ITU Workshop on
"Autonomous Driving safety data and metrics- what do we really need?"

SW Development Strategies for Automated Driving Services

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Artificial Intelligence lab.
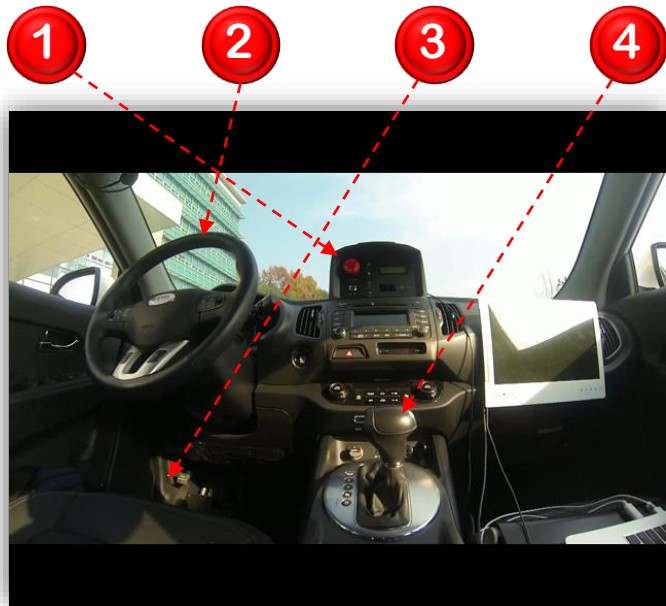Intellignet Robotics Research Division

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COTENTS
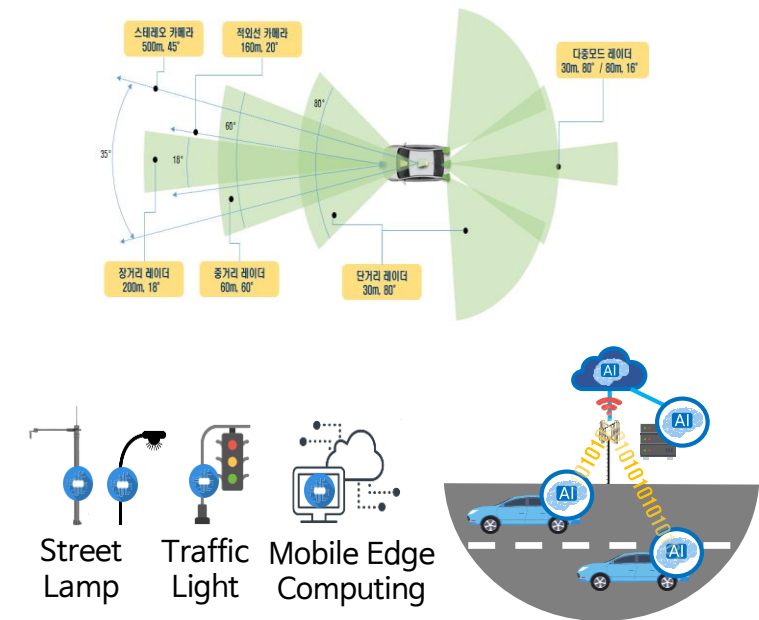
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Status of AV Technology Development – R&D

Electronic control of drive systems

Response accuracy and performance

Surround Sensing & Decision

스테레오 카메라 500m, 45°
적외선 카메라 160m, 20°
다중모드 레이더 30m, 80° / 80m, 16°
장거리 레이더 200m, 18°
중거리 레이더 60m, 60°
단거리 레이더 30m, 80°

Street Lamp
Traffic Light
Mobile Edge Computing

AI

Environment/Road infra. data

Autonomous Driving Safety

Fitting for Mobility services

Unmanned Patrol Service

Unmanned Shuttle*

Unmanned logistics*

Scalable software stack

※ source from unmanned solutions in Korea

Status of AV Technology Development – PG test & Regulation ready

Autonomous driving functions in the simulated city

① Automatic speed reduction in the School zone

② Intersection signal recognition with camera sensors, or information transmission by 5G communication

③ Automatic stop by cyclist detection

④ Traffic jam assistance

⑤ Automatic acceleration to enter the highway

⑥ Pass through the automatic tolling entrance

⑦ Entry and passage the tunnel

Additional:

Automatic detection and stop of pedestrian crossing, and

Entering and passing through the roundabout

PG Test in K-City

M4: Traffic jam
M5: Highway
M6: Toll gate
M7: Tunnel
M3: Cyclist
M2: Crossway
M1: School zone
Finish
Start
Perception

