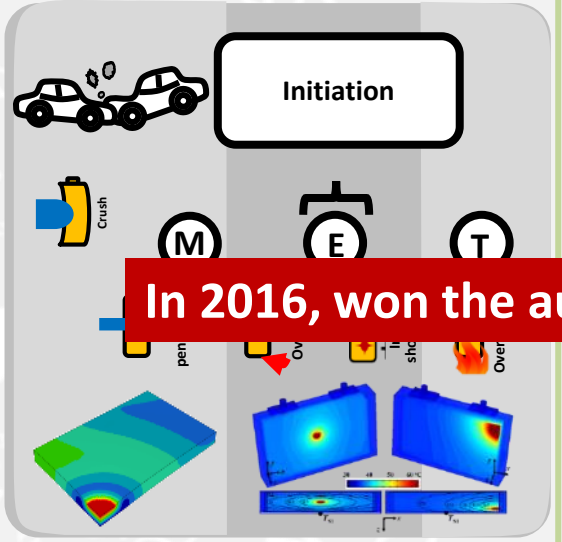
Research—Representative Achievements

清华大学车辆与运载学院
SCHOOL OF VEHICLE AND MOBILITY TSINGHUA UNIVERSITY

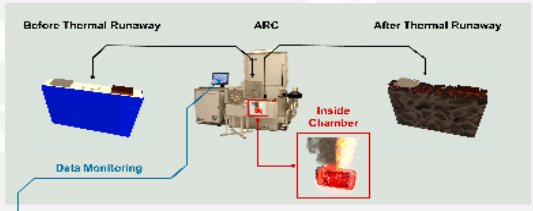
Power Battery: Focus on Safety of New Energy Vehicles, Full-time Monitoring to Achieve Battery Optimization Management

In 2016, won the automotive industry science and technology progress award (First Prize)

