



中国汽车技术研究中心有限公司  
China Automotive Technology and Research Center Co., Ltd.



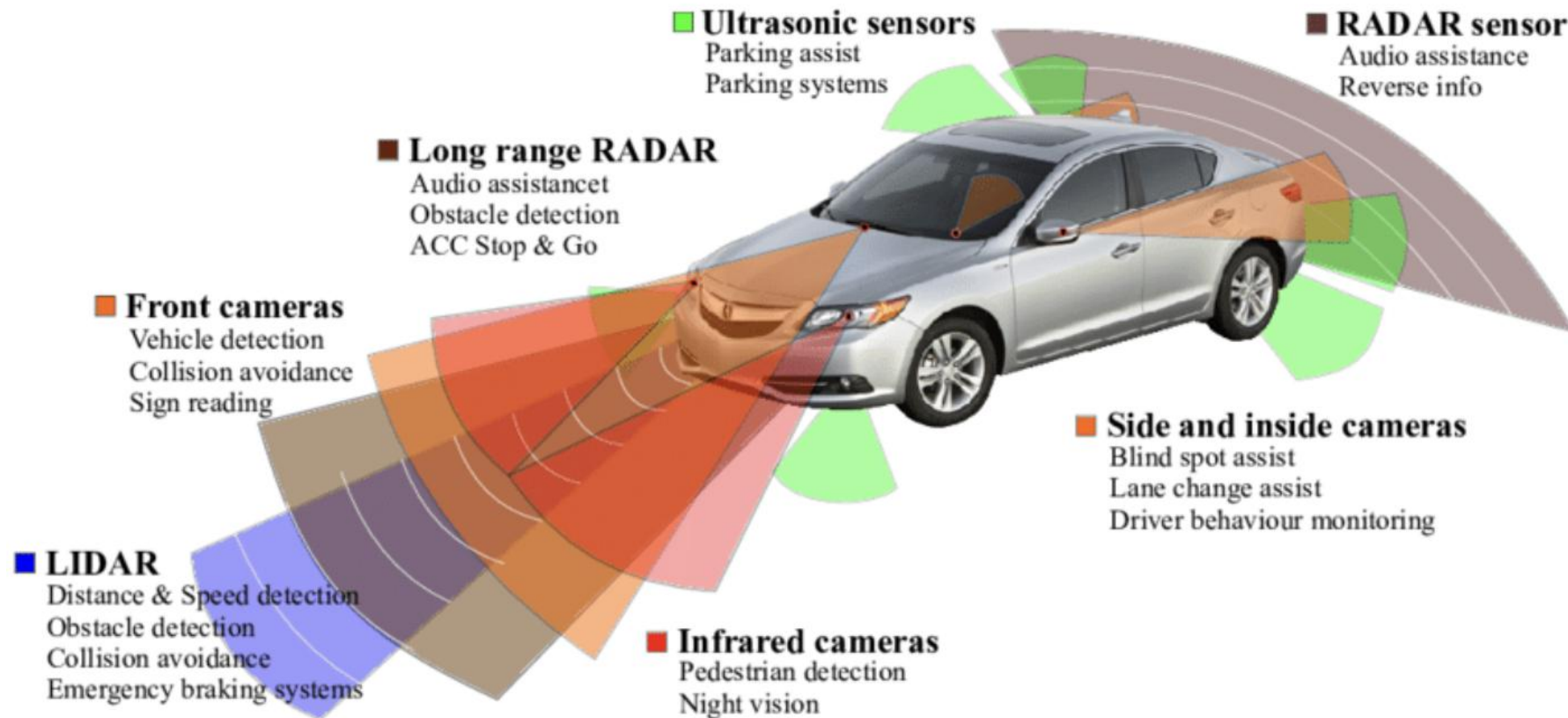
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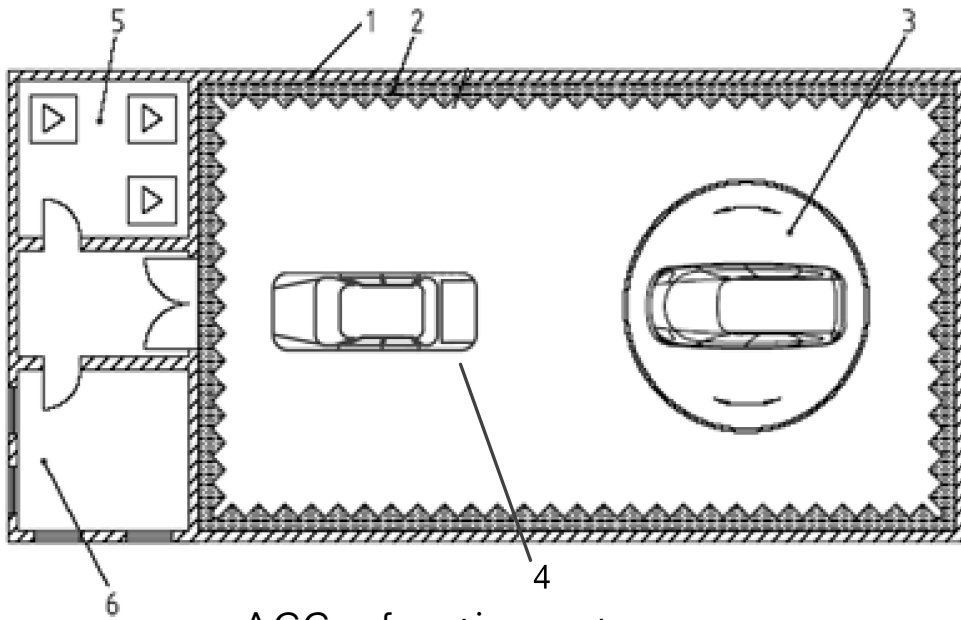
# Autonomous Driving immunity test — China proposal

