Risk prediction map

Risk prediction map

Performance

〈Summery for performance & function〉
It widened this prediction area of Risk Map to urban road and intersection, it even consider potential risks in blind spots to enable expected driving.

〈Appeal point〉
1) Accuracy with recognition of potential risks, and safeness of "Expected Driving" in urban scene and intersection.
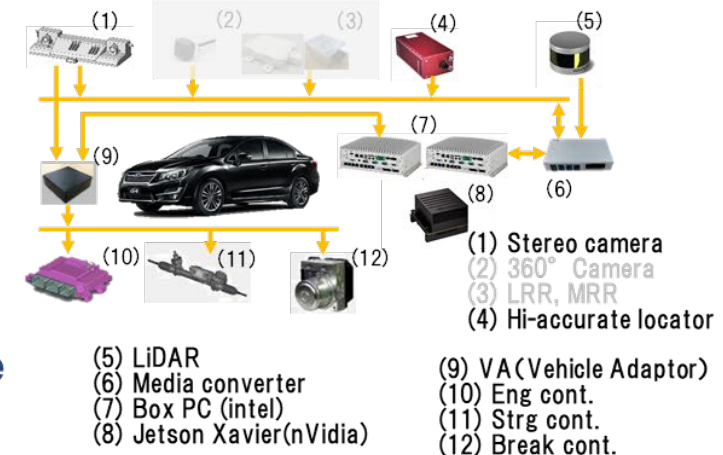2) Proposing for solution enabling further safeness and convenient, smooth driving by "Connected"

25m
13m
Variable by speed
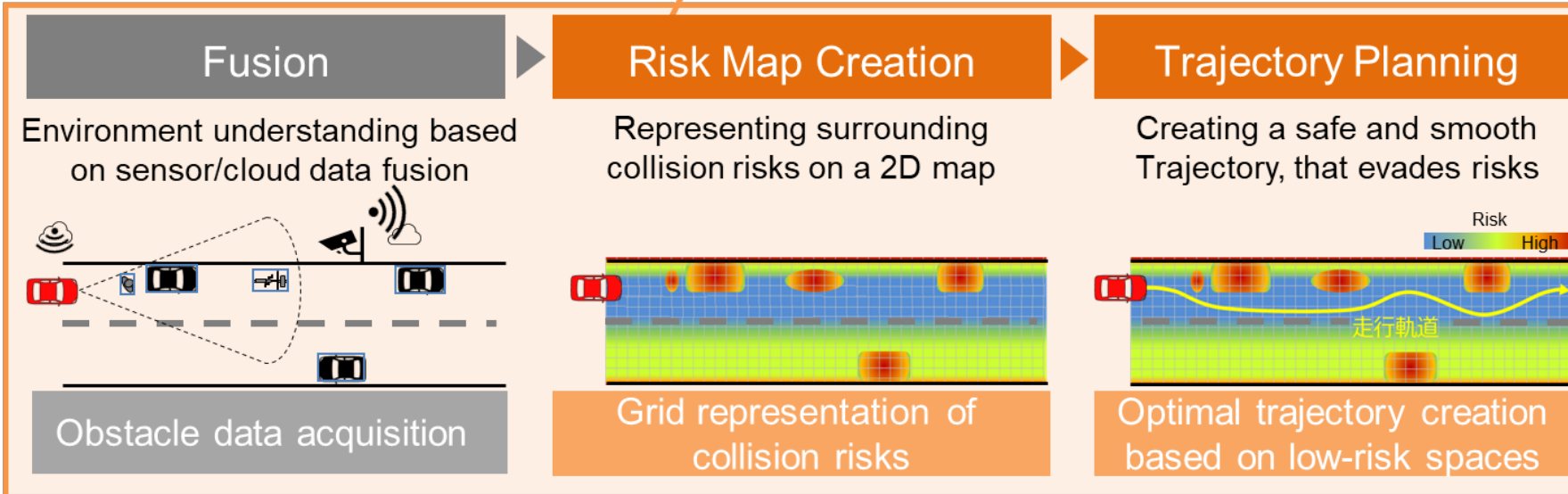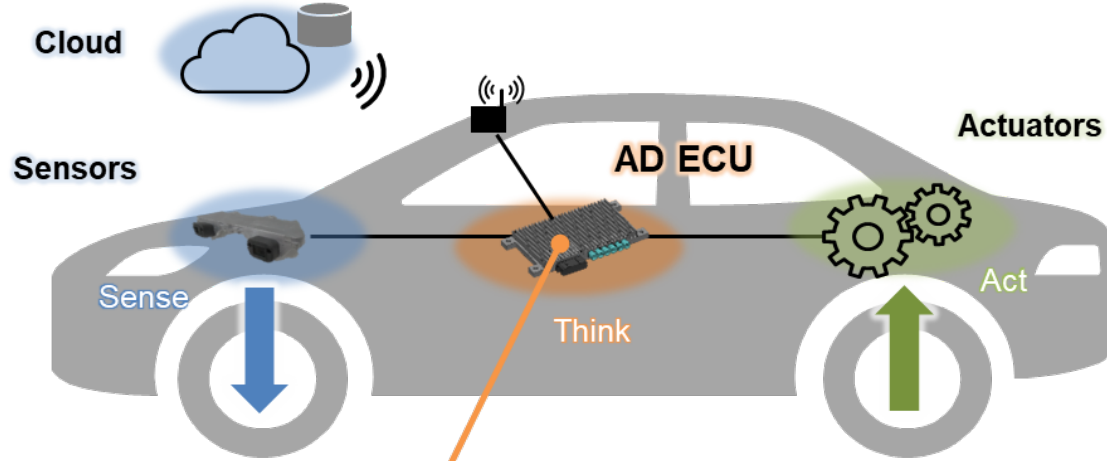My car
for Road
for Intersection

