Traffic Safety Status and Research in China

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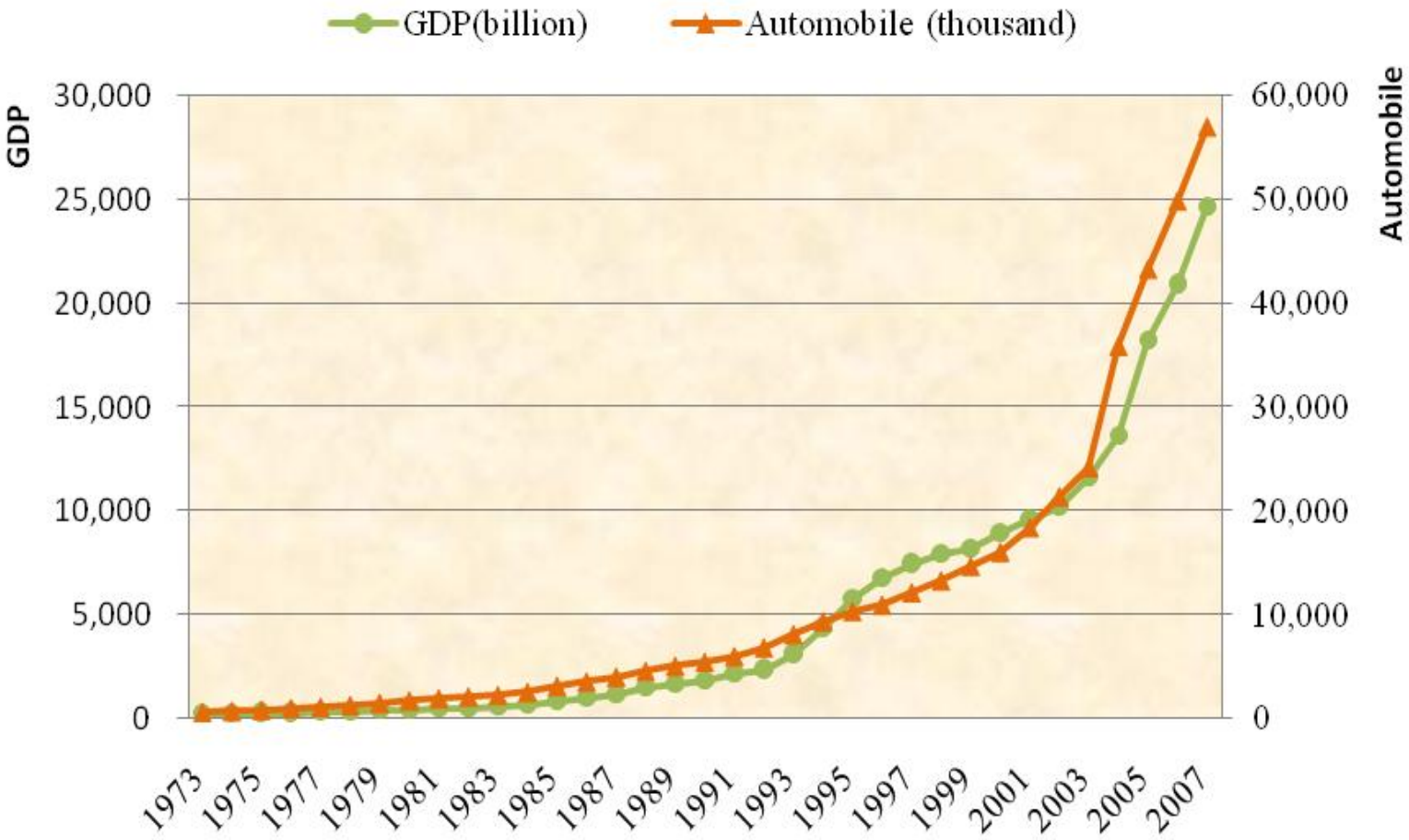
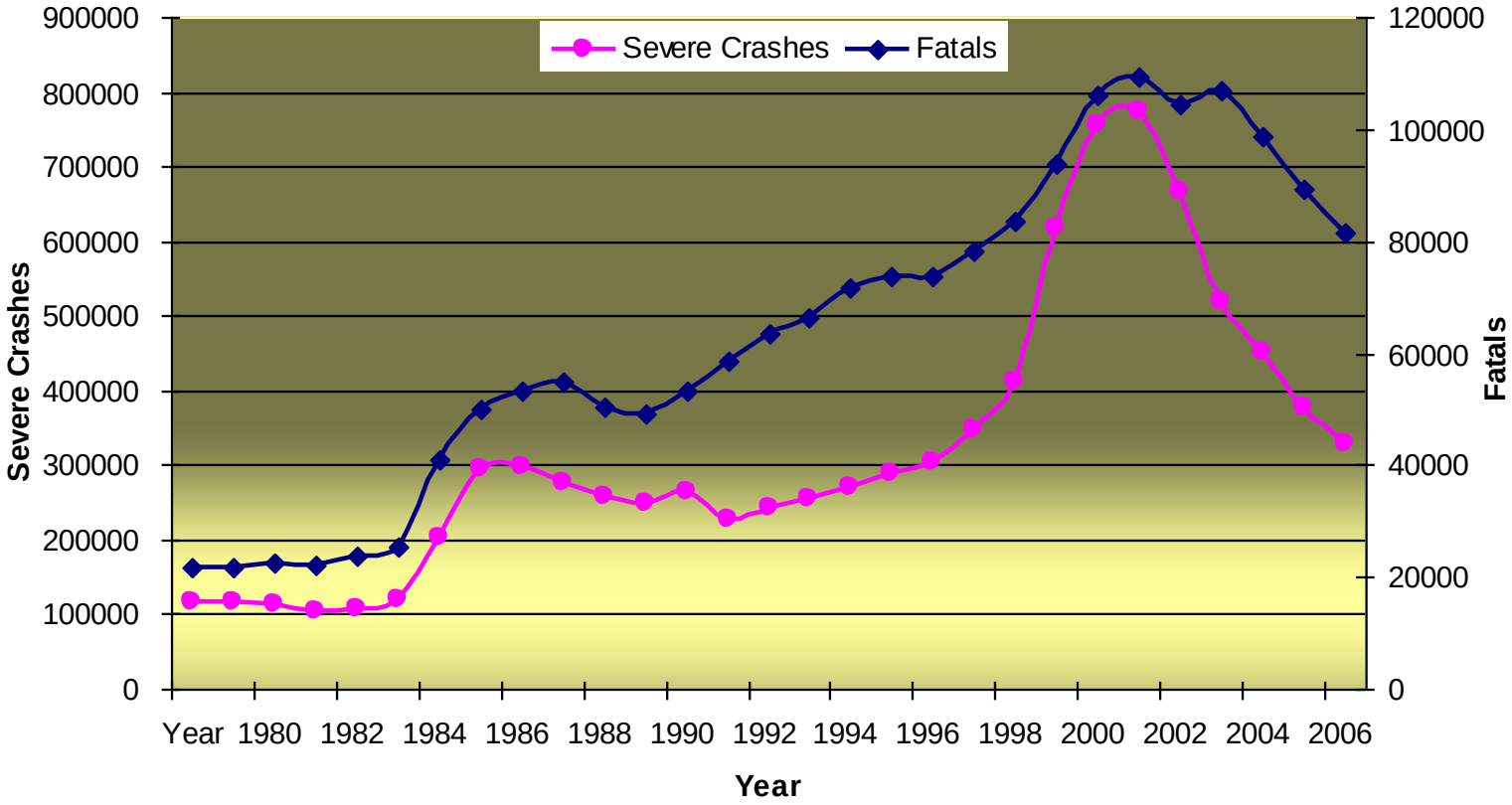
Economy Growth and Automobile Ownership