2021.07

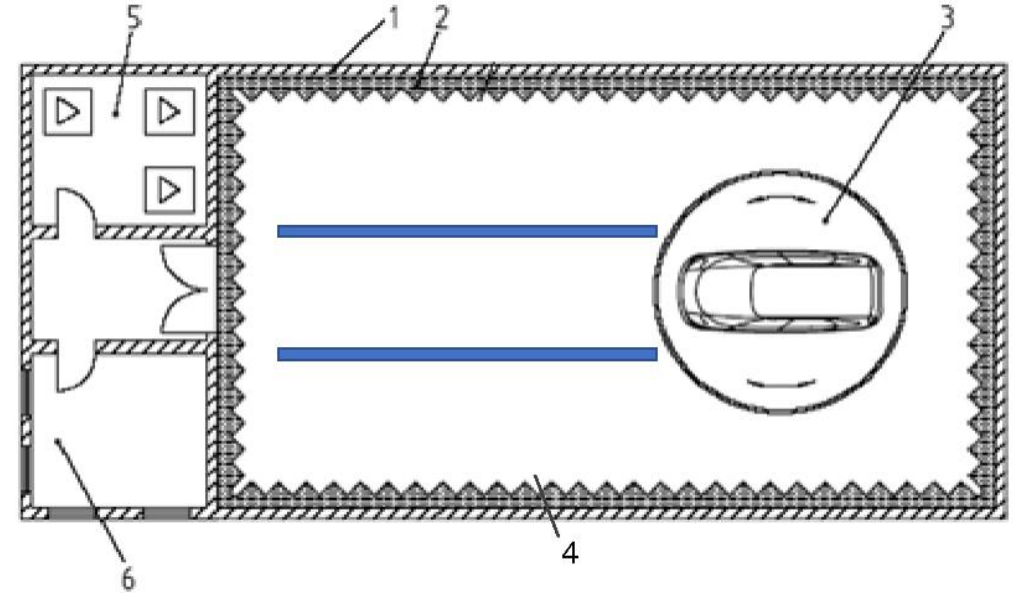
## Our Target



- Autonomous driving related on-board electronics should be tested
- Try to setup several test scenarios to activate the sensors and **actuators**