KR Government Policy for Future Mobility

🌐 **Korean Strategy 2030 for Future Mobility**
Vision : Strengthening the competitiveness of Future mobility
① **World's No.1 in supply of electric vehicles and hydrogen vehicles**
② **World's first commercialization of fully autonomous driving on major roads across the country**
 - Task1 : Establishment of four major national core infrastructure for autonomous driving
 - Task2 : Preparation of institution for Autonomous vehicle manufacturing, performance, protection and security system
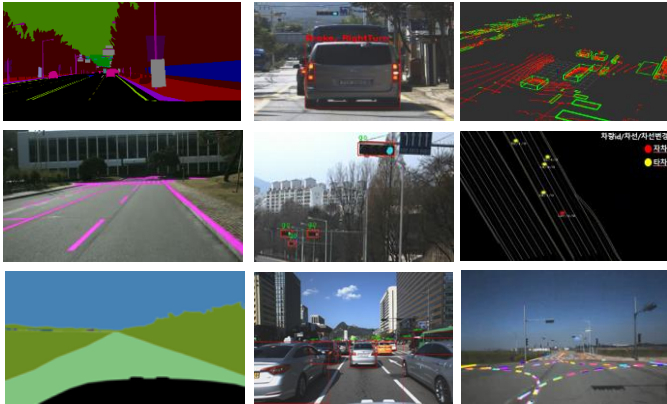 **- Task3 : Technology development to preoccupy the early market for autonomous vehicles**

ICT-centered automated driving service platform development policy(1/2)

● **AI algorithm development, Test & Validataion**
Simulation → PG Test →Securing user acceptance through real road testing
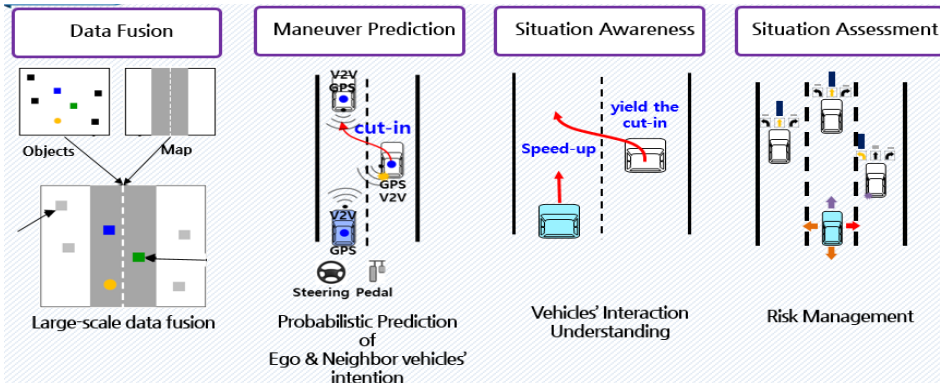

AI learning data Sets

Simulation Test
- MILS
- SILS
- HILS
- VILS

Testing in a mock environment

Real road testing (Smart Cities)

Data Fusion | Maneuver Prediction | Situation Awareness | Situation Assessment

Objects | Map

Large-scale data fusion

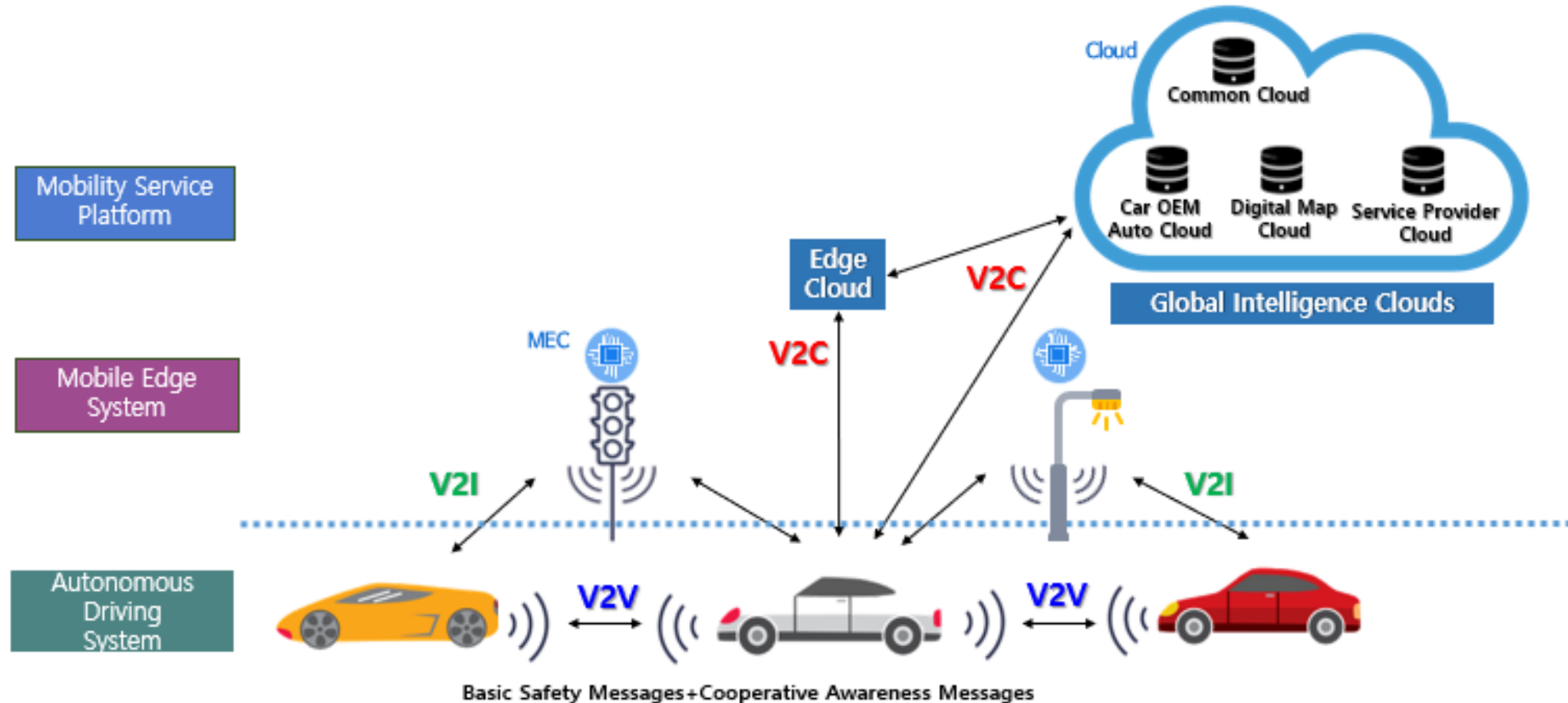Probabilistic Prediction of Ego & Neighbor vehicles' intention