Initiation of thermal runaway

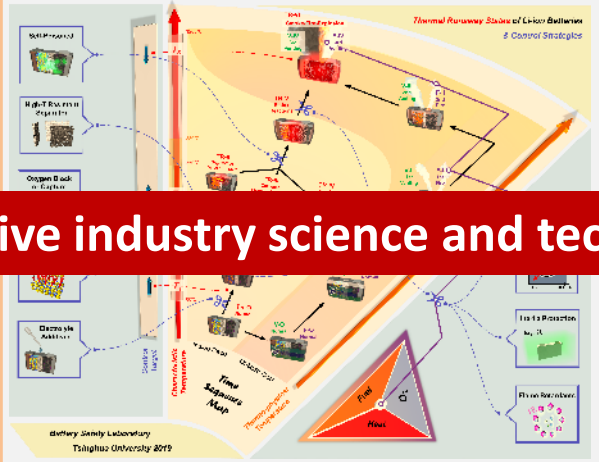


Provide technical support to international EV safety regulations

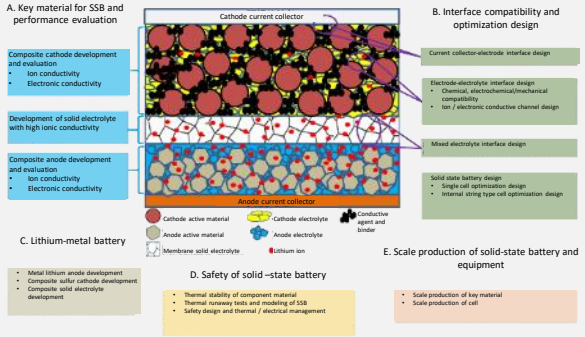


Thermal runaway

Investigation of thermal runaway mechanism

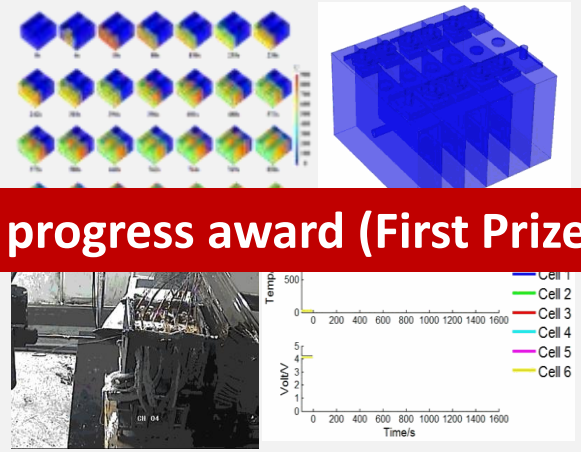


Develop solid-state battery to improve intrinsic safety

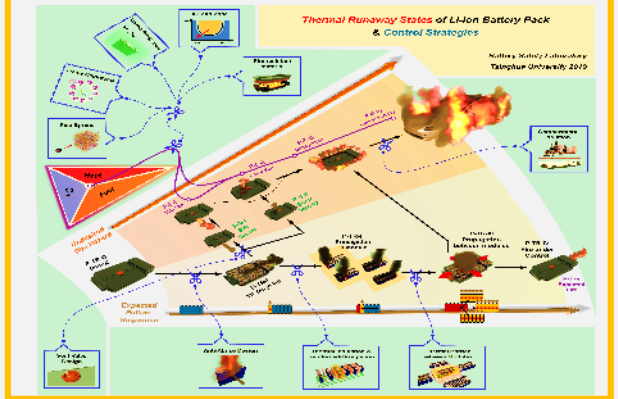


Thermal runaway propagation

Thermal runaway propagation of battery system: test and modeling



Prevention of thermal runaway propagation



Research—Representative Achievements

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Fuel Cell: Sea-land-air full space fuel cell power system platform

Leading technology: For the first time in the history of the Olympics, fuel cell city buses were introduced into bus services and marathons

Sea-land-air full space fuel cell power system platform

High power fuel cell system with international leading high environmental adaptability

Offshore base, ship, submarine

High-speed rail, heavy truck, bus

UAV, big plane, space

Research—Representative Achievements

清华大学车辆与运载学院
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Intelligent Vehicles: Development of Perception, Decision-making and Control Key Technologies

In 2013 and 2018, won the second prize of National Technology Invention Award and the second prize of National Science and Technology Progress Award

Research—Representative Achievements

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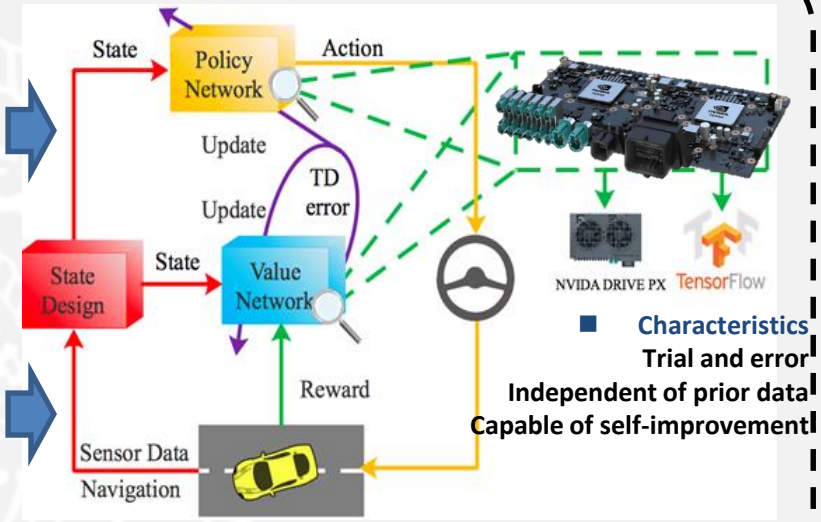
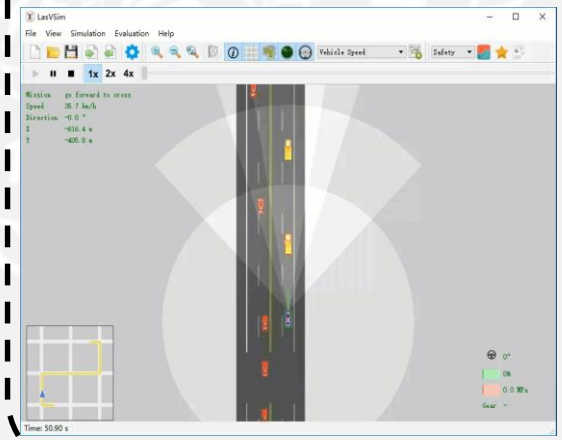
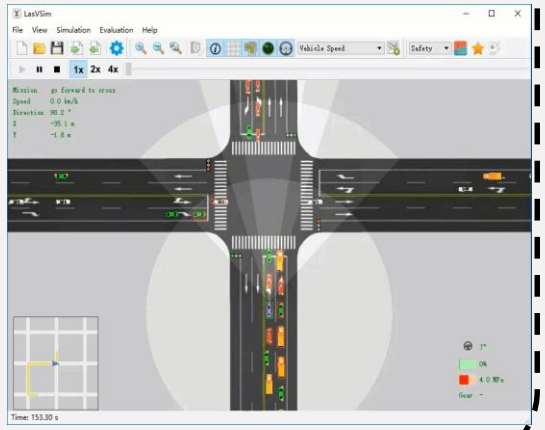
SCHOOL OF VEHICLE AND MOBILITY TSINGHUA UNIVERSITY

