Shanghai Jiyu Technology Co., Ltd.

Redundant Drive-By-Wire System & Chassis Provider



Offering Super Running Shoes for Autonomous Driving!

Xia Cunliang (Axel), Co-Founder Email: xiacunliang@drivitech.com TEL: (+86) 150 215 77 414





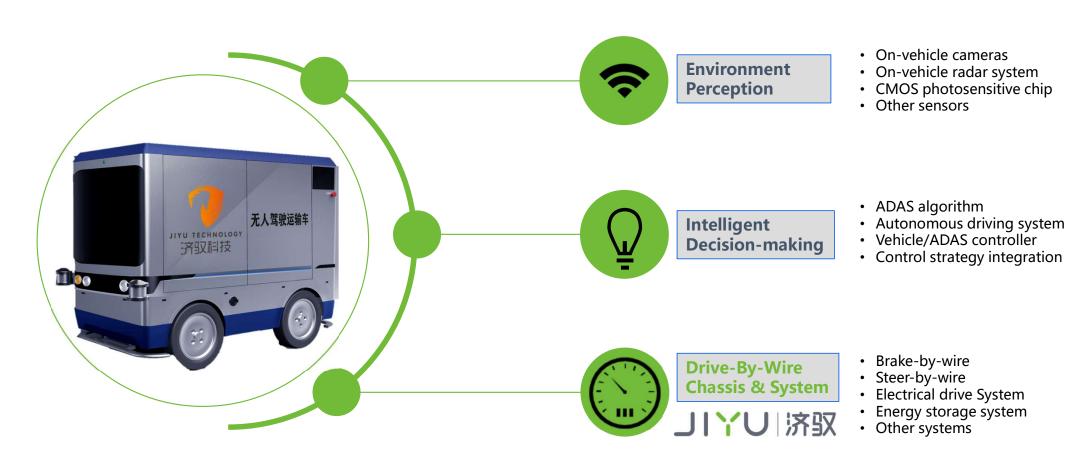
- Company Introduction
- Product Portfolio
- Cooperative Partners & Application Cases





Autonomous Driving Products Chain

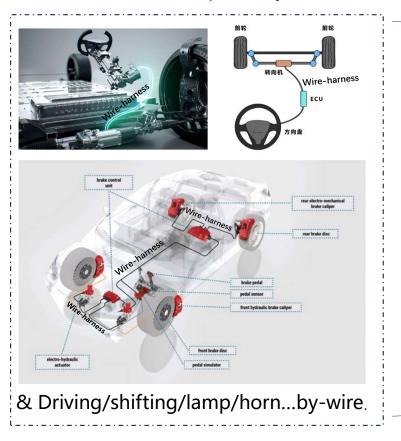


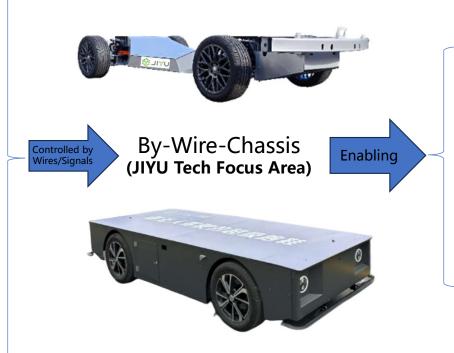


Understanding of By-Wire-Chassis



Mechanical connection replaced by Wire-harness:





Joy of driving. (Tunable & Fast Response)

Comfort & Safety.

Intelligent vehicles.

Autonomous Driving.





Shanghai JIYU Technology Co., Ltd. was established on July 14th 2020, focusing on the R&D and production of the driverless chassis-by-wire for autonomous driving. The founding team mainly comes from Tongji University, Delphi and Volvo Cars.

Shining Fairy S series, Magic Carpet M series, Legendary Heracles L series, & Combat Wings W series, as Four series of by-wire chassis, have been put on market, covering unmanned logistics, unmanned distribution, unmanned disinfection and sterilization, unmanned special vehicles, etc., which have been applied in multiple scenes and put into long-term operation.

JIYU Technology provides precise and adaptive **Super Running Shoes** for autonomous driving.

Four series of X-by-wire chassis products:

Shining Fairy S series,



Magic Carpet M series,



Legendary Heracles L series,



Combat Wings W series.









罗永昌 Mr. Luo Yongchang, Founder and CEO

Founding partner of Aoteca New Energy Technology Co., LTD.

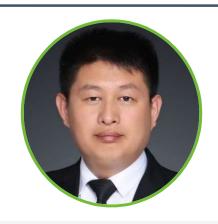
Founding partner of Shanghai Tongyu Automobile Technology Co., LTD.

Technical Strengths:

15+ years of core parts development experience for new energy vehicle chassis; Successfully developed and launch support for

VCU. MCU. BMS. ACC. PTC. EHB. EPB:

10 cases granted for invention/utility patents.



孙永正 Mr. Sun Yongzheng, PhD, Partner

EMS Development engineer in Delphi China R&D Center.

Senior Manager of VCU software Development in Auteca New Energy Technology Co., LTD.

Technical Strengths:

15+ years SW & algorithm development experience; Expert in engine EMS software development & calibration; Proficient in hybrid HCU software development;

Skilled in VCU software development for BEV & NEV; Experienced in model-based development process and deployment for ISO 26262 function safety.



夏存良 Mr. Xia Cunliang, Partner

Chassis engineer of Ford China R&D Center (Nanjing) Co., Ltd;

Chassis manager (Brakes & Tyres) at Volvo Car China R&D center.