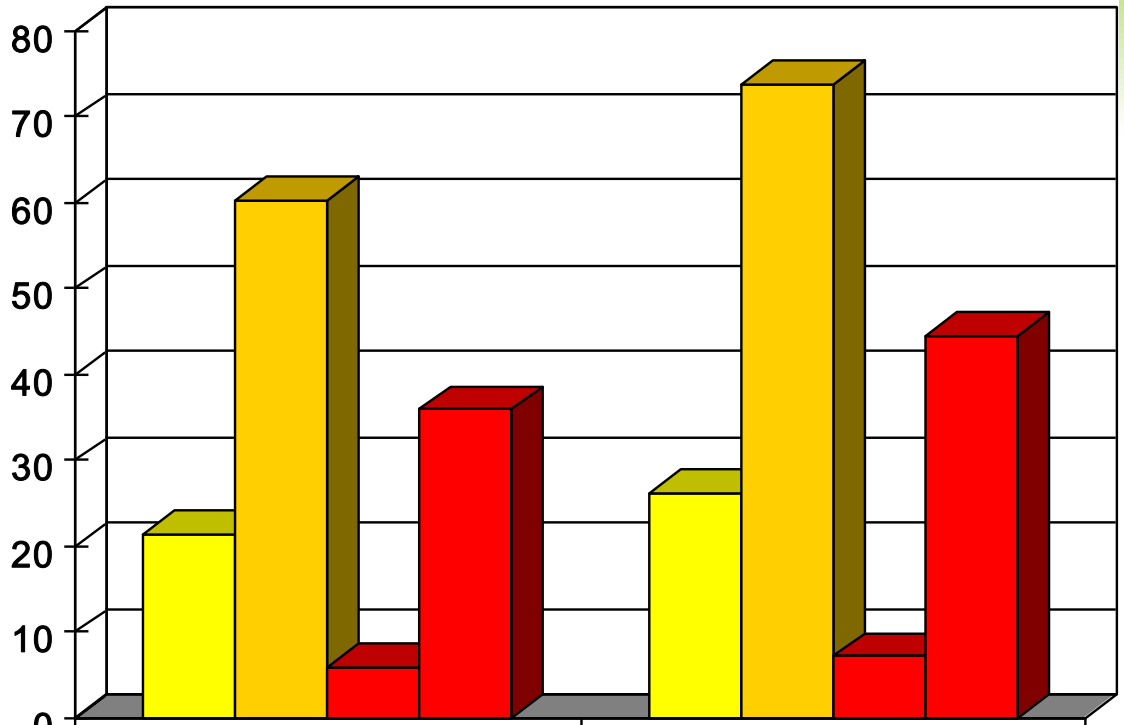
China economy and car ownership are growing dramatically. In 2009, 13 million car were sold in China (22% sold vehicles of the world). By the end of 2009, the car ownership was 76 million. The private cars increased near 30%.

Traffic Safety History in China



Traffic safety is a severe problem for the country. In 2007, the fatality rate per 10 thousand vehicles was 5.1, which is much higher than the US (i.e., 1.7).