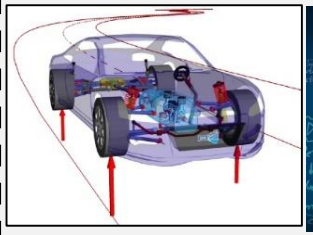


■ Characteristics
Trial and error
Independent of prior data
Capable of self-improvement

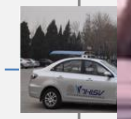



Model-driven Counter-enhancement Parallel computing



L2
L3
L4





2015

Research—Representative Achievements

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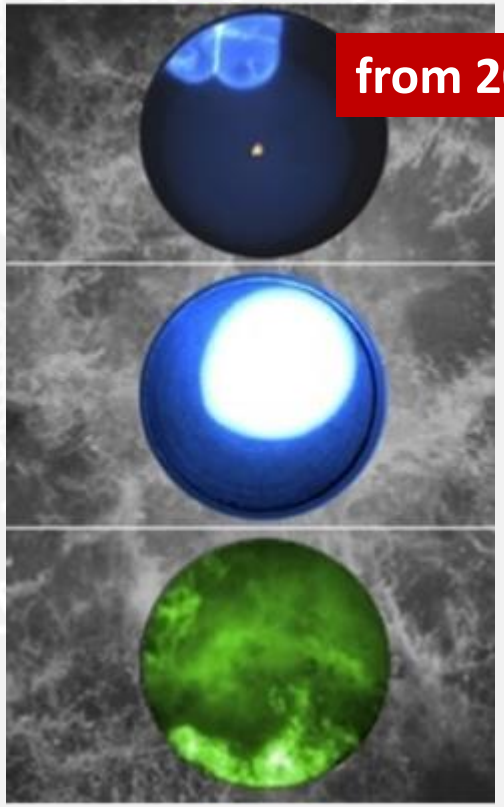
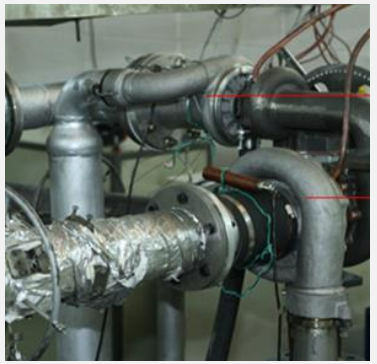
Internal Combustion Engine: Super Detonation

Mechanism revelation: the first internationally proven detonation combustion mode and mechanism

Technical invention: the top ten engine with the international leading power index