ACC function setup



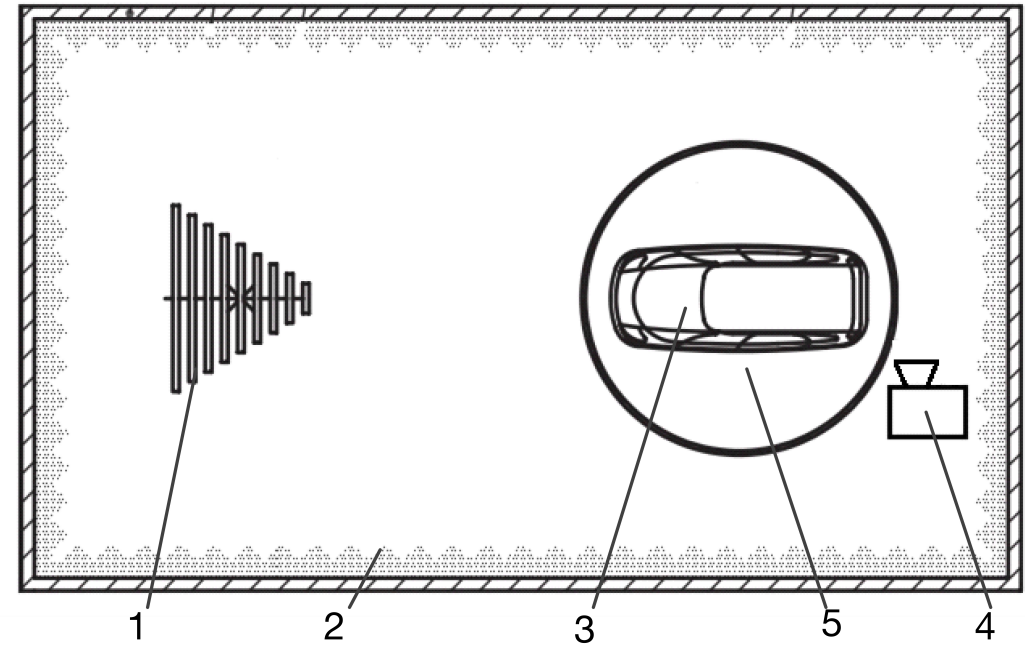
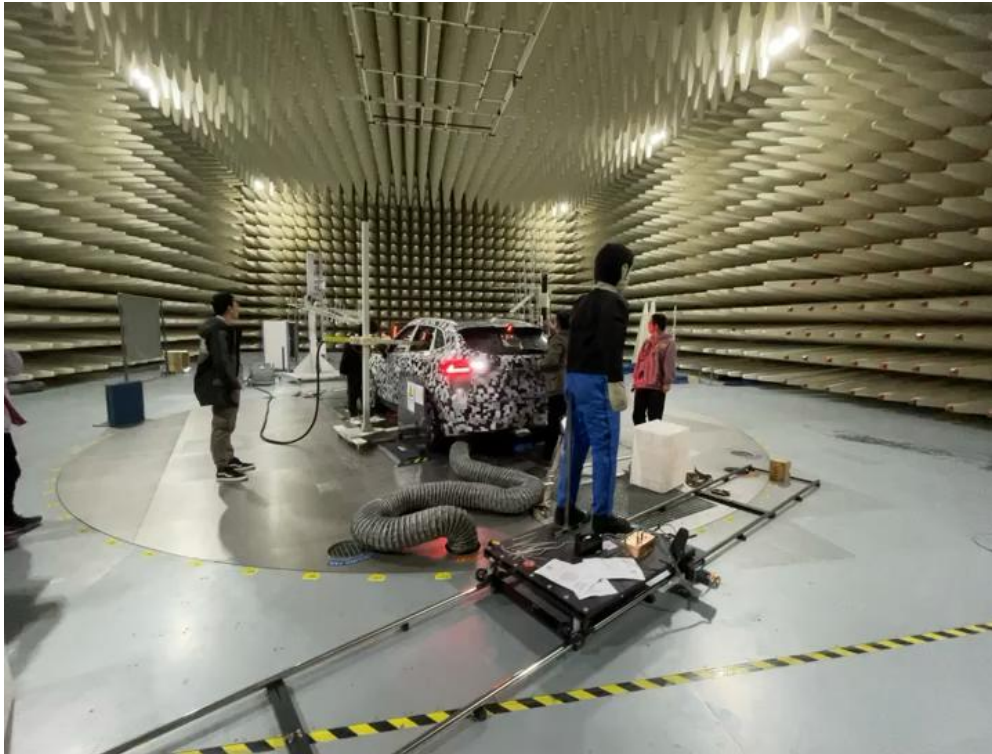
LKA function setup