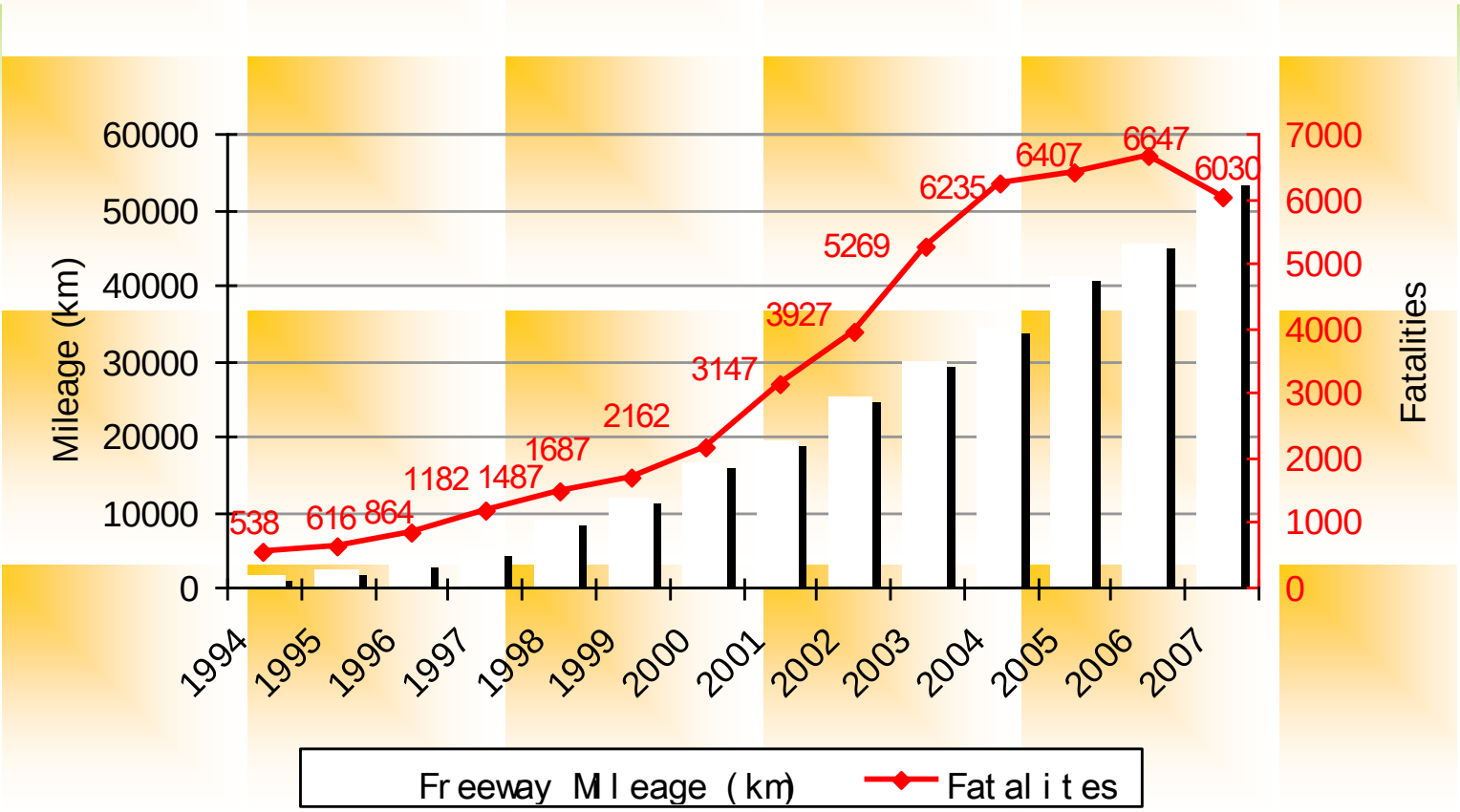
Traffic Safety of Highways



	Fatalities (Thou.)	%
Urban Streets	21	26
Highway	60	74
Freeway	6	7
Minor Arterials	36	45

Highways have safety problems, particularly minor arterial roads.

Freeway Traffic Safety



Freeways are not safe in China.

Highway Emergency Management

The ability of emergency response and management of highways need improve.

Participant Impropriate Traffic Behaviors

Traffic participants have poor safety awareness and behaviors.

Safety of Commercial Vehicles

Commercial vehicle-related crashes occur often and are serious.

Nationwide Traffic Safety Research in China

The National Traffic Safety Technical Action Plan (2009～2011) was signed in 2008 in Beijing.
The program is lead and sponsored by the Ministry of Science and Technology, Ministry of Public Security, Ministry of Communication.

Field 1: Safety Information Platform

课题1：交通安全信息集成、分析及平台构建技术开发与示范应用

Traffic Safety Information Integration and Analysis Platform Development

- 交通安全信息资源共享与交换体系

Information sharing and exchanging mechanism

- 交通安全信息集成管理与应用服务平台

Safety information management and application

- 交通安全综合分析与决策支持系统

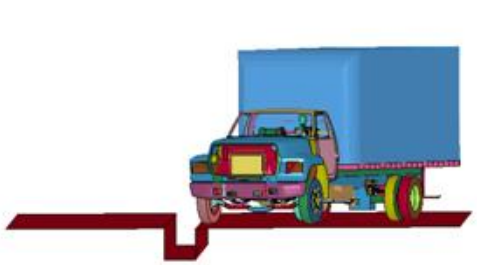
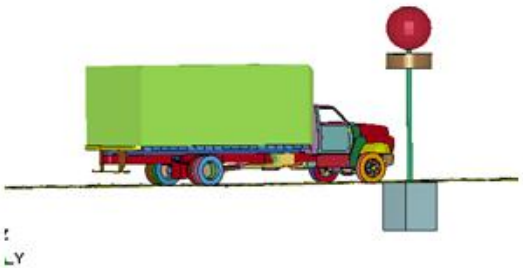
Comprehensive safety analysis and decision making system

Field 2: Mountain Area Traffic Safety

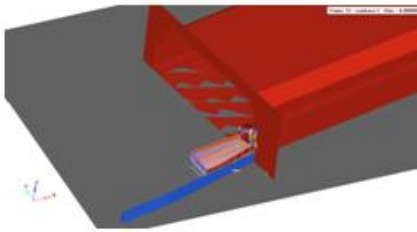
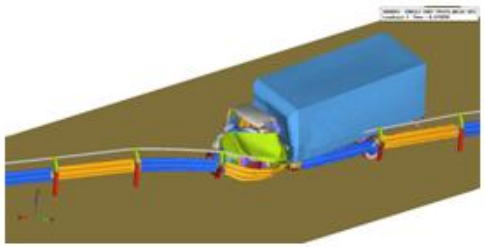
课题2：山区公路网安全保障技术体系研究与示范工程

