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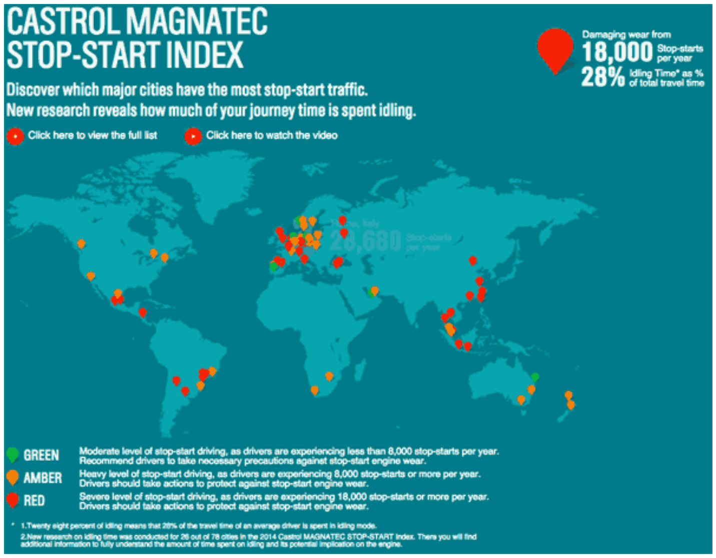
1, 車社会 の 課題 の 一つ として 、 交通渋滞 を 緩和 する 対策 の 現状 と 有力 と 思える自身 の 考え を 述べよ 。

For decades, Traffic flow problems have been given much attention with considerable interest, and one of the most impressive problems of traffic flow is traffic congestion (traffic jam).



[Figure 1-1 traffic condition survey by Castrol]

If a volume of traffic or modal split generates demand for space greater than the available road capacity then traffic congestion occurs. There are a number of specific circumstances which cause or aggravate congestion; most of them reduce the capacity of a road at a given point or over a certain length, or increase the number of vehicles required for a given volume of people or goods. In the United States, about half traffic congestion is recurring, and is attributed to sheer weight of traffic; most of the rest is attributed to traffic incidents, road work and weather events.

There are several Congestion Reduction Strategies as follow:

- Roadway Capacity Expansion
- Improving and Favoring Space-Efficient Modes
- Transport Pricing Reforms
- Improving Traveler Information
- Smart Growth Development Policies
- TDM Programs

Most cities are implementing some innovative strategies, while few are implementing all that are economically justified, considering all impacts.

	Roadway Expansion	Improve Alt. Modes	Pricing Reforms	Smart Growth	TDM Programs
Congestion impacts	Reduces short-run congestion, but this declines over time due to generated traffic.	Reduces but does not eliminate congestion.	Can significantly reduce congestion.	May increase local congestion intensity but reduces per capita congestion costs.	Can reduce congestion delays and the costs to users of those delays.
Other costs and benefits	High costs. Minimal co-benefits. Tends to increase indirect costs by inducing vehicle travel.	Medium to high costs. Numerous co-benefits.	Low to high implementation costs. Costs users, generates revenue (an economic transfer). Numerous co-benefits.	Low to high costs. Numerous co-benefits.	Generally low to moderate implementation costs. Numerous co-benefits.
Consideration in current planning	Commonly considered and funded.	Sometimes considered, particularly in large cities.	Sometimes considered but seldom implemented.	Not generally considered a congestion reduction strategy.	Sometimes considered, particularly in large cities.

[Figure 1-2 impacts and benefits of different congestion reduction strategies]

From my point of view, smart traffic is a promising direction, as I joined a smart city project.It would be very lucky for me to make a brief introduction.
Smart traffic is a part of smart city which is an urban development vision to integrate multiple information and communication technology (ICT) and Internet of Things (IoT) solutions in a secure fashion to manage a city's assets including transportation systems, power plants, water supply networks, waste management, law enforcement and so on.

City officials can directly interact with the community and the city infrastructure and to monitor real-time situation of city by ICT. By using sensors integrated with real-time monitoring systems, data are collected from citizens and devices – then processed and analyzed. The information and knowledge gathered are quite important to tackling inefficiency. ICT is used to enhance quality, performance and interactivity of urban services, to cost reduction and resource consumption.