Technology Summary

〈system composition〉

Risk Map Technology
- Expansion of prediction range and responding to intersection by evolving of prediction model.
- Expressing risk/potential risk on individual layer enable to plan/judge corresponding with each risk.
- expressing existing risks in 3D space by 2D, enable to calculate by ADAS ECU.

(1) Stereo camera
(2) 360° Camera
(3) LRR, MRR
(4) Hi-accurate locator
(5) LiDAR
(6) Media converter
(7) Box PC (intel)
(8) Jetson Xavier(nVidia)
(9) VA(Vehicle Adaptor)
(10) Eng cont.
(11) Strg cont.
(12) Break cont.

AStemo

Risk prediction map

Technical Elements 1： Process for a Driving Plan

Cloud

Sensors

AD ECU

Actuators

Sense

Think

Act

Fusion

Environment understanding based on sensor/cloud data fusion

Obstacle data acquisition

Risk Map Creation

Representing surrounding collision risks on a 2D map

Grid representation of collision risks

Trajectory Planning

Creating a safe and smooth Trajectory, that evades risks

Risk
Low — High

走行軌道

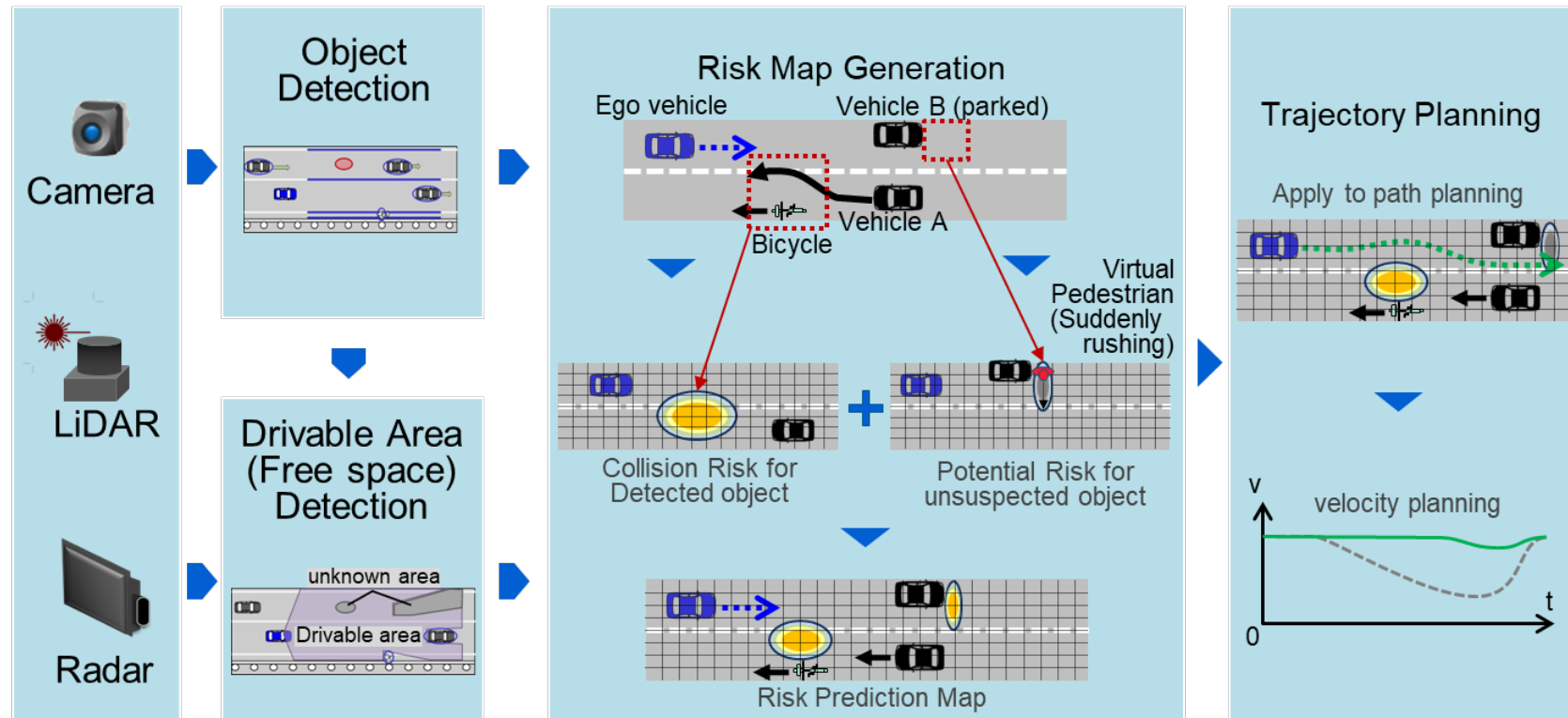Optimal trajectory creation based on low-risk spaces

Risk prediction map

Technical Elements 2 : Dynamic Risk Map Technology

1) Detect surroundings with sensors, recognize surrounding objects and free space
2) Predict collision risk with detedted objects and potential risk of blind spots
3) Plan optimal trajectory and speed profile based on risk prediction results
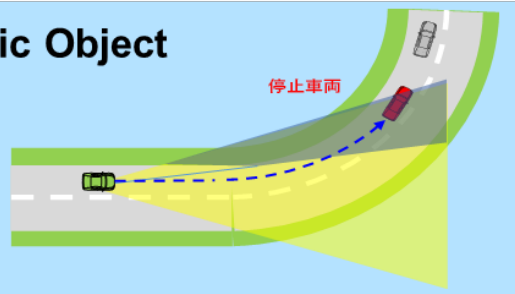
Sensing > **Cognition** > **Decision / Planning**

Camera

LiDAR

Radar

Object Detection

Drivable Area (Free space) Detection

unknown area

Drivable area

Risk Map Generation

Ego vehicle — Vehicle B (parked)

Vehicle A

Bicycle

Collision Risk for Detected object

+

Virtual Pedestrian (Suddenly rushing)