Mountain Area Traffic Safety Enhancement and Application

- 山区公路基础设施安全保障能力提升




Computer experiments for collision mechanism

Field 3: Freeway Traffic Safety

课题3：国家高速公路安全和服务技术开发与应用示范

Integrated freeway information and management system

Field 4: Commercial Vehicle Safety Management

课题4：营运车辆安全保障技术开发及大范围集成应用

Commercial vehicle safety management technology

- 营运车辆运行安全性能评价与检测

  Evaluation and detection of commercial vehicle operation safety

- 安全性能技术状况保持

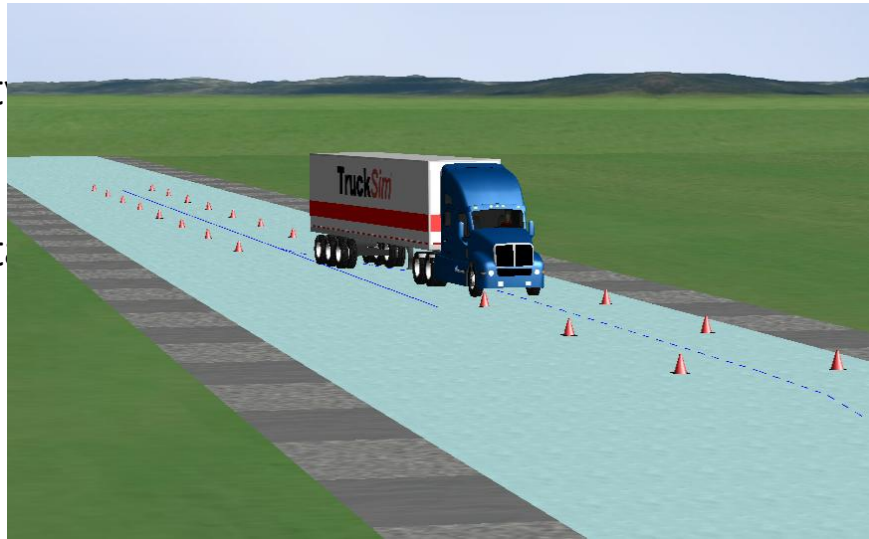
  Maintenance of commercial vehicle safety condition