Technical Strengths:

17+ years' experience in chassis development, with dedicated 12+ years in brake system development (EHB/ESC/EPB/One-Box & others);

Profound architecture expertise for brake, steering, suspension and wheels/tyres development.

Familiar with legal requirements for global markets within chassis area.





Dozens of invention patents, utility model patents and software copyrights have been obtained, in the area of by-wire chassis core technologies.









Redundant Steering & Brake & other X-By-Wire Systems

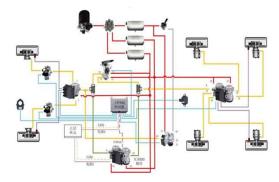




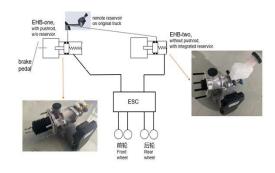
Redundant By-Wire-EPS/EHPS, for heavy-duty commercial vehicles



Redundant By-Wire-EPS, for light/mid-duty vehicles, with Road Force Feedback



Redundant Air-Brake-By-Wire, for mid/heavy-duty vehicles



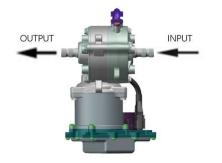
Redundant Brake, with one/two EHBs & ESC, for mid-duty vehicles



VCU: Vehicle Control Unit



EHB, Electrical-Hydraulic Brake Module



By-Wire Column-EPS, Drive-By-Wire trucks adaption



Cable-EPB, Cable controlled Electrical Parking Brake Unit

In-house developed & produced VCU







- In-house developed & produced VCU, mass production for passenger cars;
- >0.5M pcs of mass production for OEM until now, w/o critical issues;
- Supports UDS (Unified Diagnostic Services) and Bootloader;
- Support rapid prototype development, automatic code generation, hardware in the loop testing, calibration and verification;
- 2 channels CAN with communication function;
- 2 channels CAN communication with wake up function;
- MCU maximum dominant frequency 200MHz.

Technical parameters as follows:

Electrical test:

Normal voltage: 12VDC & 24VDC

Specification: ISO16750-2 (GBT 28046-2)

EMC (Electro Magnetic Compatibility) test:

Electrostatic discharge test (ESD): ISO10605 (GBT19951)

Transient disturbance/interference interference: ISO 7637-2 (GB 21437-2)/ISO 7637-3 Electromagnetic disturbance/interference interference: CISPR 25 (GB 18655)/ISO 11452

Dustproof and waterproof grade:

Seal class: IP 67

Specification: ISO16750-5 / ISO 20653 (GB 28046-4)

Mechanical vibration & shock:

Vibration, shock and drop tests: ISO 16750-3 (GBT28046-3)

Climatic environment test:

Temperature parameters: storage (-40~125 °C), operating (-40~85 °C)

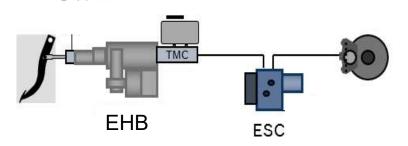
Specification: ISO 16750-4 (GBT 28046-4)

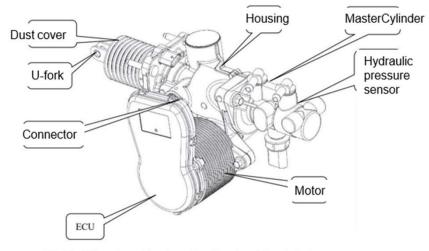
Note: If required operating temperature exceeds 85 degrees, please contact the venderdirectly.





Redundant Brake-By-Wire, EHB + ESC.





EHB (Electro-Hydraulic Brake Module)

- In-house developed EHB, & in-house algorithm development;
- Mass production for 30+ OEMs, conventional cars & AD-cars;
- Dedicated design with bigger power for light/mid-duty pickup;
- Redundency brake together with EHB and original ESC;
- Full-time regenerative brake for reduced CO2 & increased range;
- Supports UDS (Unified Diagnostic Services) and Bootloader;
- Control accuracy ≤1bar; pressure building time (10%-->90%)≤100ms;
- Pressure relief time (90% to 10%)≤150ms.

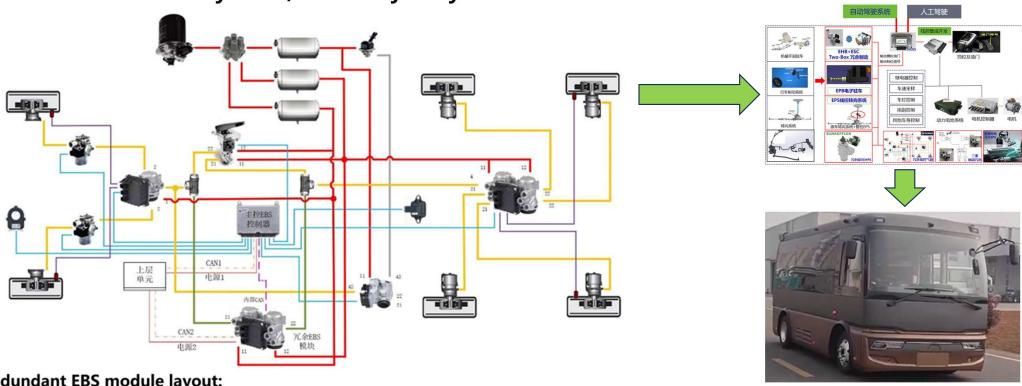


EHB (Electro-Hydraulic Brake Module) parameters		
12V power supply	9V~16V	
24V power supply	18V~32V	
Working temperature	-40~125 °C	
Maximum pressure build-up	>14MPa	
10MPa pressure build-up time	~200ms	
TTL (Time-To-Lock)	~250ms	
Dimension (mm)	357*222*185	
Mass (kg)	5.9kg	
Waterproof grade	IP67	





Redundant Air Brake-By-Wire, for Heavy-duty vehicles.



