing within the 5 <sup>th</sup> ring road
 Aito	M5 Intelligent Driving Edition	Yes	2023.8	City NCA has been available in Shanghai, Shenzhen, Guangzhou, Hangzhou, Chongqing, Beijing and will cover 45 cities in Q4
 ArcFox	Alpha S HI Version	Yes	2023.8	City NCA has been available in Shanghai, Shenzhen, Guangzhou, Hangzhou, Chongqing, Beijing
 Avatr	Avatr 11	Yes	2023.8	City NCA has been available in Shanghai, Shenzhen, Guangzhou, Hangzhou, Chongqing, Beijing
 BYD	Denza N9	Yes	2024 Q1	City NOA OTA Available

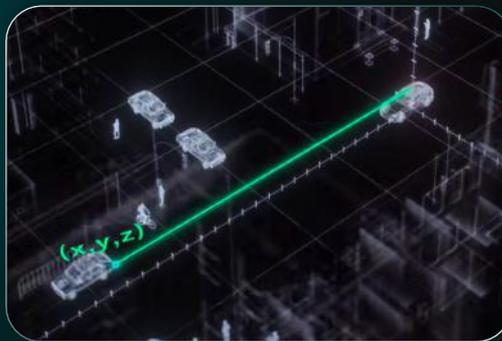
## Anti-Interference

Unaffected by changes  
in ambient light



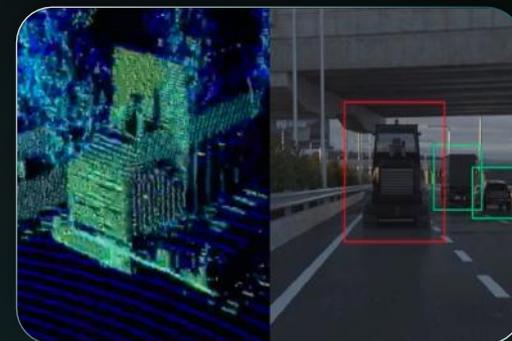
## Real 3D Perception

Directly obtain high-precision  
distance information



## High Reliability

Directly detect the objects

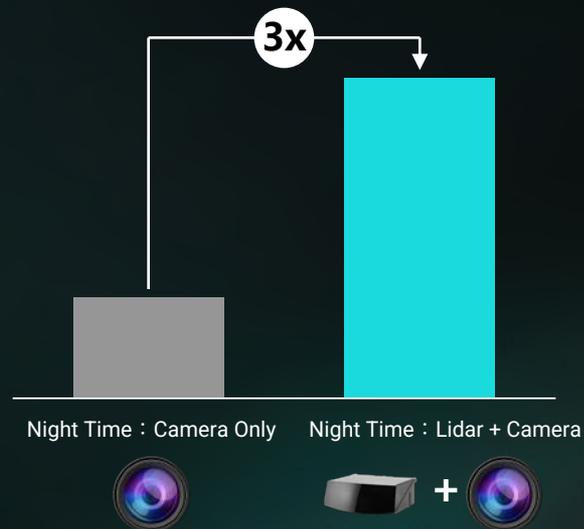


# Lidar Provides the Necessary Safety Redundancy Supplementing to Camera

- Lidar actively emits lasers that are unaffected by ambient light, supplementing camera perception to improve safety like “invisible airbags”
- A 2022 study by the MIT team indicates Lidar + camera solution improves night time perception accuracy by three times



Mean Average Precision (mAP)