- 运行过程安全监测

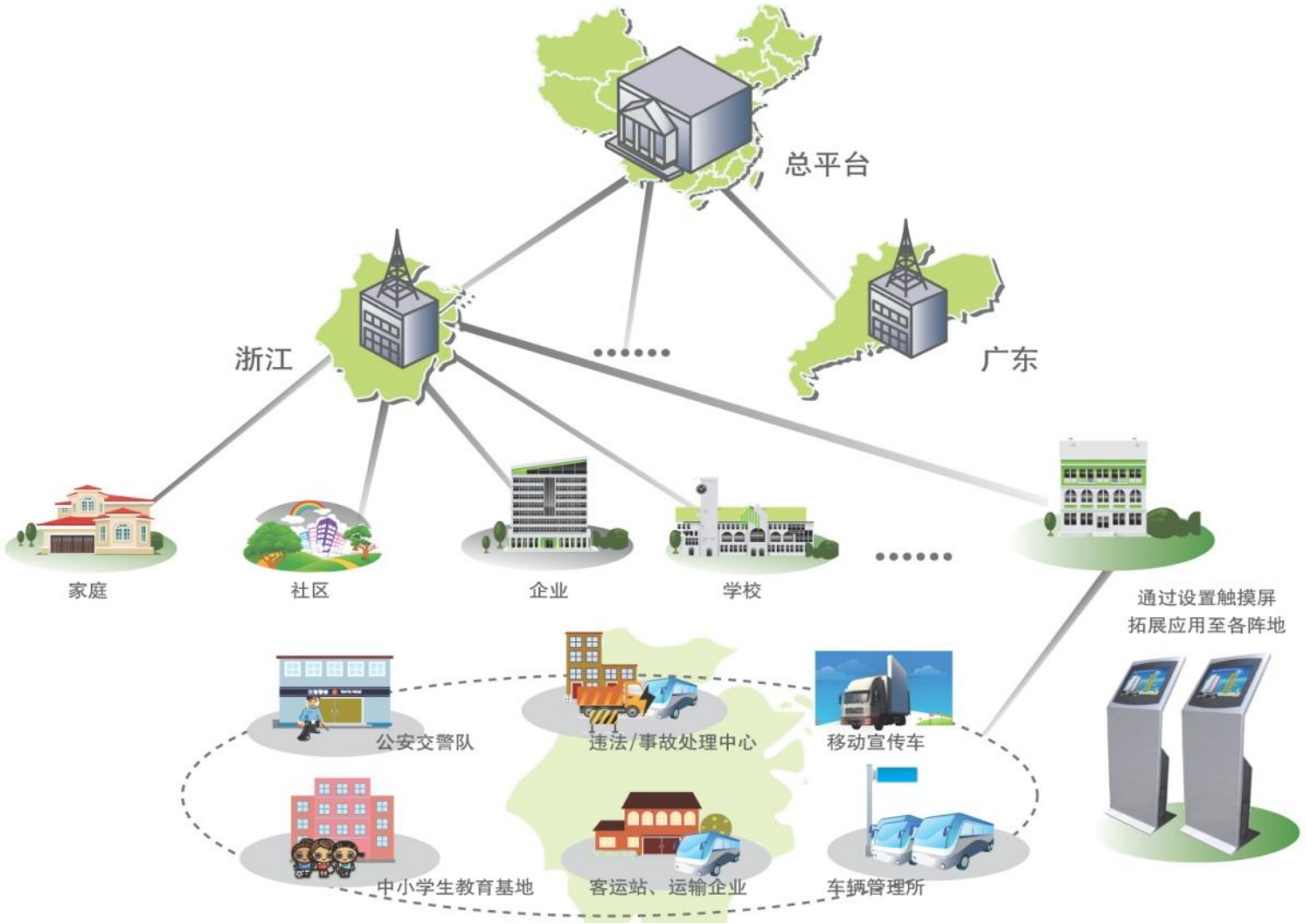
  Vehicle operation process safet

- 驾驶人适宜性甄别

  Commercial vehicle driving suit



Field 5: Traffic Participants Behavior Improvement



Field 6: Highway Network Traffic Safety Monitoring and Emergency Response

课题6：区域公路网交通安全态势监测、评估及应急指挥

Highway network traffic safety monitoring, evaluation, and emergency response

- 区域公路网的交通安全态势监测

Highway network traffic safety situation monitoring

- 交通安全态势评估与预警

Highway network traffic safety evaluation and warning

- 大范围交通安全应急指挥

Large area traffic safety emergency management

Field 7: Traffic Enforcement Technology

课题7：道路交通安全执法技术及大范围应用

Traffic enforcement technology and application

- 交通事故快速处置及现场防护新技术

Crash on site processing and police protection technology

- 事故调查与鉴定新技术

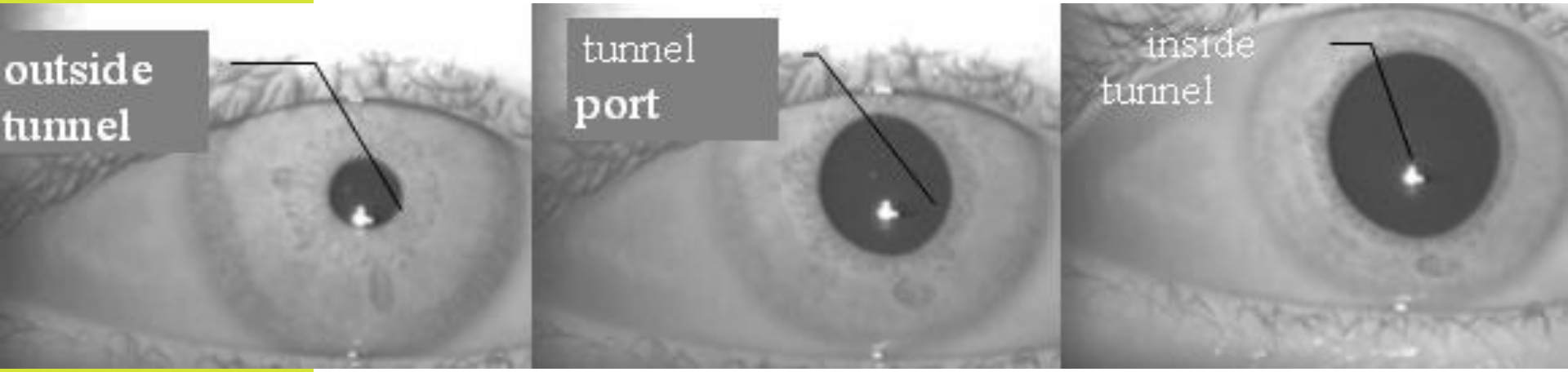
Crash investigation and judgment technology

- 交通安全执法支持技术

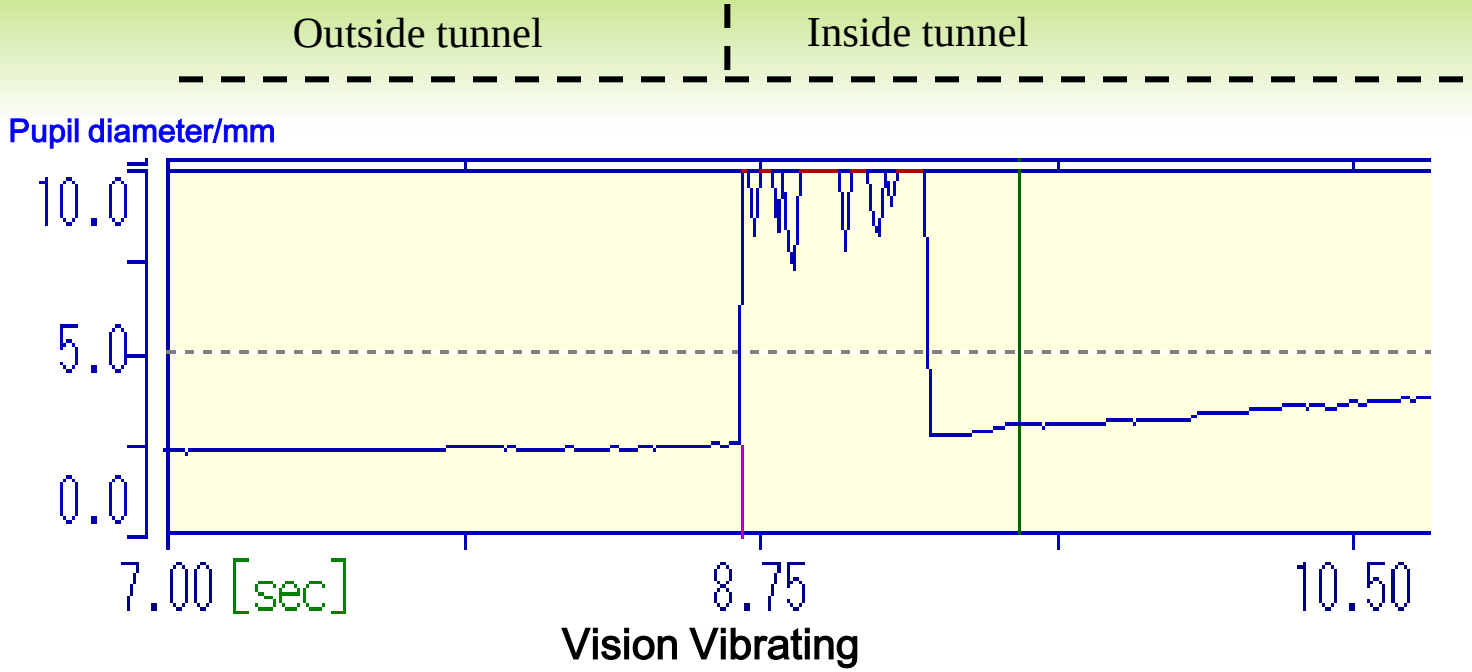
Traffic safety enforcement supporting technology