Redundant EBS module layout:

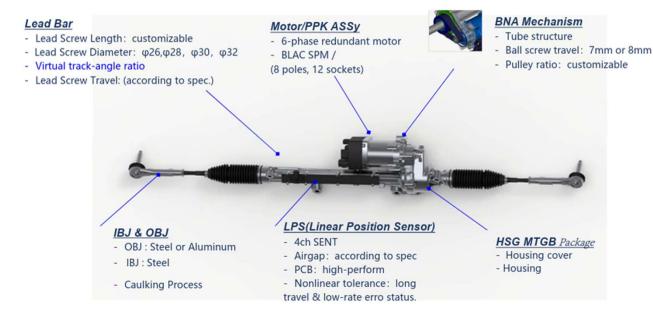
- 1, The EBS system redundancy function is mainly composed of: a redundant EBS module, two double-way check valves and wiring harness;
- 2. When the basic EBS ECU fails, the upper unit supplies power to the redundant EBS module and sends braking instructions through the standby power supply 2 and CAN2. The redundant EBS module will replace the foot valve, and the standby braking system works as the traditional braking system to provide air control signals for the front and rear axle modules and trailer modules.
- 3, The basic EBS ECU and redundant EBS module, also meet the EBS internal CAN communication, monitoring and switching.





Redundant Steering-By-Wire, both upper & lower steering.

Front Steering Actuator



Handing Feedback Actuator



- Two ECU Circuits Indenpendant Design;
- Dual Power chipset & Dual PMIC to secure safe power supply;
- Dual MCU Chipsets, no primary or secondary difference;
- Dual Motor Control IC, to secure its robotness;
- Dual Motor position check, for reliable position check;
- Dual-redundant & 4 channel LPS, offering SENT signal for two ECUs respectively;
- Support ASIL D for fulfilment of ISO26262;
- Ambient Temperature: -40°C 125°C;
- Water Proof: IP69K.



Redundant Steering-By-Wire, In-house Developed System

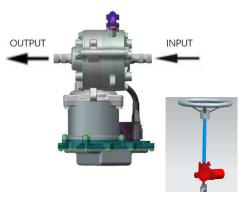




- Two ECU Circuits Independent Design;
- Dual Power chipset & Dual PMIC to secure safe power supply;
- Dual MCU Chipsets, no primary or secondary difference;
- Dual Motor Control IC, to secure its robotness;
- ☐ Dual Motor position check, for reliable position check;
- Dual-redundant & 4 channel LPS, offering SENT signal for two ECUs respectively;
- Support ASIL D for fulfilment of ISO26262;
- Ambient Temperature: -40°C 125°C;
- Water Proof: IP69K.

In-house Steering-By-Wire Integration & Calibration





UTV/无人车

UTV/Autonomous vehicle

C-EPS

80A@DC12V

DC12V

54Nm

850Kg

IP67

TAS

1°

< 50ms

适配车辆

结构型式

APPLICATIONS

最大供电电流

RATED CURRENT

OPERATING VOLTAGE 最大输出扭矩

STEERING AXLE LOAD 防护等级

PROTECTION LEVEL 传感器类型

SENSOR TYPE 角度控制精度

响应时间

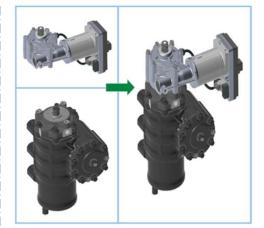
RESPONSE TIME

MAXIMUM OUTPUT TORQUE 转向轴最大载荷(参考)

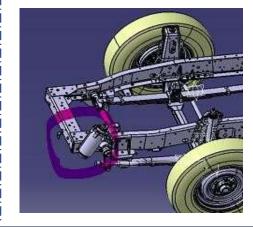
ANGLE CONTROL ACCURACY







Circular ball type for trucks, **Redundant** EPS/EHPS.



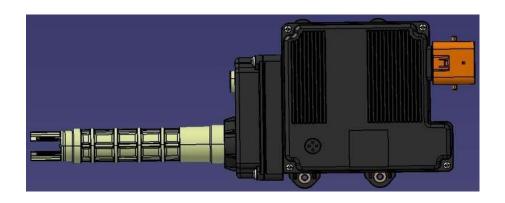
内容 Contents	性能参数 Performance Parameters
前轴载荷front axle load	8000kg
最大液压输出扭矩	8800Nm (90% efficiency @ 17Mpa)
max torque output by oil	
最大油压max oil pressure	17Mpa
最大流量 maximum flow	25L/min
HPS传动比 HPS ratio	22.2~26.2
电机最大扭矩 max motor torque	130Nm (8Nm*20.5*80%)
工作电压 Voltage	24V (18~32V)
传感器TAS Sensors	4+2
电机 Electrical Motors	6相双绕组 6-phase double winding
控制器ECU Controller	双ECU冗余 Dual ECU redundancy
电源供电 Power supply	双供电冗余 Dual redundant power supply
CAN 通讯 CAN communication	双CAN通讯冗余
	Dual CAN redudant communication
重量 weight	53kg