Vehicles' Interaction Understanding

Risk Management

ICT-centered automated driving service platform development policy(2/2)

● "Stand Alone → Edge/Cloud Connected", Connected Automated Vehicle

Early Deployment Opportunities (1/3)

🌐 **Robot taxi Service**
- ① **Voice recognition command Interfaces**
- ② **Autonomous driving from origin to destination using HD map**
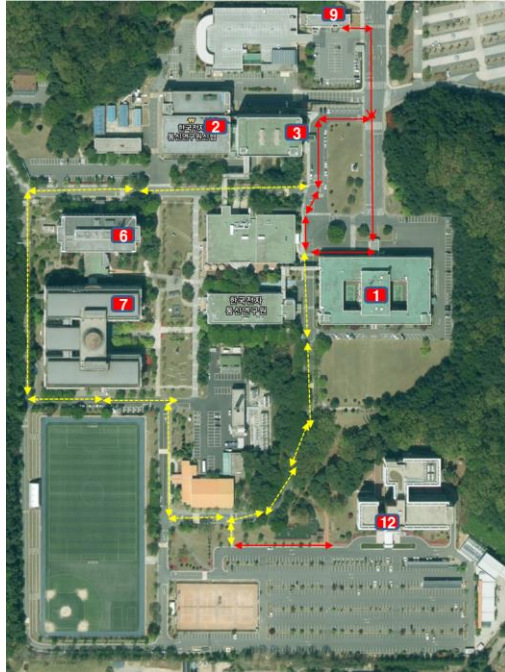- ③ **Auto-valet parking using HD map**

🌐 **Test within the geofenced area**

Early Deployment Opportunities (2/3)

🔵 **Low Speed Shuttle**
- ① **Service requests by reservation**
- ② **Voice command interfaces**
- ③ **8K-VR mobile theatre**
- ④ **AR Realistic Guide**
- ⑤ **Cooperative recognition of 5G connection**

🔵 **Test in designated routes within the geofenced area**

Early Deployment Opportunities (3/3)

Last mile service

① **Recognition of the driving area without lane**

Partial functional test in progress

Lessons learned from experiments

① **Limitations to recognizing further in advance with only vehicle-mounted sensors**

② **Necessity of learning driving culture in addition to complying with rule-cased traffic laws**

③ **Even intermediate technologies can discover demands for safer technologies through the application of commercial services and gain the acceptance from users**

Autonomous driving vehicle ride experience for the public

Conclusions

● Focuses on Highly Automated Vehicles (SAE level 4~5) Platform for mobility services
   ✓ Open Architecture
      . SW Platform in cooperation with Edge & Cloud computing
      . Lightweight and fast driving computing environment of AI algorithm
         for advanced autonomous driving intelligence
      . Low delay and reliable information transmission communication device need to be linked
   ✓ Simulation & real road test
      . Defense against Cybersecurity attacks
      . Response and avoidance strategies for Known/Unknown faults and defects
      . Many times of real roads tests to ensure acceptance with other drivers

Thanks for your listening

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