Safety Research at School of Transportation Engineering

luminance Transition Driving through a Tunnel



luminance Transition Driving through a Tunnel

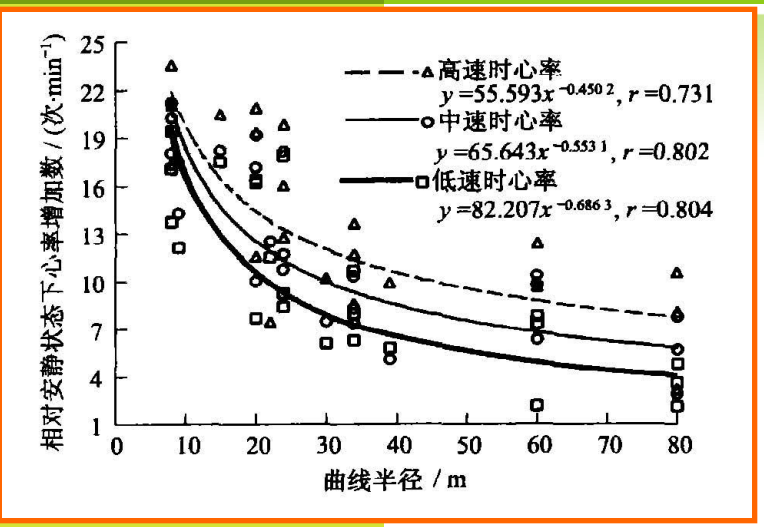


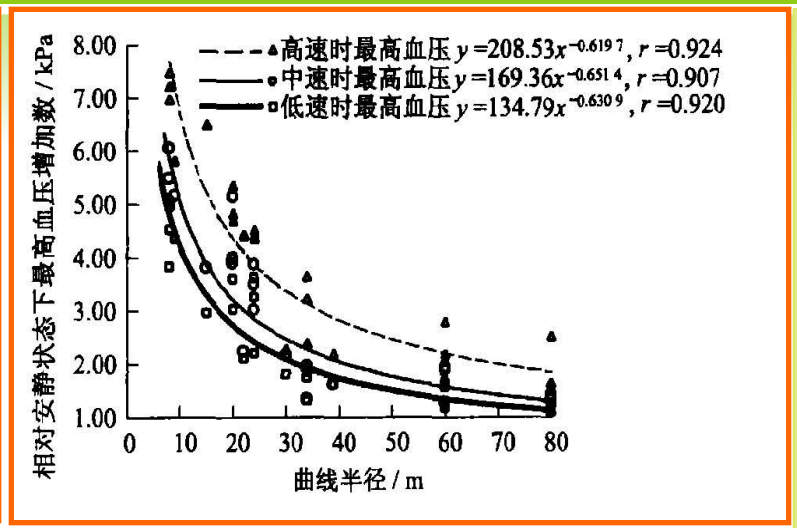
When the vehicle enters the tunnel with high speed, the driver's pupil gets larger suddenly. The picture cannot be focused on the retina (i.e., blank zone).

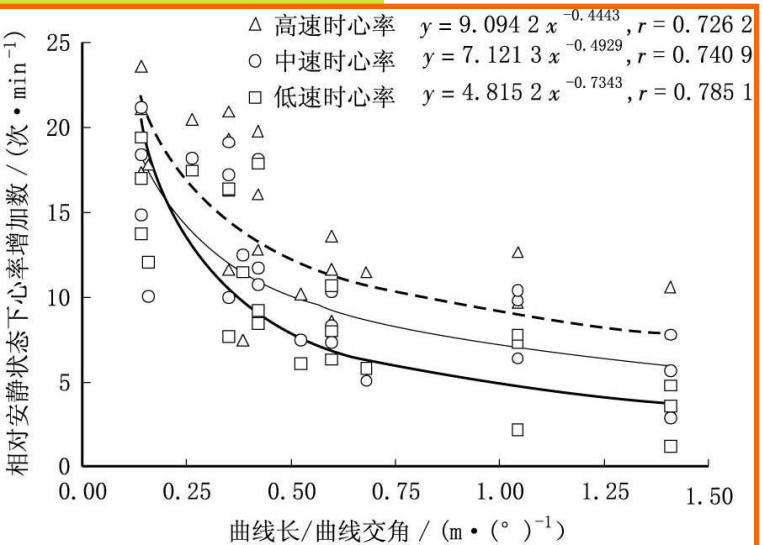
Geometry Alignment and Cardiac Rate and Blood Pressure

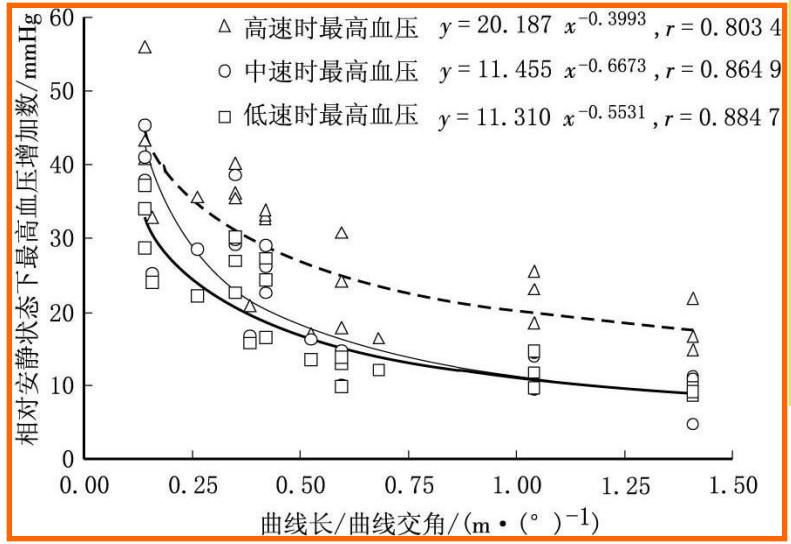
For normal person, heart rate range is large. For actively moving, it could be 190 bpm. It is about 50 bpm during sleeping. When it is higher than 100 bpm during driving, we could consider the drive is nervous.