In-house

In-house developed Cable-EPB Actuator

JIYU 済驭

- In-house developed cable-EPB, in-house developed control algorithm integrated in EPB unit;
- · Perfect solution for parking-by-wire on heavy-duty commercial vehicles.





integrated parking brake

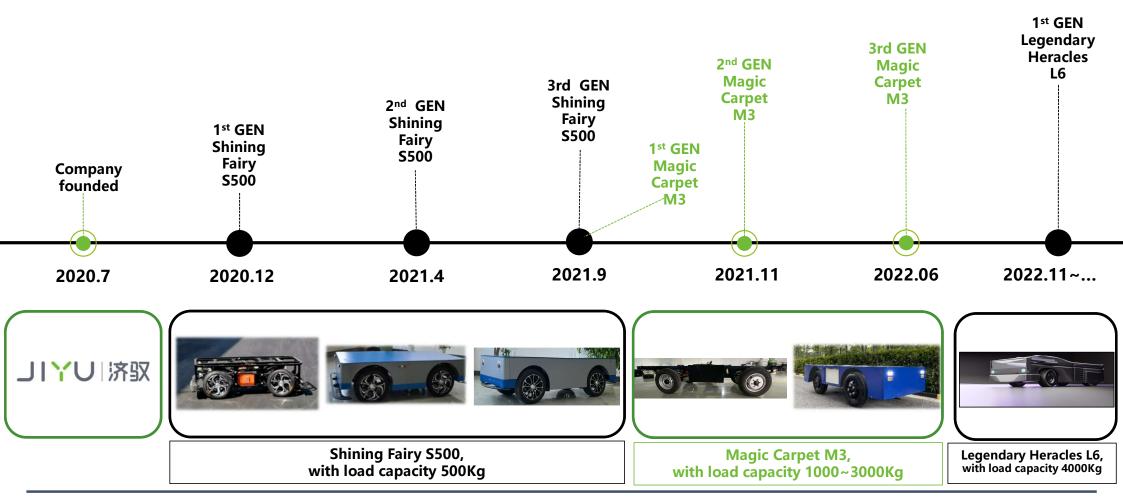
EPB actuator parameters		
24V power supply	18V~32V	
Working temperature	-40~125 °C	
Maximum pulling force	2500N@27V	
Response time	1600N 30mm ≤1.5s	
Mass (kg)	1.6kg	
Waterproof grade	IP67	

Typical EPB Functions:

- 1. Manual Parking:
- 2. Manual Release:
- 3. Automatic Parking:
- 4. Automatic Release:
- 5. External parking and external release:
- 6. Limp-home mode:
- 7. Maintenance Mode:
- 8. Dynamic and static diagnostics of vehicles status;
- 9.









Drive-By-Wire Chassis Product Portfolio



Shining Fairy S Series

Payload≤500kg



Magic Carpet M Series

M1A payload≥1000kg





M1B platform payload ≥ 1200kg Specifically developed for mobile charging and energy storage

Legendary Heracles L series

Payload 3~5 tons



Combat Wings W Series

Four-wheel distributed drive skateboard chassis





Unmanned patrolling



Unmanned grocery retail & delivery



Unmanned delivery



mobile charging and energy storage



Unmanned transportation for heavy load parts



Autonomous driving algorithm verification, Distributed drive algorithm research, Turning to redundant algorithm research, Research on four-wheel independent braking algorithm. . .





By-Wire-Chassis delivery for autonomous grocery transportation vehicle



Chassis-By-Wire for autonomous grocery delivery vehicle



By-Wire-Chassis update & adaption for Deeproute Pickup



Chassis-By-Wire for autonomous disinfection vehicle



By-Wire-Chassis update & adaption for Robotaxi AD



By-Wire-Chassis for autonomous grocery delivery vehicle







Shining Fairy S500-Chassis



2021.4



Shining Fairy S500-Chassis



2021.9



4.5 tons pickup X-by-wire Chassis



2021.11



Magic Carpet M3-Chassis



2022.06



Passenger Car X-by-wire Chassis



2022.11~...



Magic Carpet M3-Chassis









Chassis size (L*W*H) (mm)	1100*740*400 (customizable)
Wheelbase (mm)	600 (customizable)
Chassis weight (kg)	160
Load capacity (kg)	300
Min ground clearance (mm)	70
Max speed (km/h)	5
Max gradeability with full load	20% (11.31°)
Propulsion	Rear drive
High voltage battery	Lithium Iron Phosphate
Battery voltage (V)	72 or 48
Communication	CAN2.0B

Main application Scenarios:





unmanned delivery & grocery retail





unmanned disinfection & patrol

Shining Fairy S300 Series: High Frequency, Rigid demand, Ready for mass production.



Product -- Shining Fairy S500, Small-Size X-By-Wire Chassis





Chassis parameters with 500kg load capacity		
2120*900*655 (customizable)		
1000~1600 (customizable)		
350		
500		
72		
6		
120		
35		
20% (11.31°)		
20% (11.31°)		
≤1		
≤1		
≥120		
Rear drive		
Disc brake		
Disc brake		
Electrical parking brake		
Direct TPMS		
CAN2.0B		

Main application scenarios





unmanned delivery & grocery retail





unmanned disinfection & patrol

Shining Fairy S500 Series: High Frequency, Rigid demand, Ready for mass production.