- Activate Front cam/mm-radar using dummy car
- speed control actuator activated by controlled dummy distance

i.e. ACC speed set to 40kph, dummy distance lower the speed to 10kph

- Activate Front cam using lane tape
- steer control actuator activated by turn table

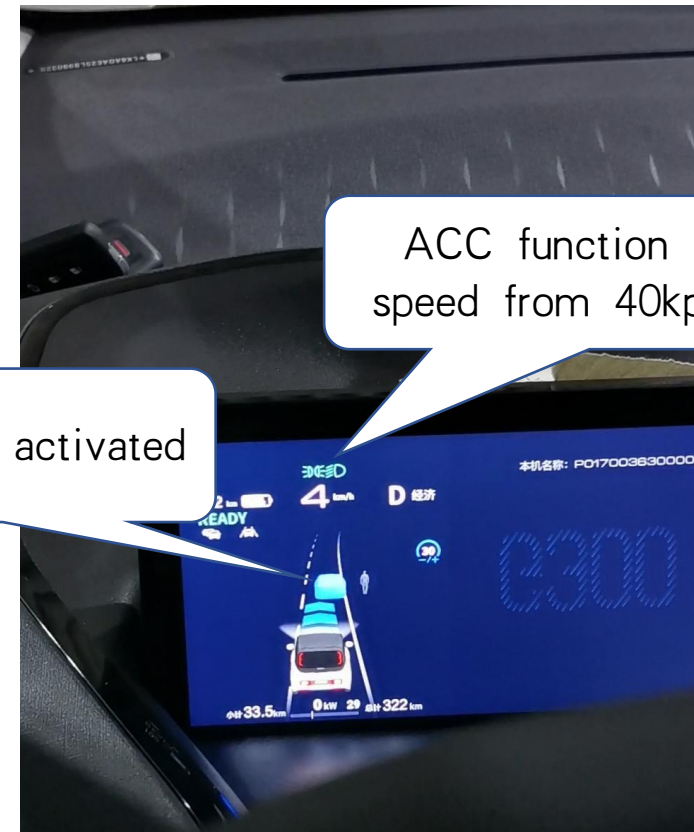
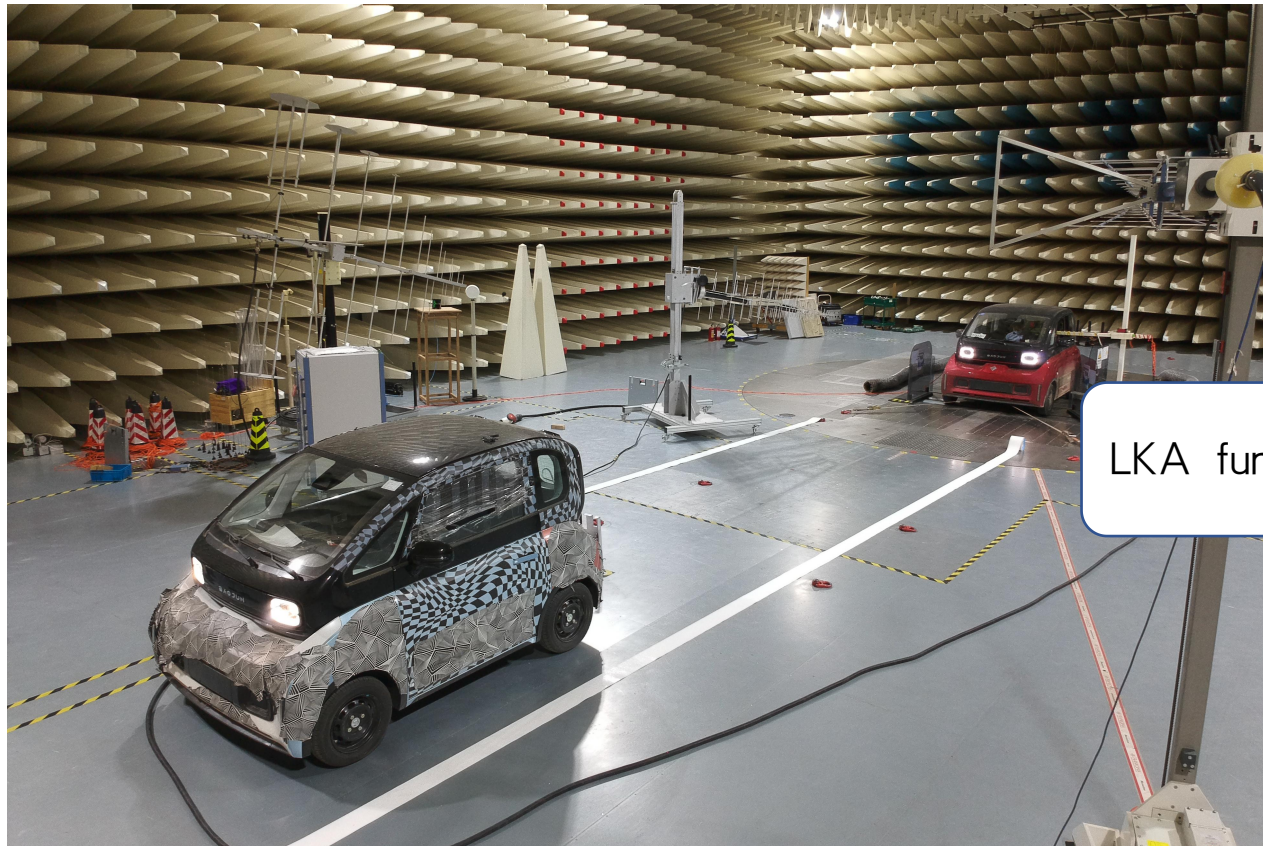
i.e. LKA lightly steer the vehicle when turntable adjust small degrees



BSD function setup

- Activate rear mm-radar related functions using dummy/target simulator
- Need relative speeding to trigger the warning
- Periodic triggered according to frequency steps/dwell time may needed

# Test examples



Chinese Low-end EV @ 10,000 US dollars

1 front cam + 1 front mm-radar

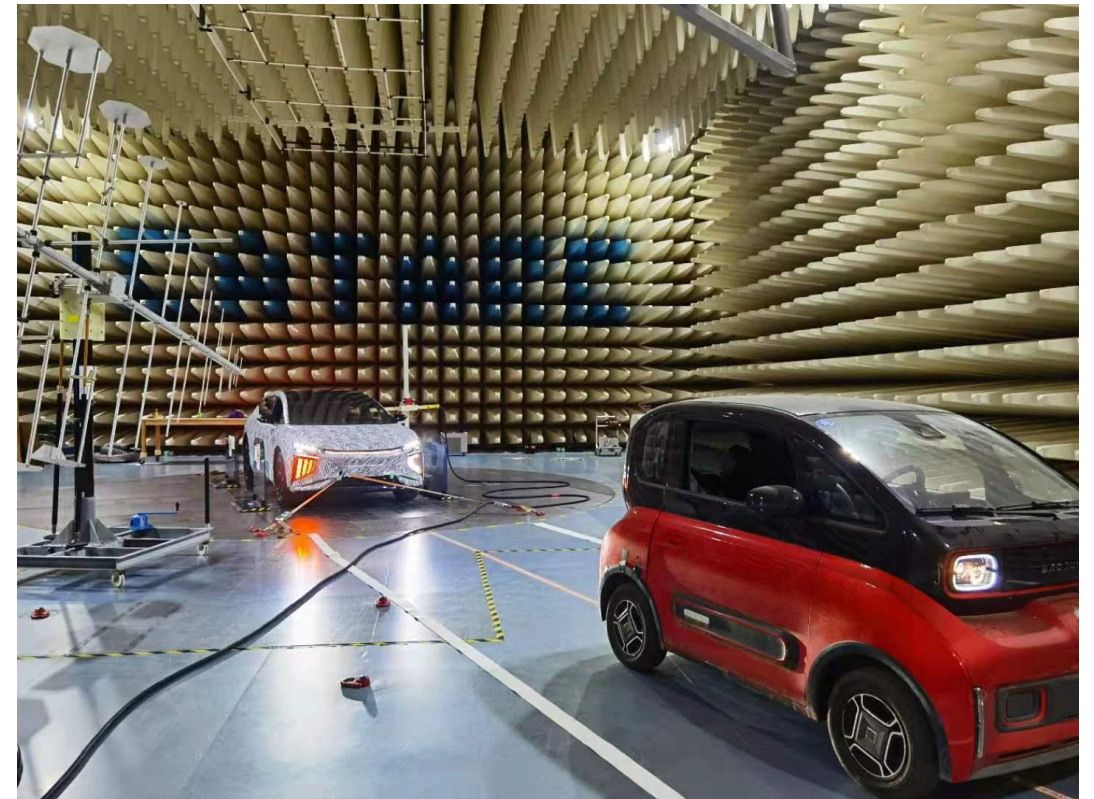
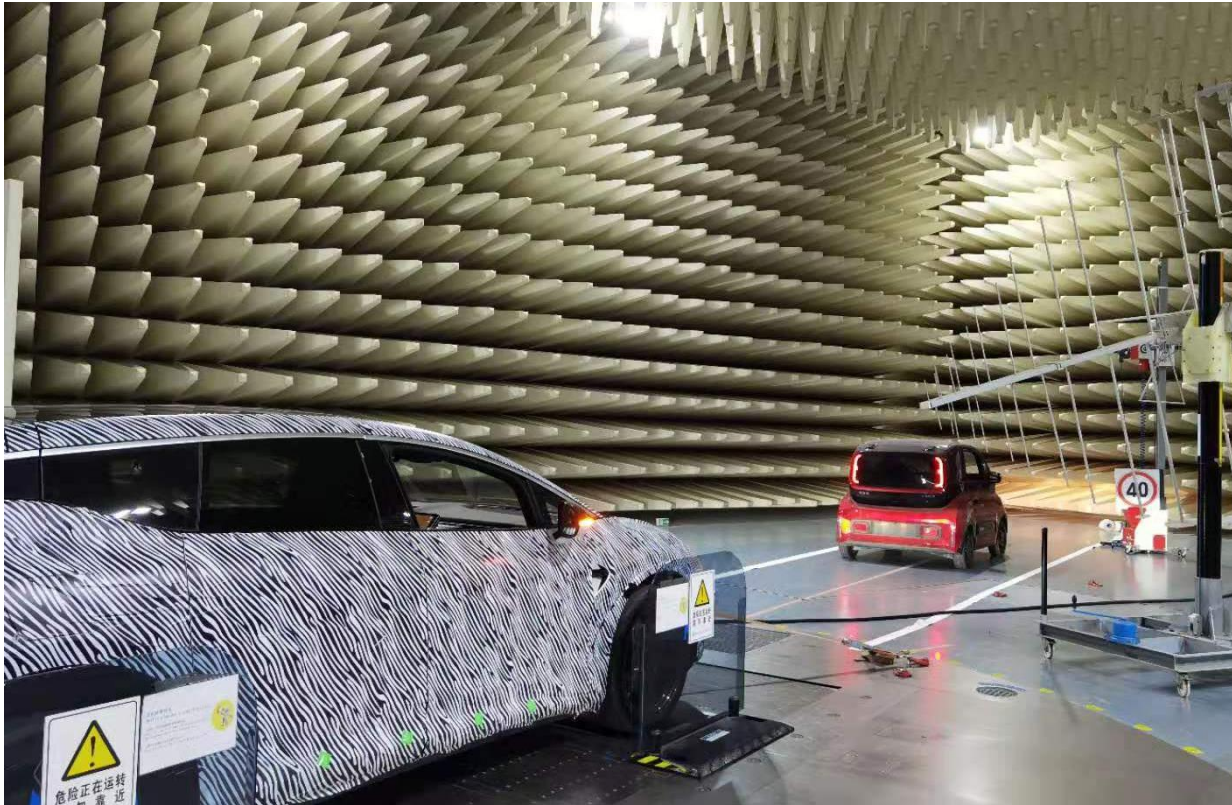
## Test examples



Chinese Mid-end EV @ 50,000 US dollars

4 front cams + many mm-radars

## Test examples



Chinese Hi-end EV @ 100,000 US-dollars

## L4 examples



[广州无人车集体穿越抗疫封控线!连夜上岗,雪中送炭 - 知乎](#)



2021年6月8日 有全球总部就在广州的文远知行。作为广州自动驾驶测试牌照最多的公司,文远知行的RoboTaxi小车和Mini RoboBus小巴,连夜部署

L3+ autonomous driving has been used in certain areas of china

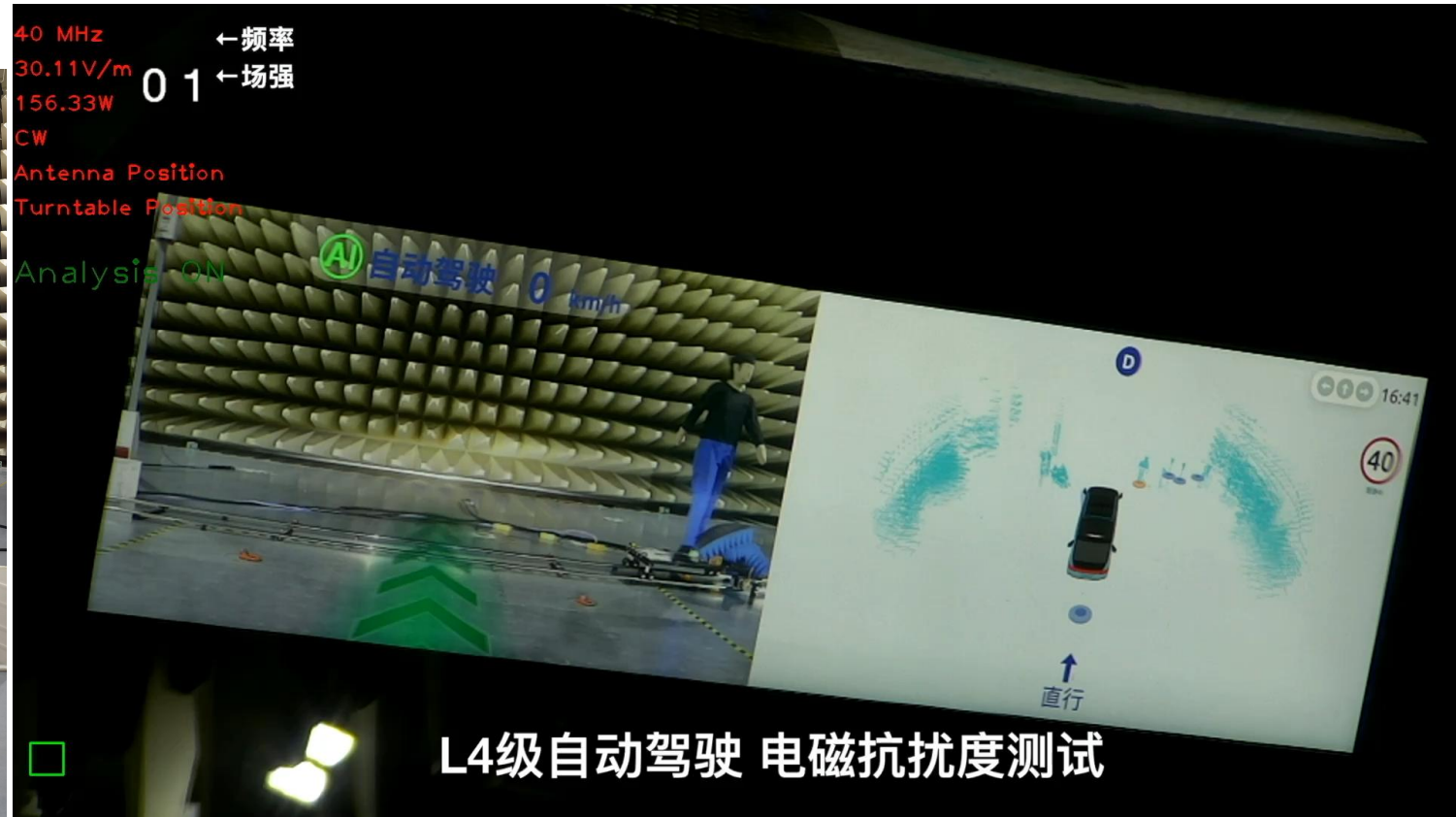
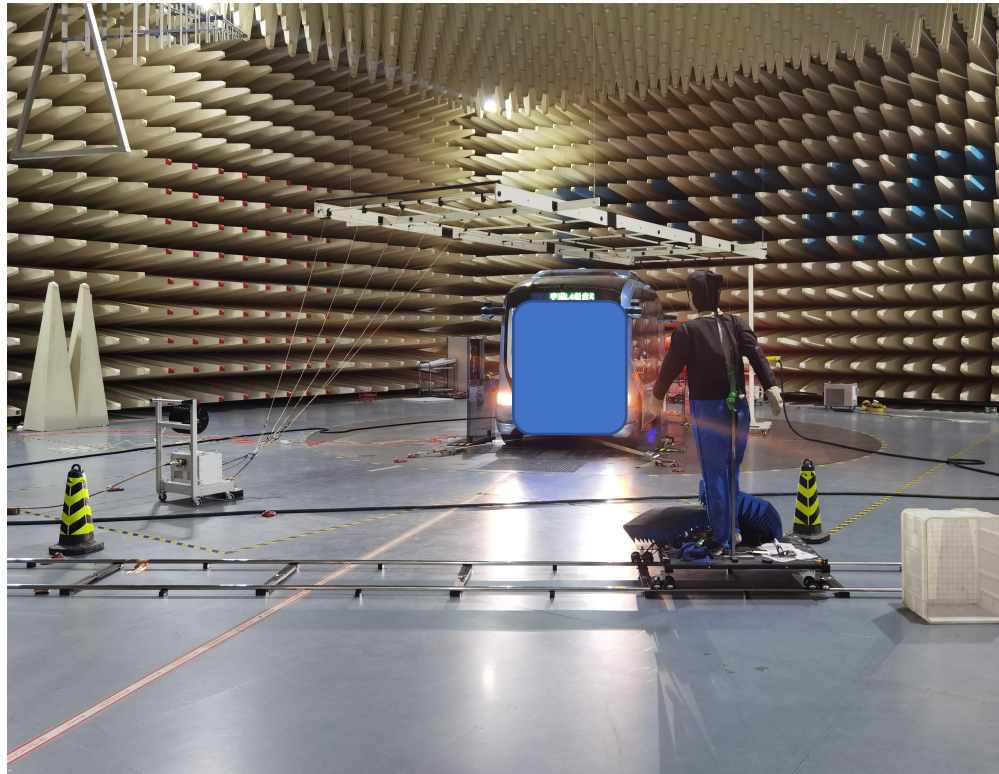


## L4 examples



L3+ autonomous driving has been used in certain areas of china

## L4 examples



We tried our solution on one typical L4 mini-bus

Proved vulnerable to immunity test even @30V/m

The Key challenge is the initialization of e-map and IMU to active autonomous driving

Which could be done by the support of supplier.

<i>"50 km/h mode" vehicle test conditions</i>	<i>Failure criteria</i>
Vehicle speed 50 km/h (respectively 25 km/h for L <sub>1</sub> , L <sub>2</sub> vehicles) ±20 per cent (vehicle driving the rollers). If the vehicle is equipped with a cruise control system, it shall be used to maintain the required constant vehicle speed and maintained without any deactivation.	Speed variation greater than ±10 per cent of the nominal speed. In case of automatic gearbox: change of gear ratio inducing a speed variation greater than ±10 per cent of the nominal speed.
Dipped beams ON (manual mode)	Lighting OFF (front light and rear light)
Specific warning (e.g Rotating/flashing light, signaling bar, siren...) ON	Specific warning OFF

We propose to add Failure criteria:



Test conditions	Failure criteria
ADAS Speed control related system ON	Unexpected speeding or braking
ADAS Steer control related system ON	Unexpected steering
Autonomous driving system (level 3 or higher) shall be operational	Unexpected system failure warning Unexpected vehicle action



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