Geometry Alignment and Cardiac Rate and Blood Pressure





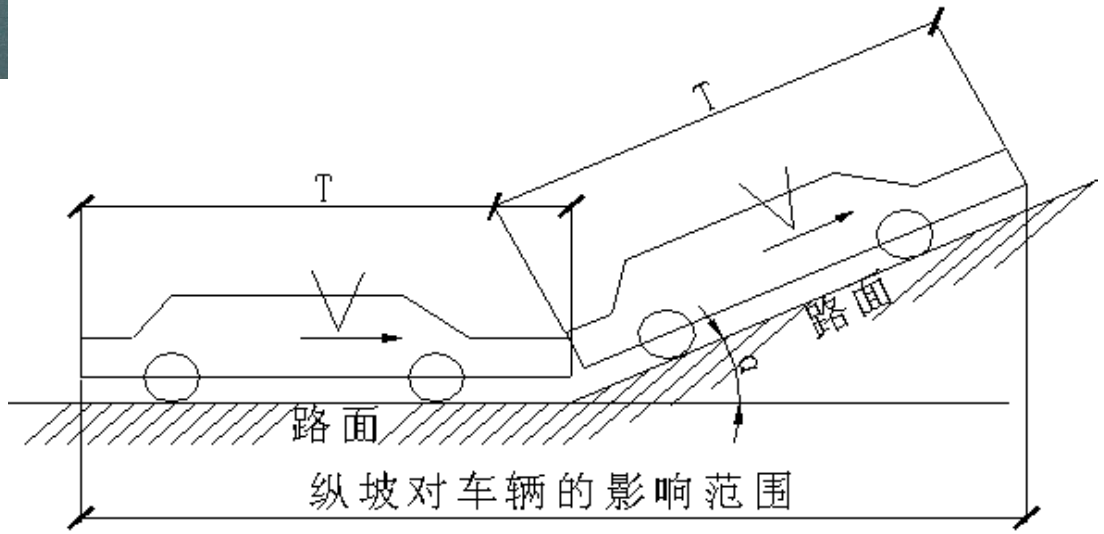




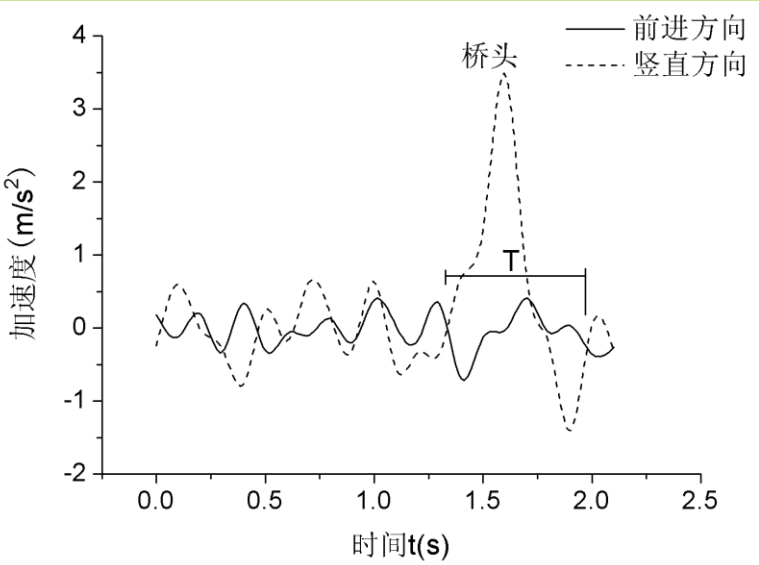
✓ When the curve rate is smaller than 30 m, the highway environment pushes the drivers too nervous.

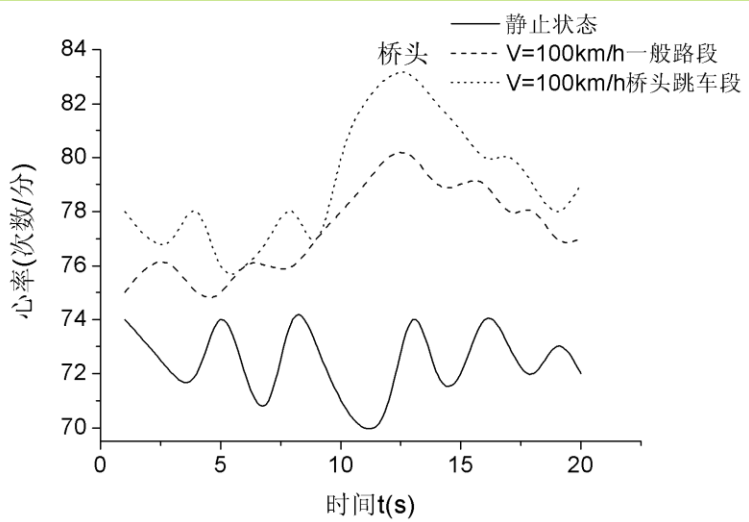
✓The ratio for curve angle and length should be controlled within 0.5 ~ 1.0.

Bridge Edge Bumping and Cardiac Rate



Bridge Edge Bumping and Cardiac Rate





Bridge edge bumping affects driving feeling as well as safety.

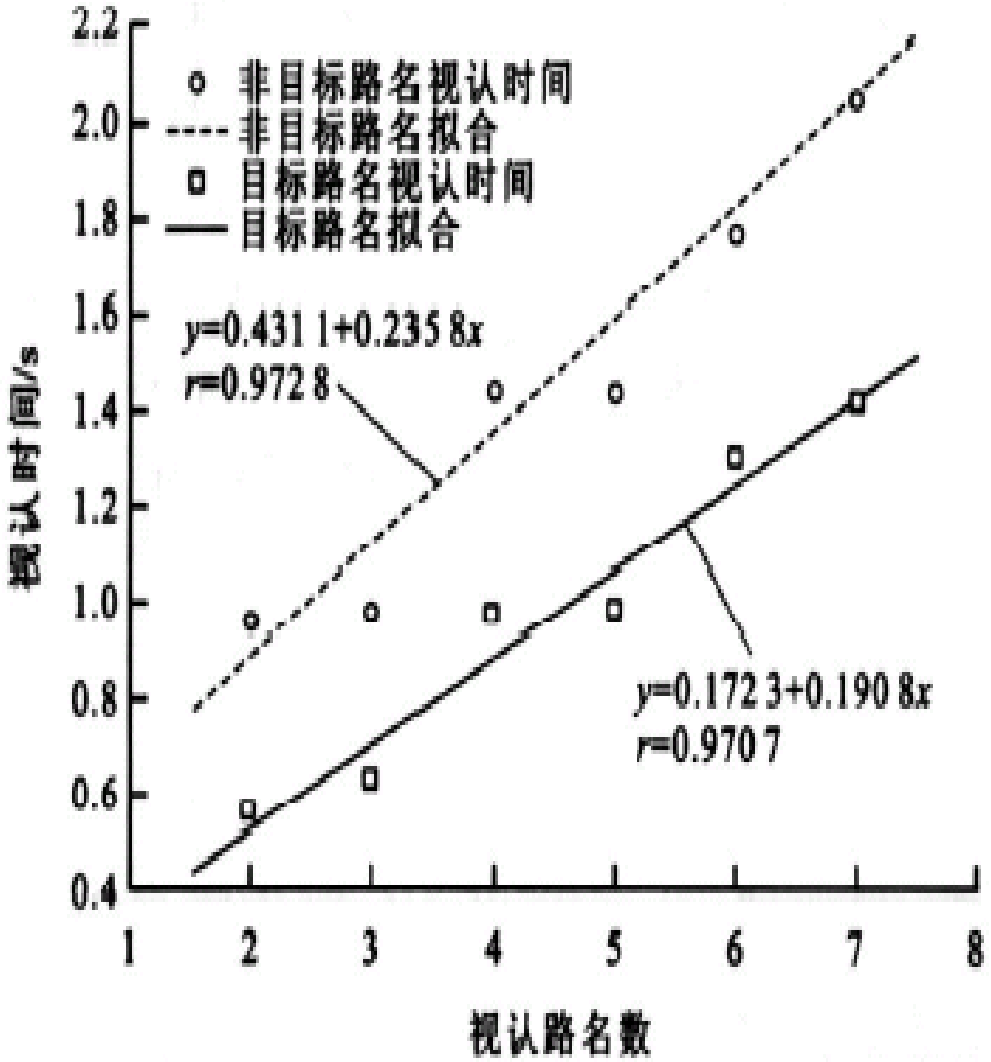
Heart rate correlates to the vehicle erect acceleration.