III

Product -- Magic Carpet M1A-1T, Mid-Size X-By-Wire Chassis







Chassis parameters with 1 ton load capacity 3300*1200*700 (customizable) Chassis size (L*W*H) (mm) 2000 (customizable) Wheelbase (mm) Chassis weight (kg) 800 Load capacity (kg) 1000 Min ground clearance (mm) 120 Parking slope 20% (11.31°) Max gradeability with full load 20% (11.31°) Min steering radius (m) 4.5 Rear axle drive **Propulsion** Front brake Disc brake Rear brake Disc brake Parking brake Electrical parking brake Peak power of electrical Motor (kw) 15 Peak torque of electrical 90 Motor (Nm) Range with full load (km) 120 40 Max speed (km/h) High voltage battery Lithium Iron Phosphate Battery voltage (V) 73.6 Battery capacity (Ah) 280 CAN2.0B Communication

Main application scenarios





unmanned delivery, retail & disinfection





unmanned towing & bus.

Magic Carpet M series: Customized X-by-wire chassis with 1~3 tons load.

Product -- Magic Carpet M1B-1.2T, Mid-Size X-By-Wire Chassis







Chassis parameters with 1.2 ton load capacity 1655*850*470 (customizable) Chassis size (L*W*H) (mm) 1100 (customizable) Wheelbase (mm) Chassis weight (kg) 250 1200 Load capacity (kg) Min ground clearance (mm) 100 20% (11.31°) Parking slope 20% (11.31°) Max gradeability with full load 2.5 Min steering radius (m) Propulsion Rear axle drive Front brake Drum brake Rear brake Drum brake Parking brake Electrical parking brake Peak power of electrical Motor (kw) 6 Range with full load (km) Depending on battery capacity Max speed (km/h) 35 Lithium Iron Phosphate High voltage battery Battery voltage (V) 72V /320V / 800V customizable Battery capacity (Ah) CAN2.0B Communication

Main application scenarios





unmanned delivery, retail & disinfection





unmanned towing & bus.

Magic Carpet M series: Customized X-by-wire chassis with 1~3 tons load.



Communication







Chassis parameters with 3 tons load capacity 3700*1660*900 (customizable) Chassis size (L*W*H) (mm) 2000 Wheelbase (mm) Chassis weight (kg) 1200 3000 Load capacity (kg) Min ground clearance (mm) 230 20% (11.31°) Parking slope (%) 20% (11.31°) Max gradeability with full load (%) Min steering radius (m) 4.8 Propulsion Rear axle drive Front brake Drum brake Rear brake Disc brake Parking brake Electrical parking brake Peak power of electrical 36 Motor (kw) Peak torque of electrical Motor (Nm) 160 Range with full load (km) 60 Max speed (km/h) 25 High voltage battery Lithium Iron Phosphate Battery voltage (V) 96 Battery capacity (Ah) 270

CAN2.0B

Main application scenarios





unmanned delivery, retail & disinfection





unmanned towing & bus.

Magic Carpet M series: Customized X-by-wire chassis with 1~3 tons load.

Product -- Legendary Heracles L6, Large-Size X-By-Wire Chassis







Chassis parameters with 5 tons load capacity Chassis size (L*W*H) (mm) 5000*2000*900 Wheelbase (mm) 2400 Chassis weight (kg) 2000 5000 Load capacity (kg) 230 Min ground clearance (mm) 20% (11.31°) Parking slope Max gradeability with full load 20% (11.31°) Min steering radius (m) Front & Rear axle drive Propulsion Front brake Drum brake Drum brake Rear brake Parking brake Electrical parking brake Peak power of electrical Motor (kw) 40 Peak torque of electrical Motor (Nm) 300 Range with full load (km) 60 Max speed (km/h) 15 Lithium Iron Phosphate High voltage battery 350 Battery voltage (V) CAN2.0B Communication

Main application scenarios





unmanned delivery, retail & disinfection





unmanned towing & bus.

Legendary Heracles L6 series: Customized X-by-wire chassis with 4 tons load.

Product -- Combat Wings W Series, Skateboard Chassis







Combat Wings W Series, Skateboard Chassis 4800*1850*1660 (customizable) Chassis size (L*W*H) (mm) 2875 (customizable) Wheelbase (mm) Chassis weight (kg) 1200 Load capacity (kg) 800 Min ground clearance (mm) 158 Parking slope 20% (11.31°) Max gradeability with full load 20% (11.31°) Only front steering: < 6m; Min steering radius (m) Front & Rear Steering: < 3.5m. Propulsion Four In-wheel motor Steering Front and/or Rear Steering Disc brake Front brake Disc brake Rear brake Parking brake Electrical parking brake Peak power of electrical 6kW for each in-wheel motor. Motor (kW) 24kW in total. Range with full load (km) 100 Max speed (km/h) 80 Lithium Iron Phosphate High voltage battery Battery voltage (V) 73.6 260 Ah or 350 Ah Battery capacity (Ah) Communication CAN2.0B

Key Features:

1) Independent distributed drive, with four in-wheel motors.

2)Three steering modes:

- 2.1) Only the front wheels steering;
- 2.2) Steering in same direction for front and rear steering wheels;
- 2.3) Steering in opposite direction for front and rear steering wheels.

3) Three driving modes:

- 3.1) Remote control mode;
- 3.2) Unmanned driving mode;
- 3.3) Manual driving mode.

4) **Decoupled** Upper Steering Column & Lower Steering Gear.