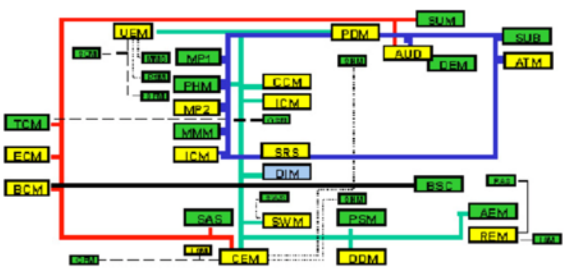
[Figure 1-3 ERP System Structure of Singapore]

2, アダプティブ クルーズ コントロール システム 実用化 における ドライバー と 支援制御 システム の 操作量配分 、 及び事故発生時 における 責任問題 について 、 自身 の考えを述べよ.

Operation parameters for divers:

- Destination
- Satisfaction grades to the Adaptive Cruise Control(ACC) Systems feedback and Driver's personal driving & car-infotainment system habit to training Adaptive Cruise Control Systems
- Retake control right of the Vehicle when emergency situation occurs or the driver want to modify the cruise state.

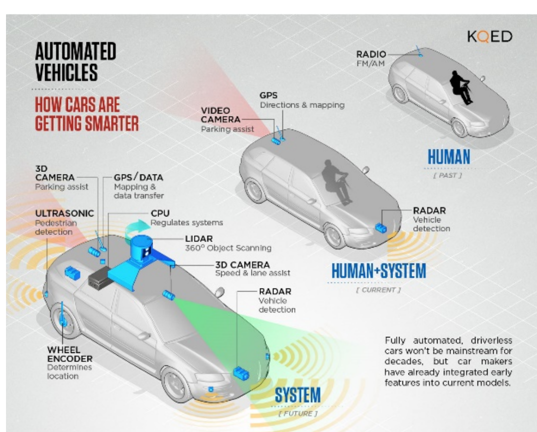
Operation parameters for assist systems:



Powertrain and chassis		Body electronics	
TCM	Transmission control module	CEM	Central electronic module
ECM	Engine control module	SWM	Steering wheel module
BCM	Brake control module	DDM	Driver door module
BSC	Body sensor cluster	REM	Rear electronic module
SAS	Steering angle sensor	SWM	Steering wheel module
SUM	Suspension module	DDM	Driver door module
AUD	Audio module	PDM	Passenger door module
		REM	Rear electronic module
Infotainment/Telematics		CCM	Climate control module
MP1,2	Media players 1 and 2	ICM	Infotainment control
PHM	Phone module	UEM	Upper electronic module
MMM	Multimedia module	DIM	Driver information module
SUB	Subwoofer	AEM	Auxiliary electronic
ATM	Antenna tuner module		

[Figure 2-1 Distributed control Architecture for the VoloveXC90]

- According to the [Fig 2-1], I think the traditional Control Architecture has contain enough parameters to keep driver-driving vehicle work.
- To realize Auto cruise, communicating with traffic control system and detected real-time information near the car is necessary with LiDAR, 3D Camera, RaDAR, GPS, Ultrasonic, Wheel Encoder in [Fig 2-2].



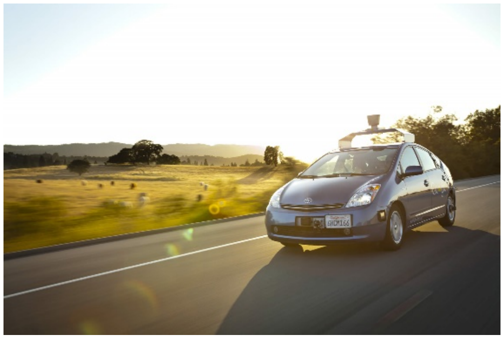
[Figure 2-2 Contrast of Car Structure]

Responsibility of traffic accident related with ACC System:

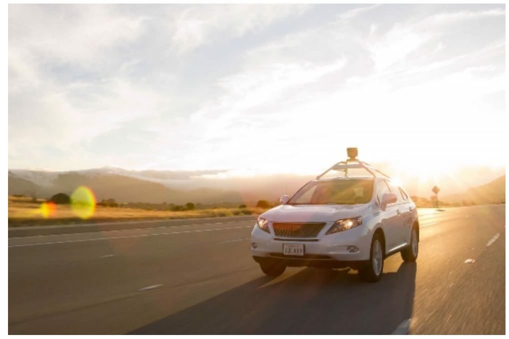
- According to the majority countries' current law systems, completely dependent on automatic driving systems in public is not allowed. And with the development of strength of Car calculate & Memory systems, we can pay more attention to Driving Data Recorder which can provide more key information to reproduce accident scene for judge, such as whether the driver sleepy or with malice.