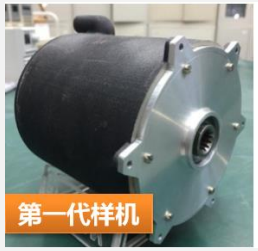


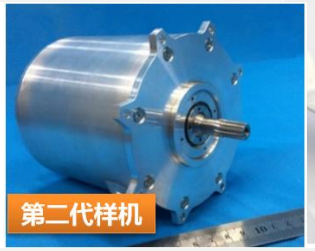
from 2017 to 2018, received 3 provincial and ministerial first prizes



Single-stage and two-stage high pressure ratio turbocharger research results of internal combustion engines

(won two second prizes for National Science and Technology Progress Award)





Innovated turbo-electric propulsion integrated thermal management technology, and applied it to hybrid electric propulsion systems for UAV and flying vehicles

Research—Representative Achievements

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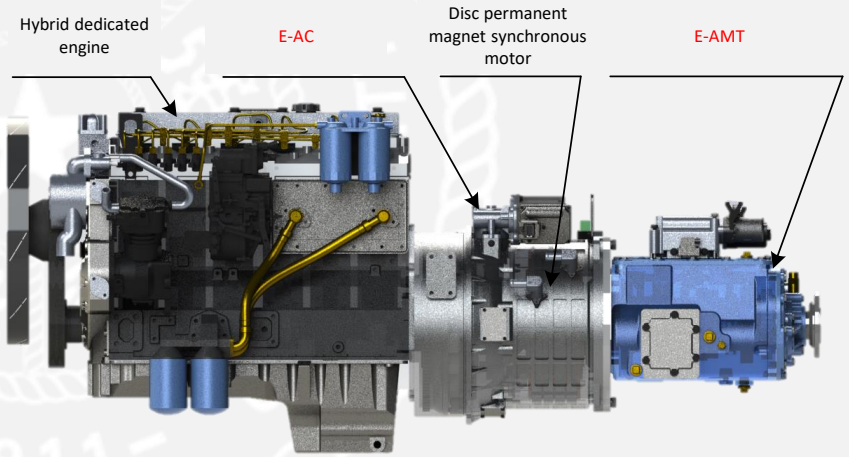
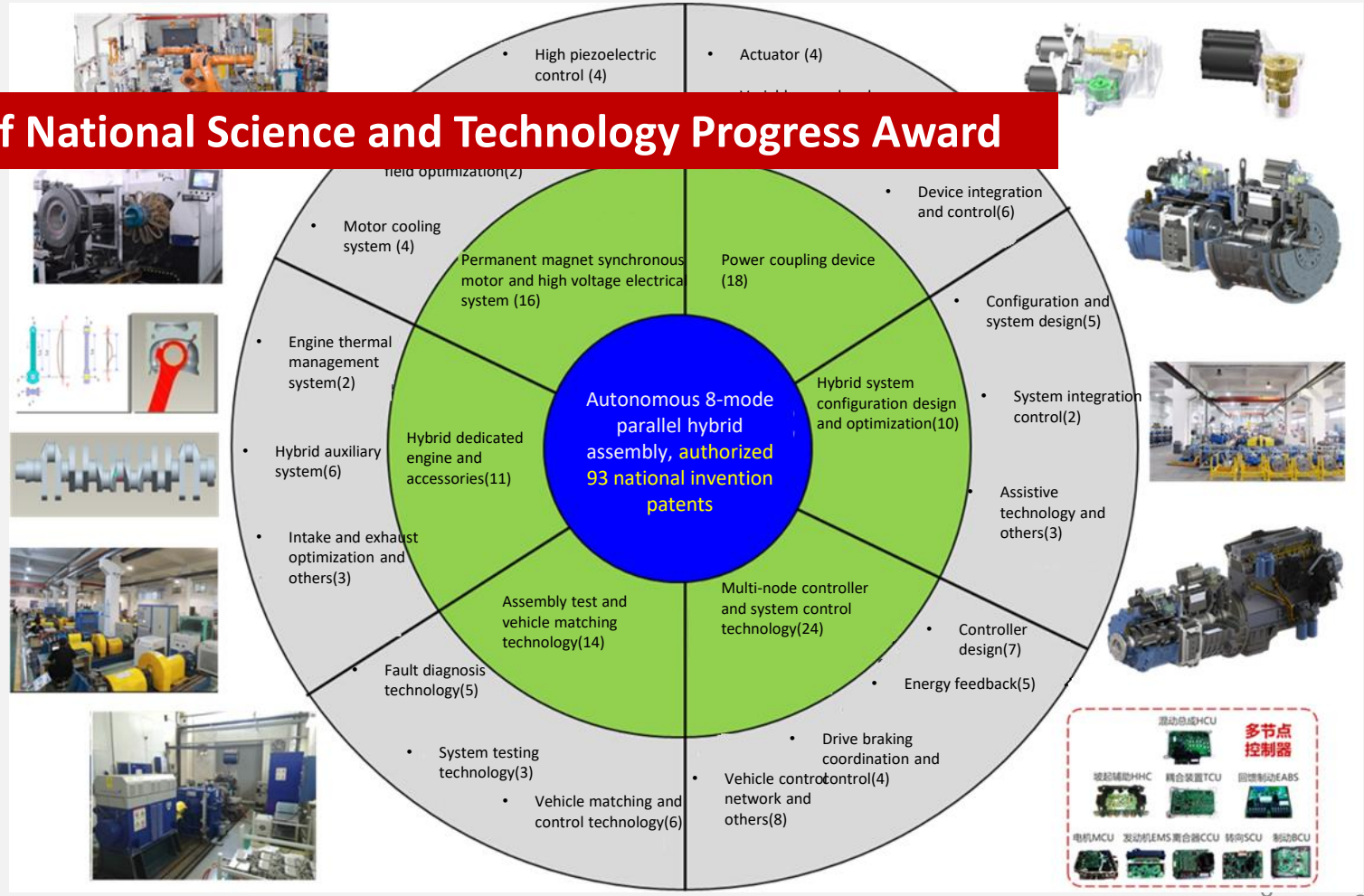
Automotive Dynamics: Commercial Vehicle Hybrid Powertrain