Application Scenarios -- Drive-By-Wire Chassis







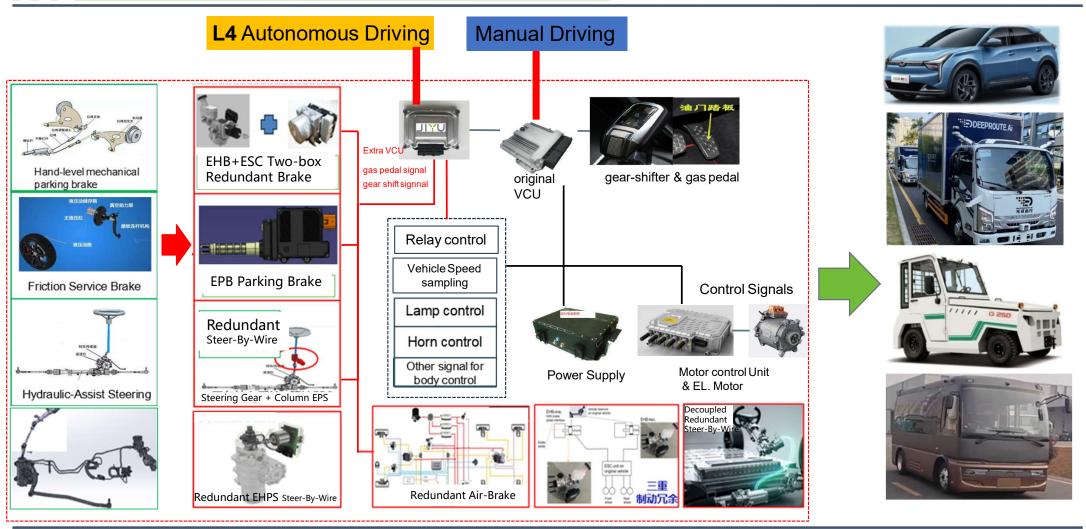




yWire

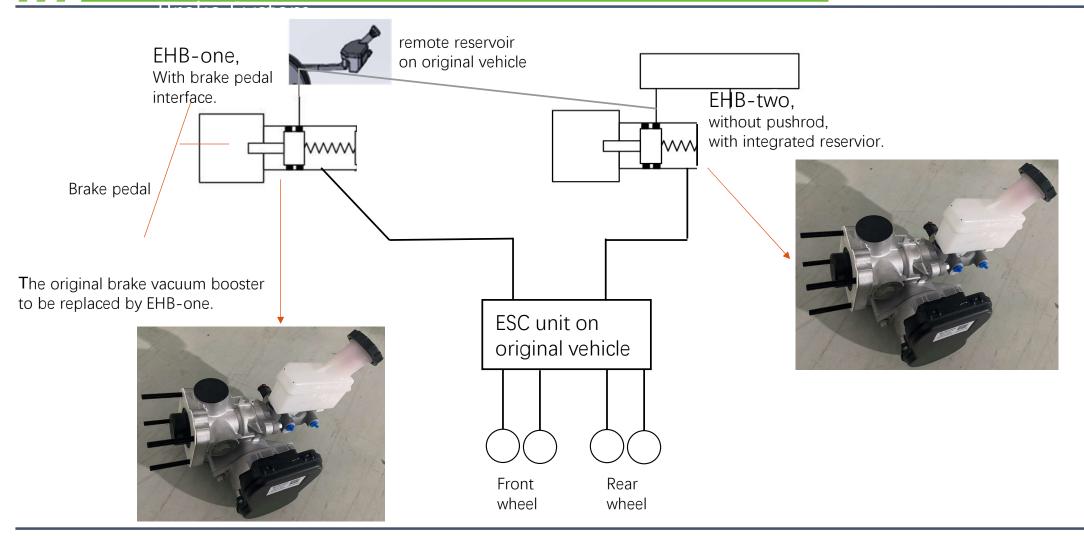
Drive-By-Wire Chassis upgrade & adaption





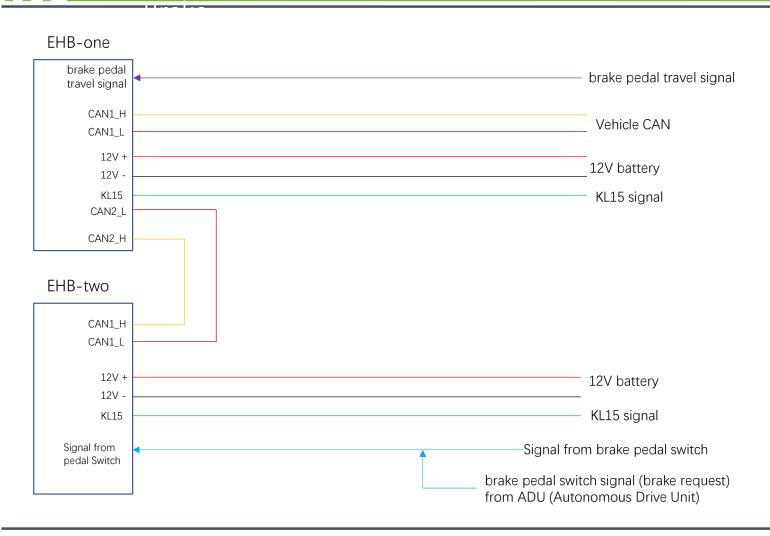
Customer Case 1 - ISUZU USA Project, Redundant