Potential Risk for unsuspected object

Risk Prediction Map

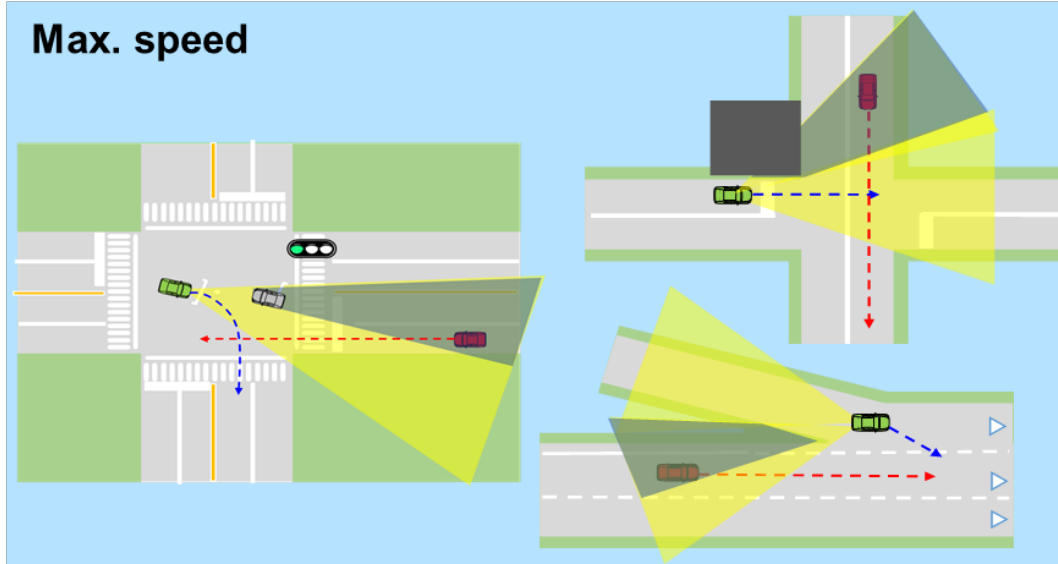Trajectory Planning

Apply to path planning

velocity planning

Technical Elements 3 : Use cases of Risk Map

1) Modeling blind area in various driving scene, and predicting potential risks
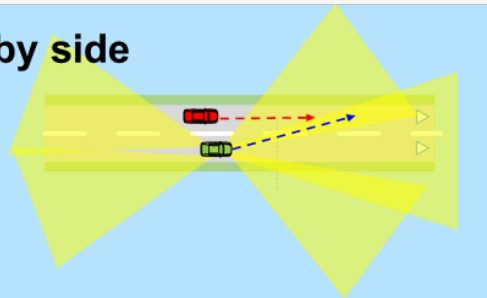2) Can be used for early warning and AEB in ADAS(ACC,LKS), not only for AD Lv3-
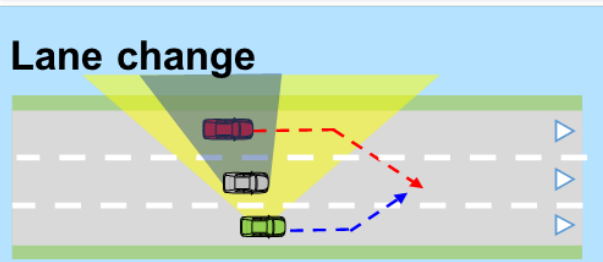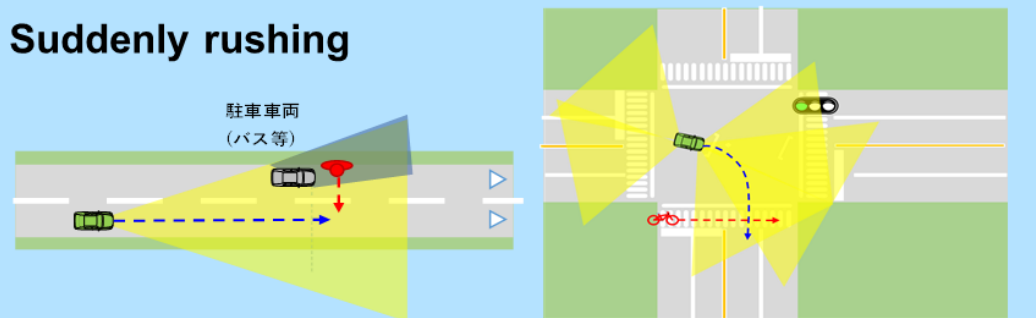
Static Object

停止車両

Side by side

Lane change

Max. speed

Suddenly rushing

駐車車両
（バス等）