In 2019, won the second prize of National Science and Technology Progress Award





Research—Representative Achievements

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Automotive Dynamics: High-safety and High-performance Braking System

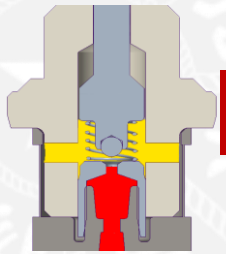
Four key indicators are better than those of international monopoly suppliers

Key Technologies of High-performance Braking System for Vehicles

High-safety braking

Flutter control of valve element at critical position based on pressure tolerance

Multi-source active cooperative pressurization control technology



Improve the accuracy of control

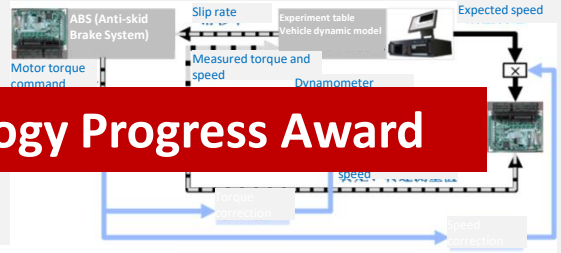
High-efficiency energy recovering

Dynamic balance technology of braking medium based on guidance

Eliminate interference to safety

High-precision loading

Decoupling methods for dynamic load control and braking control in extreme driving condition



Reproduce load change under critical condition

In 2019, won the second prize of National Science and Technology Progress Award

High-performance Series Braking Products

Passenger vehicles

Vacuum booster

Brake module assembly

Passenger vehicle ABS

Commercial vehicles

Trailer ABS

Electronic control unit

Bus

Bus ABS

Electric vehicles

Electronic control unit

Hydraulic EABS

Pneumatic EABS

In the past three years, the technologies and products have been applied in 6,190,000 vehicles, which has huge economic benefits and broke the international monopoly. At the same time, the products have entered the US market.