In bridge edge bumping area, the heart rate increases 10 time/min.

Traffic Sign Recognise

Where and how long the drivers gazing at the information?

Traffic Sign Recognise



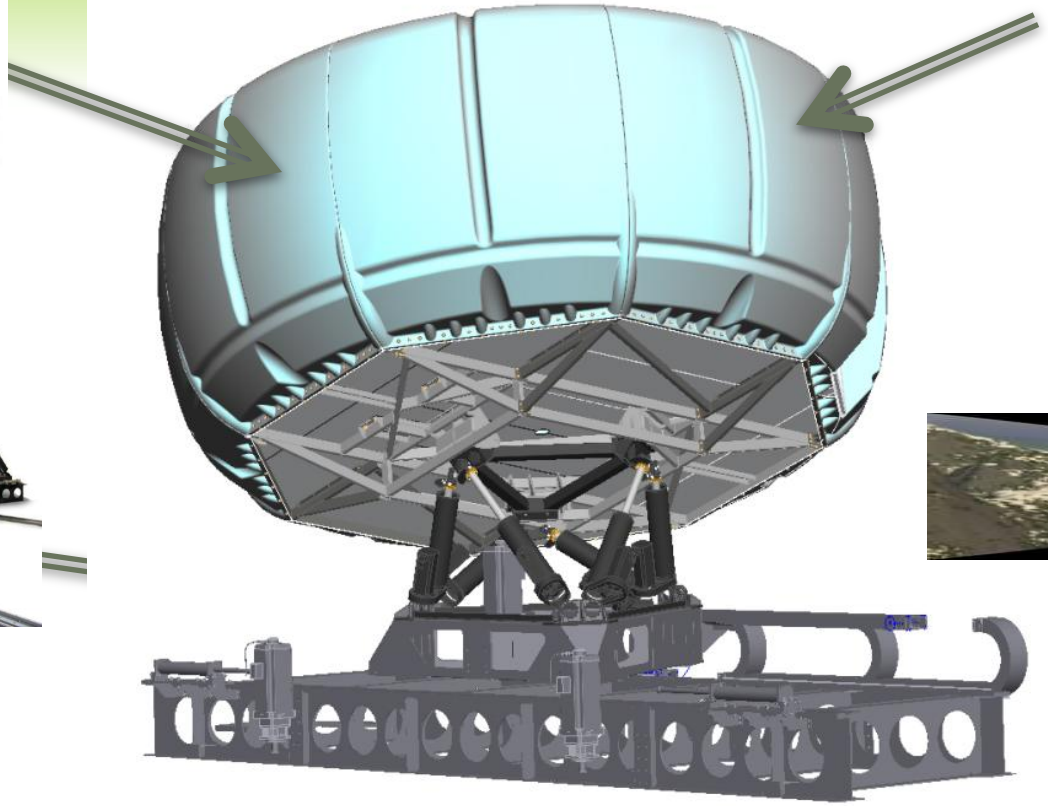
- When the road name information points are 2 to 7, the recognizing time is about 2.5 sec. It is proportional to the quantity of information.
- In urban area, the recognizing time is 2 sec. when the speed is lower than 50 km/h and information points are less than 5. Otherwise, 2.5 sec. is necessary.
- It will be better that the information points are less than 5.

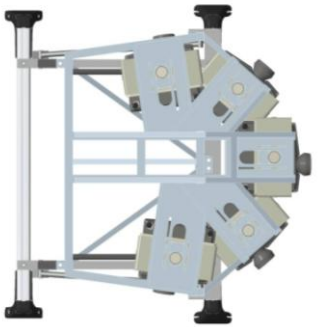
Traveller Behaviour and Traffic Safety Research Platform

- ✓ Drivers' reaction under complicated driving conditions.
- ✓ Road facilities features and drivers' psychology and behaviour.
- ✓ Driving circumstances and drivers' psychology and behaviour.
- ✓ Man-machine interface and drivers' psychology and behaviour.

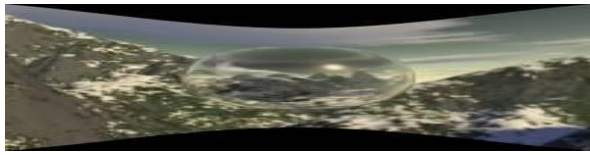
Tongji University 8DOF Driving Simulator

Renault Megane 3





5 Projectors



250°Horizontal FoV

8 DoF Motion System, Bosch Rexroth

SCANeR studio Simulation Engine

Naturalistic Driving Study -- A Pilot Study with VTTI

Major Phases	Schedule
Tongji professors visited VTTI and confirmed the pilot study in China	Jan. ~ Aug., 2010
Project preparation in Tongji	Sep. ~ Dec., 2010
System installation and training	Spring 2011
Pilot study	2011 ~ 2012

THANKS !