Requirements for driver-assist technology

• R1.

The system and functions should ensure that data and processing capability are available to satisfy the needs by intelligent actions. The data collecting by sensors needs to be processed and available to CPU in 100ms.

• R2.

Real Time Delivering of warnings/actions should be in real time to be useful. Realtime means delivering time which warnings showing up in user screen needs is within 100ms.

• R3.

Warnings and actions correctly and accurately reflect the current driving condition and has accurate prediction of potential incidents on road. The predication accurate rate needs to be 90%.

• R4:

System is able to predict potential dangerous conditions while on all speed, <10km/h, 10-40km/h, 40km/h-100km/h and >100km/h with low error rate (20%).

Requirements for autonomous vehicles

R1

Vehicle can be operated both in full self-driving mode and driver-driving mode. Full self-driving means the vehicle can drive while without any control/monitoring by driver.

R2

Vehicle can detect 90% objects in range of 100m. For objects that bigger than normal pig, vehicle needs to have 99% detection rate in range of 100m.

R3

Vehicle can detect 90% objects while in high speed (>50km/h) and in low speed (<50km/h). For objects that bigger than normal pig, vehicle needs to have 99% detection rate.

R4

Vehicle can start to do action to elude objects after detection in 100ms.

R5

Vehicle needs to finish eluding actions in 3s while on high speed (>50km/h), in 6s while on low speed (<50km/h)

R5

Vehicle can warn driver when it can not finish eluding actions which satisfies R5. At the same time, vehicle needs to warn driver in 100ms.

R6

Vehicle can not break the law. It needs to detect all traffic lights/sign and know it's own driving factors such as speed, modules' temperature and modules' performance stats.

Choosing Metrics

Item	Explanation
Parking 1	Parking successful rate.
Parking 2	Parking time needed for a successful parking
Usability	Time for a 100km range trip while on avg speed of 50km/h.
Learning Time	Learning time for a user to fully understand how to operate the system.
cost	Cost of whole system
Dangerous Action Time	Time needed for vehicle to detect and take action to avoid dangerous condition
Convenience	Average Fatigue for 100km/200km/300km range trips
Detection Error rate	Overall error rate of detection
Detection Time	Overall time needed for detection objects/dangerous condition

Testing Plans:

Hiring 20 people, from age 21 – age 50 with driving license.

First part is parking part.

The testers operate both systems to perform 3 parking tasks. Record parking time and record status of parking (successful or no?).

Second part is Objects detection test.

In a simulating environment, testing objects detection rate and time. Simulating objects varies from small objects (basketball) to big objects (vehicle), speed of objects varies from 0km/h to 160km/h.

Third part is road testing part.

The testers operate both systems for a 100km trip, a 200km trip, a 300km trip in avg speed of 50km/h. Record time consuming, and fatigue for each trip. Also, record vehicle/animals detected by system, and compare to other data collecting by outsource. The traffic lights and signs also need to be recorded and compare to outsource.