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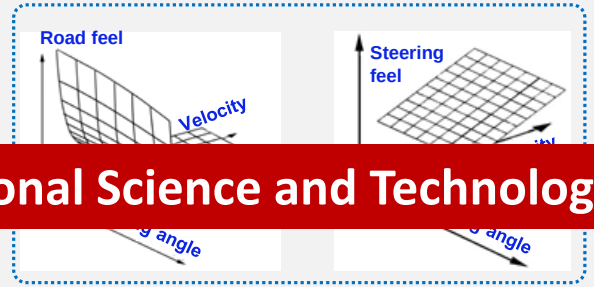
Automotive Dynamics: Electric Power Steering System

Overcame the technical bottleneck, and realized industrial application, with internationally advanced performance.

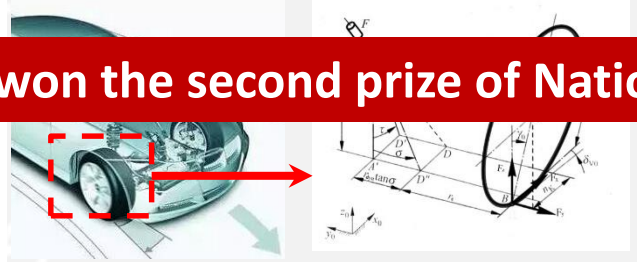
In 2014, won the second prize of National Science and Technology Progress Award

Industrial promotion and application

Key technology of EPS characteristic design



Basic theoretical research of road feel

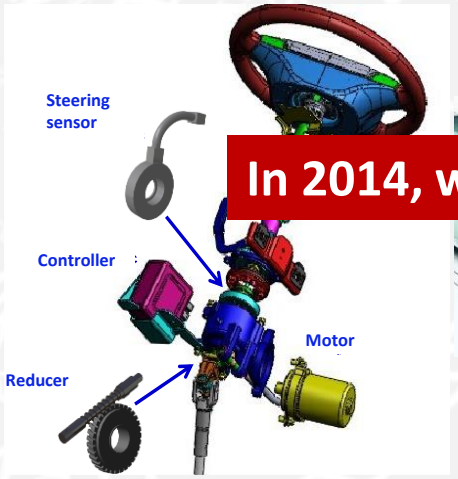


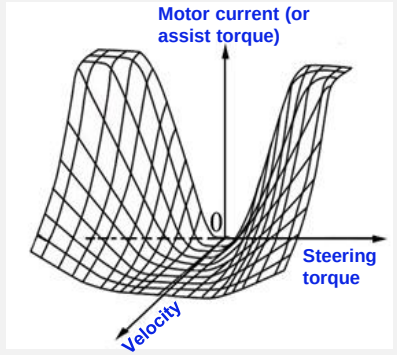
$$\frac{dM_z}{da_y}=\frac{bmg}{l}\cdot\sin\sigma\cdot\cos\tau\cdot\cos\sigma\cdot\cos\delta\cdot\left(r_s+r_{dyn}\cdot\tan\sigma\right)\cdot\left(\frac{l}{V^2}+G_{us}\right)$$

$$+\frac{F_r bm\sin\sigma}{lC_\alpha}\cdot\cos\left(\frac{bm}{2lC_\alpha}\cdot\frac{\delta}{\frac{l}{V^2}+G_{us}}\right)\cdot\left(r_{dyn}\cdot\sin\tau+n_\tau\cdot\cos\tau\right)$$

$$+\frac{k}{g}\cdot\left(\frac{-2am}{l}\cdot\frac{\delta}{\frac{l}{V^2}+G_{us}}\cdot\sin\delta+f_r mg+\frac{C_d A\rho V^2}{2}\right)$$

$$+\frac{bm}{l}\cdot\left(r_{dyn}\cdot\sin\tau+n_\tau\cdot\cos\tau\right)+\mathrm{L}$$





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