# Real-World Examples in a Media Test Drive Demonstrate Lidar's Value

HESAI



*Detecting a pedestrian in black shirt at night*



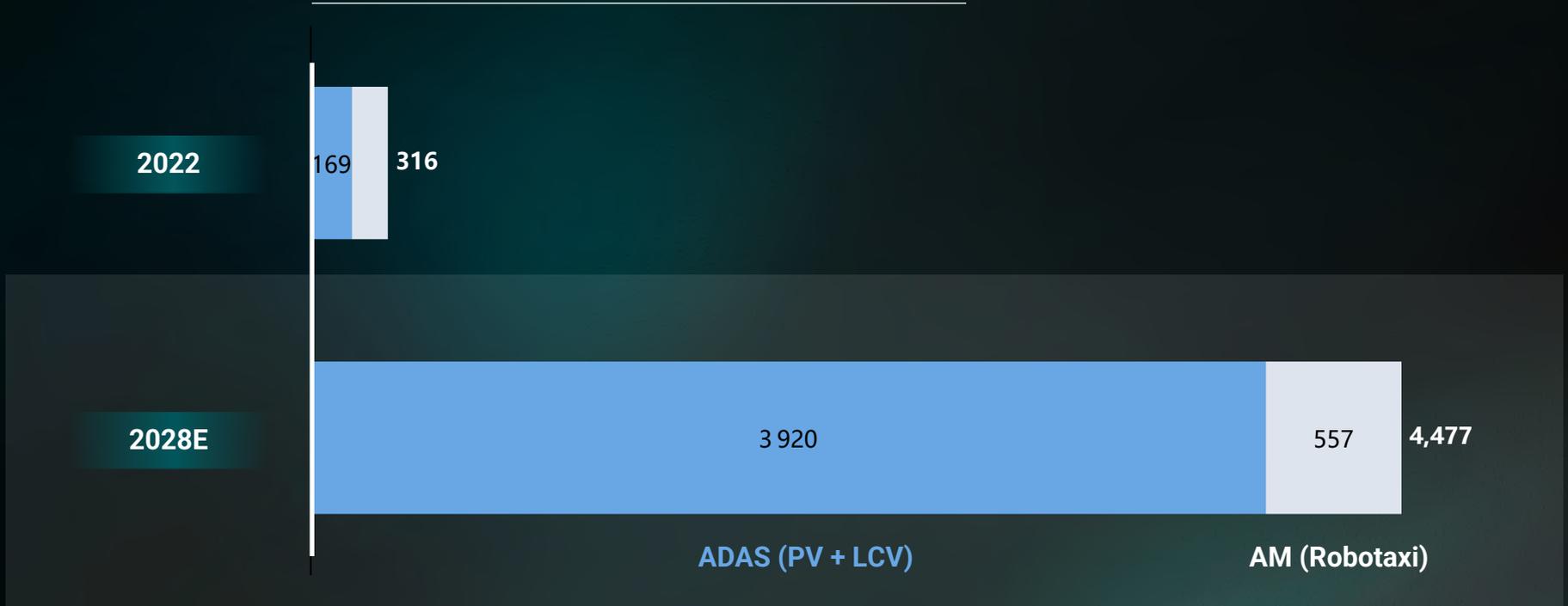
*Bypassing a road-cleaning vehicle blended into the background*



# The Automotive Lidar industry is Expected to Maintain High Growth

## Global Automotive Lidar Market Size

Unit: M USD



A dark, grayscale photograph of a car's interior from the driver's perspective. Two large, inflated airbags are visible, one on the left and one on the right, framing the center console and dashboard area. The text is overlaid in the center of the image.

Lidars - the Invisible Airbag  
for All Smart Vehicles

# Thank You

## Contact Us:

### Shanghai

Building L2, Hongqiao World Center,  
Shanghai, China 201702

### U.S.A

3500 W Bayshore Rd.,  
Palo Alto, CA 94303

### EU

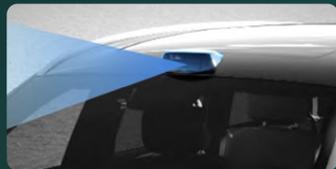
Charles-Lindbergh-Platz 1  
71034 Böblingen, Germany

[sales@hesaitech.com](mailto:sales@hesaitech.com)  
[pr@hesaitech.com](mailto:pr@hesaitech.com)

# Our Product Offerings for Different Markets

## ADAS (Series Production Cars)

### AT Series Ultra-High Resolution Long-Range



**AT128**

Auto-grade



### FT Series Fully Solid-State Short-Range

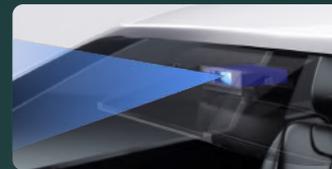


**FT120**

Auto-grade



### ET Series Ultra-Thin Long-Range



**ET25**

Auto-grade



## Autonomous Mobility

### Pandar Series High-Performance Long-Range



**Pandar128**

Auto-grade



### QT Series Ultra-Wide View Short-Range



**QT128**

Auto-grade



## Robotics

### XT Series Cost Effective Mid-Range



**XT32**



\*All detection range data is in 10% reflectivity condition; ET25's range is at center FOV of Lidar with AR-coated windshield transmittance >85%; specifications are subject to change in the SOP version, and are customizable per the customer's needs.