3, 知能自動車実現 へ 向け て 、 自動走行機能 の 開発状況について述べよ.

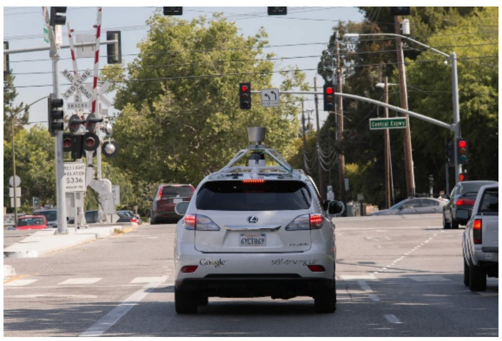
FOR Google:



[PIC 3-1 Google with Toyota Prius on freeway]



[PIC 3-2 Google with Lexus RX450h on freeway]



[PIC 3-2 Google with Lexus RX450h on city streets]

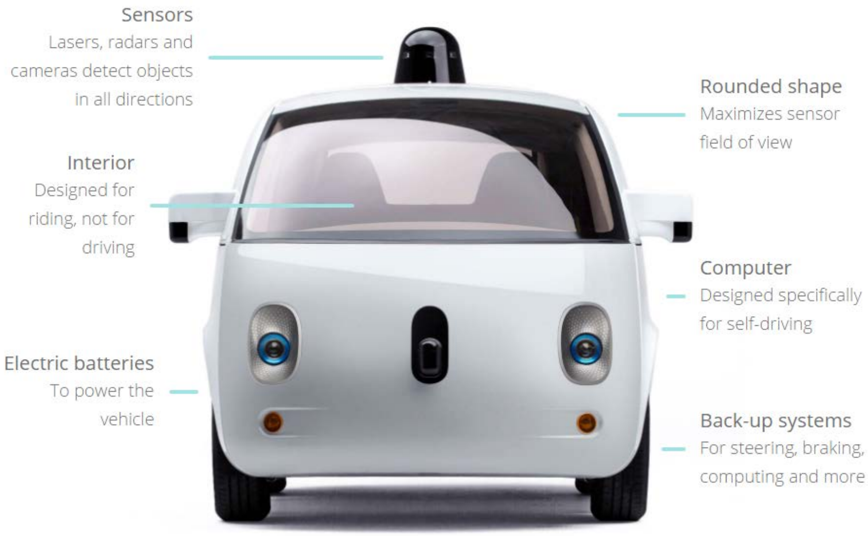
[PIC 3-4 Google proto vehicle]

[PIC 3-5 Google proto vehicle]

Google, which is a multinational technology company specialized in Computer Science, started testing self-driving technology on freeways with the Toyota Prius in 2009 as [PIC3-1]

Google began testing with the Lexus RX450h. At this point, they had completed over 300,000 miles of testing on freeways. Next, shifted focus to city streets, a much more complex environment than freeways.as [PIC3-2] and [PIC 3-3] in 2012.

Google unveiled an early construction of their new prototype vehicle in 2014. It's designed from the ground up to be fully self-driving. After months of testing and iterating, google delivered the first real build of their prototype vehicle in December 2014.as [PIC 3-4] and [PIC 3-5]



[Figure 3-6 Google Self-Driving Car]

Google working toward vehicles that take people where they want to go at the push of a button. They started by adding components to existing cars like Lexus SUVs, then began designing a new prototype from the ground up to better explore what should go into a fully self-driving vehicle. Google removed the steering wheel and pedals, and instead designed a prototype that lets the software and sensors handle the driving.

FOR Baidu:

Baidu, which is the largest search engine company in China, has been working on self-driving project in their deep learning research lab since 2013.
On Dec 15th 2015, Baidu announced its autonomous car has successfully navigated a complicated route through Beijing. According to the company, the modified BMW 3-Series drove an 18.6-mile route around Beijing that included side streets as well as highways. The car made left, right, and u-turns, changed lanes, passed other cars, and merged onto and off the highway.
On Sep 1st 2016, Baidu and Nvidia announced a partnership that will focus on using artificial intelligence to develop a computing platform for self-driving cars. The platform will include cloud-based high-definition maps.
On Nov 3rd 2016, Baidu announced self-driving vehicle service will be commercially viable in China by 2018, while the mass production of self-driving cars will be realized within five years.

[PIC 3-7 Baidu & BMW Self-Driving Car]

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