Customer Case 1 - ISUZU USA Project, Redundant

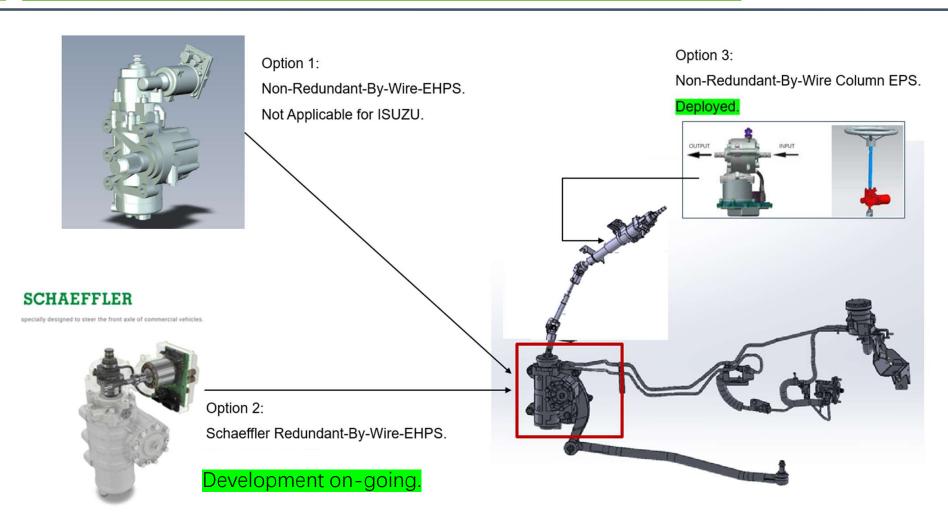






Customer Case 1 - ISUZU USA Project, Steering System



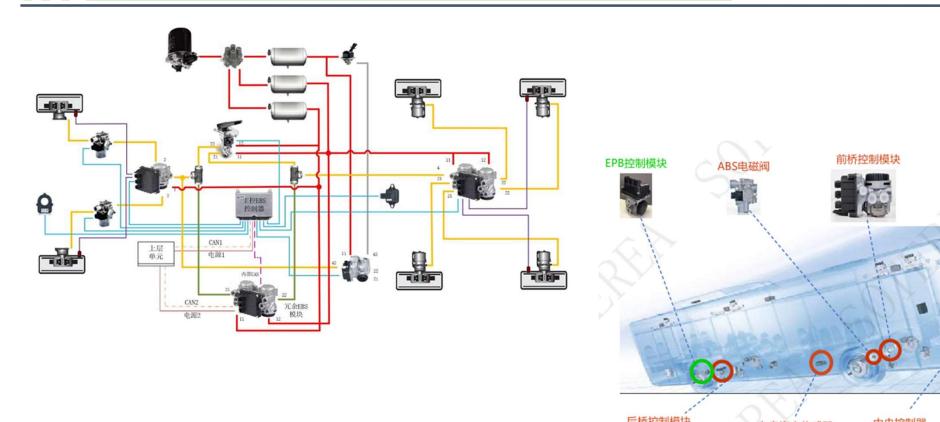




ISUZU USA New Project - Redundant Air Brake



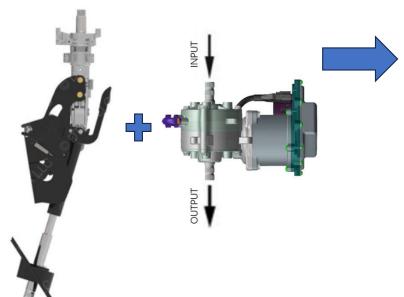
EPB旋钮阀



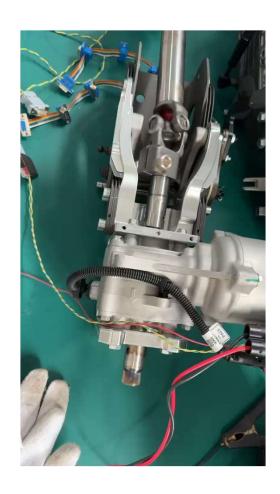
Customer Case 2 - Steering for Robo-Truck in Texas







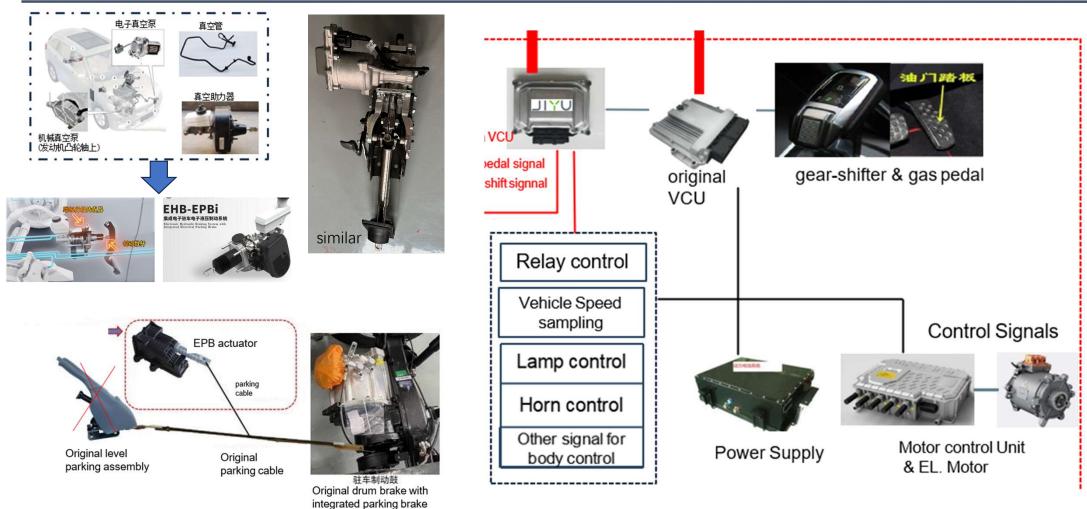




Customer Case 3 - ISUZU-China 4.5 tons pickup







111

Customer Case 4 - ZC Robo-Bus for EU/Japan





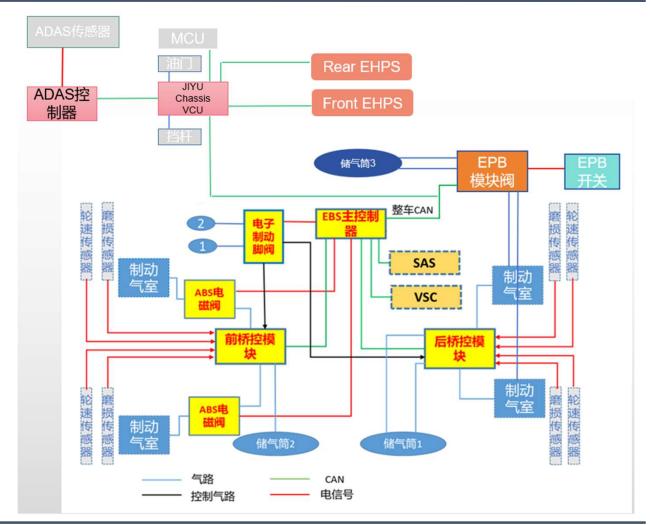
Air brake system & EHPS



6 meters & 7 meters Mini-Bus



12 meters Tourist Bus





Customer Case 4 - ZC Robo-Bus for EU/Japan







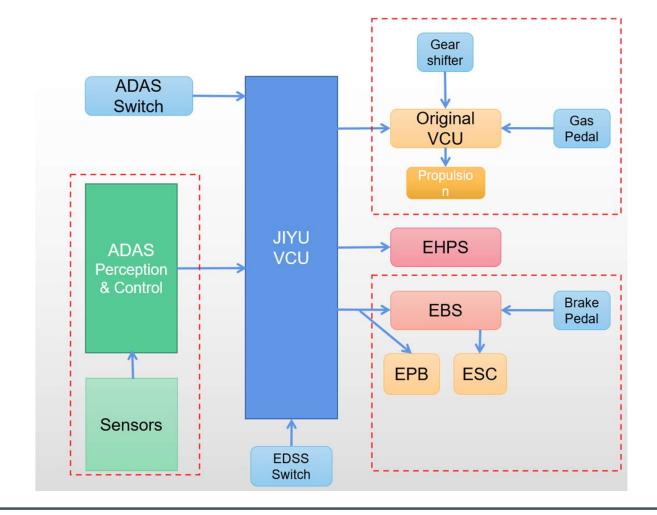
AEBS Electrical Architecture



6 meters & 7 meters Mini-Bus



12 meters Tourist Bus



More Customer Cases - Passenger Cars Adaption for Robo-taxi















Automotive grade components



VCU: Vehicle Control Unit



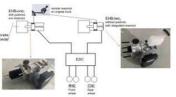
EPB-ECU, Electrical Parking **Brake Control Unit**



Redundant By-Wire-EPS/EHPS, Circular ball EPS/EHPS for heavyduty commercial vehicles



Redundant By-Wire-EPS, column / rack assisted

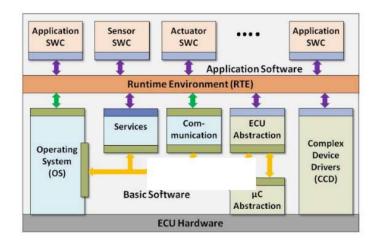


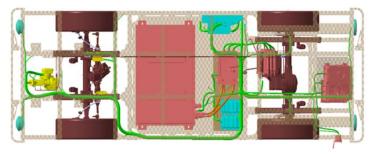
Redundant Brake System Two EHBs & ESC



EHB, Electrical-Hydraulic Brake Module

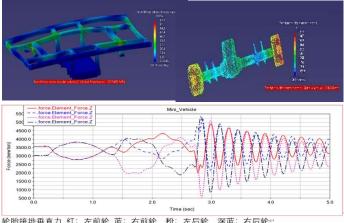
In-house SW & HW architecture





Chassis design/CAE/Integration

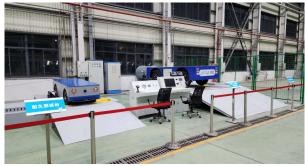




Product Verification & Advanced manufacturing



Prototype development, design, testing and verification capabilities



Chassis-By-Wire durability dynamometer & performance test dynamometer.

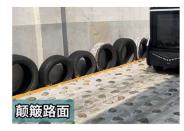


20% (11.31°) and 25% (14.04°) standard slopes

Product assembly testing and verification capabilities













Mass production delivery capability



Suzhou Intelligent Manufacturing Factory
More than 11,000 units/year





Some of partnership





















Strategic cooperation

















Public Road

Rivian, Canoo, PIX Moving....

JIYU X-by-wire chassis application senarios: Low Speed, cargo carrier, closed roads (including highways for robo-trucks) Unmanned delivery & grocery retails (Shining Fairy S500 & Magic Carpet M1)





Transportation inside of logistics parks (Magic Carpet M3 & Legendary Heracles L6)





X-By-Wire chassis upgrade & adaption











YouTube Link, JIYU-Chassis-By-Wire:



