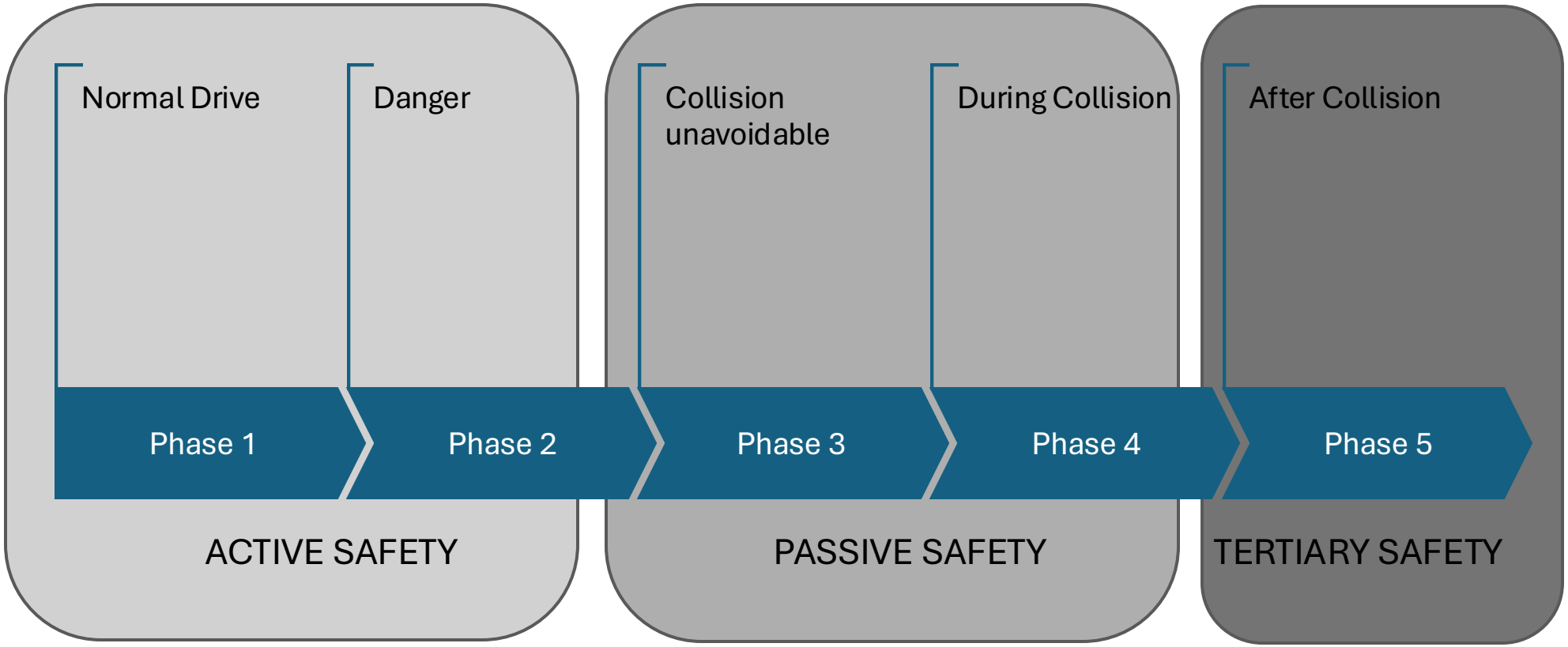
# Simulating ADAS with SOME/IP

# What is ADAS?

- Advanced Driving Assistance Systems
- These are technologies developed to enhance vehicle safety and driving experience by assisting the driver in various tasks.
- These systems typically use sensors such as cameras, radar, lidar, and ultrasonic sensors to monitor the vehicle's surroundings and provide feedback or take corrective actions when necessary.
- The ultimate goal of ADAS is to reduce accidents and improve overall road safety.

# Why do we need ADAS?

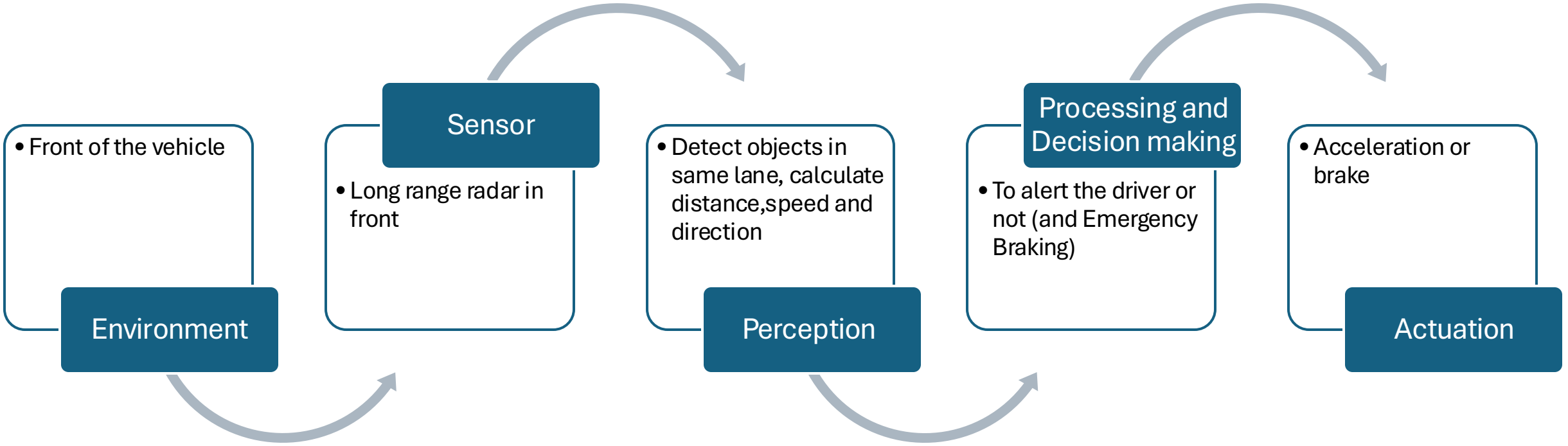


# Levels of automation

- Level 0 – No automation
- Level 1 – Emergency braking, collision warning
- Level 2 – ACC, Parking line detection,autonomous emergency braking
- Level 3 – complete control except under certain traffic and weather conditions.Tells driver when it cant
- Level 4 – no assistance from driver but require assistance time to time. Geographical area is limited.
- Level 5 – Complete automation. No control elements like steering wheel or pedal.

# General Block Diagram

# Block Diagram for ACC



# SOME /IP

- SOME/IP (Scalable Service-Oriented MiddlewarE over IP) is a communication protocol used in automotive and other industries.
- It operates at the application layer over IP, typically UDP or TCP, for efficient data exchange between electronic control units (ECUs).
- It supports service-oriented architecture, efficient data serialization and service discovery
- ADAPTIVE AUTOSAR uses SOME/IP as one of its communication protocol.

# How it sends Data?

## Method

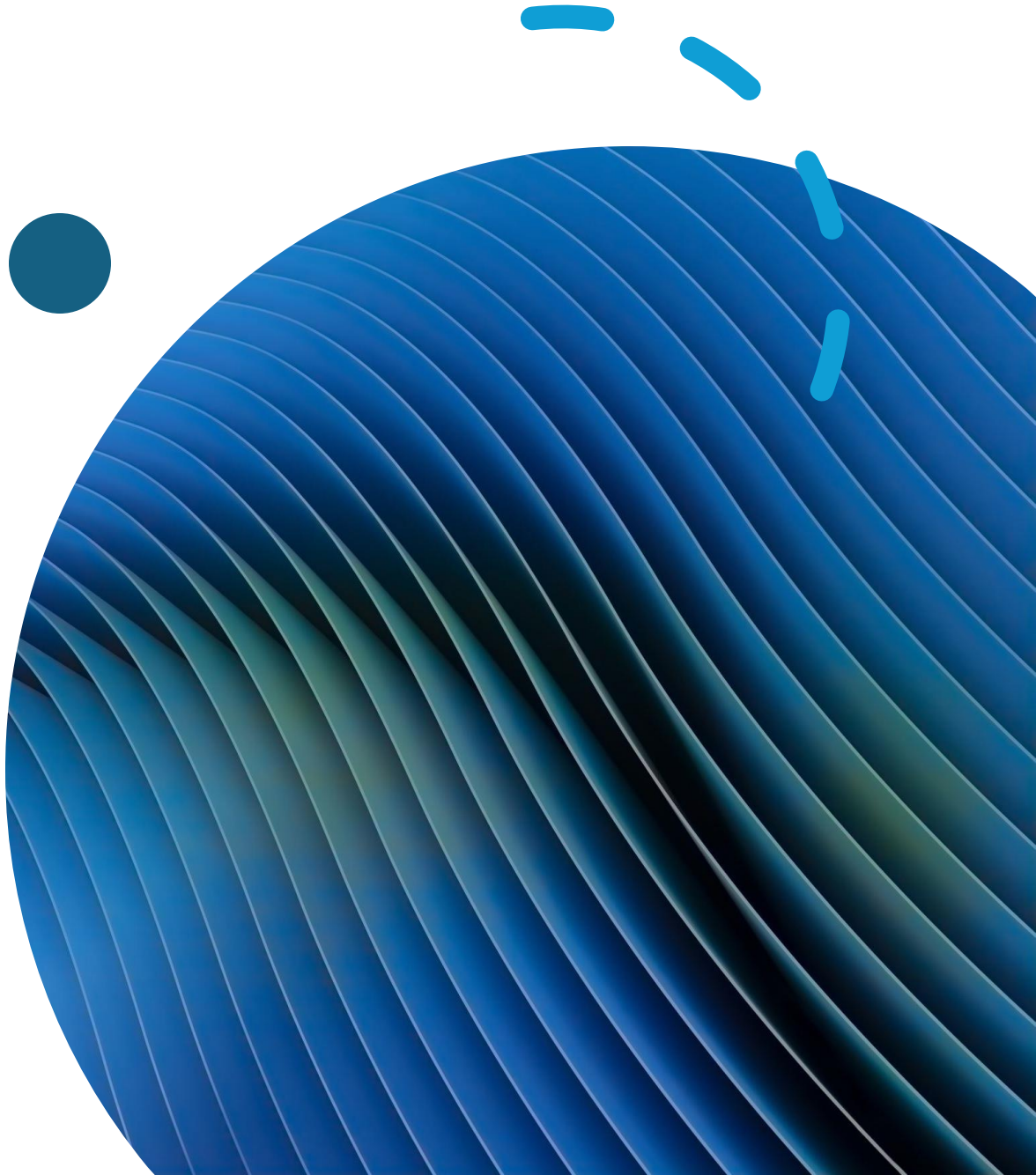
- Client requests the server and Server gives response

## Events

- Client subscribes to an event and gets notified whenever server publishes.Either update on change or periodic

## Fields

- A combination of method and events. A client can set and get data in the server and gets notified whenever the server publishes.



# Pybus Simulation

- A python package which simulates sensor data and sends them to your fusion application through someip
- It uses vsomeip – a c++ based implementation of SOME/IP

# Folder Structure

VSOMEIP BINDINGS

ECU SIMULATION CLASS

CONFIG FILES

DATABASE

# Config File Structure

Application

Unicast

Routing

Netmask

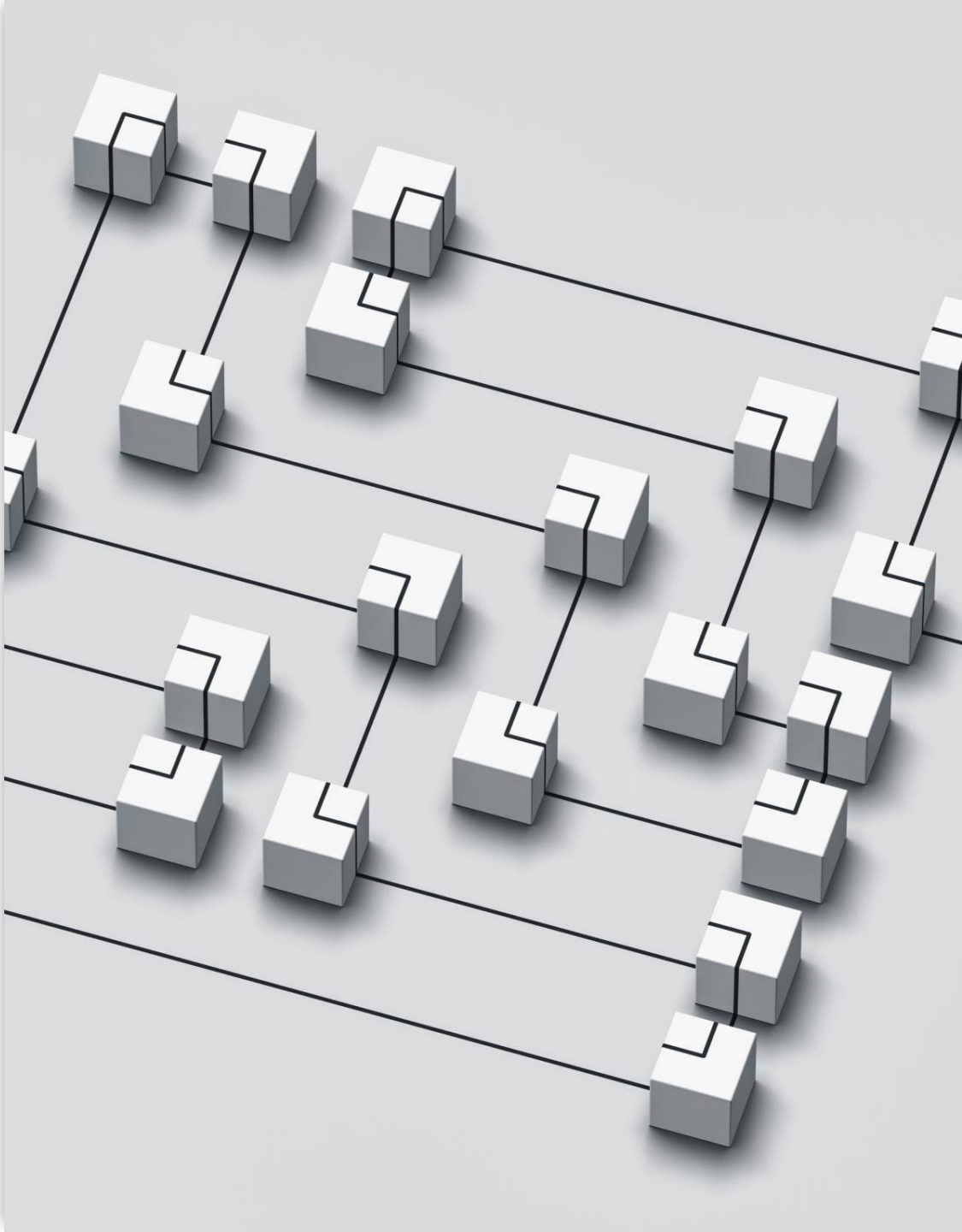
Services

Service Discovery

logging

# ECU Simulation Class

- Represents an ECU node in  the vehicle architecture.
- Every ECU has a config manager. The config manager fetches config data for the ECU from its corresponding config file.
- It initializes a vsomeip runtime and creates an application for the ECU.
- All provided and required services for the ECU are registered here.
- Call the start function to start ECU simulation.

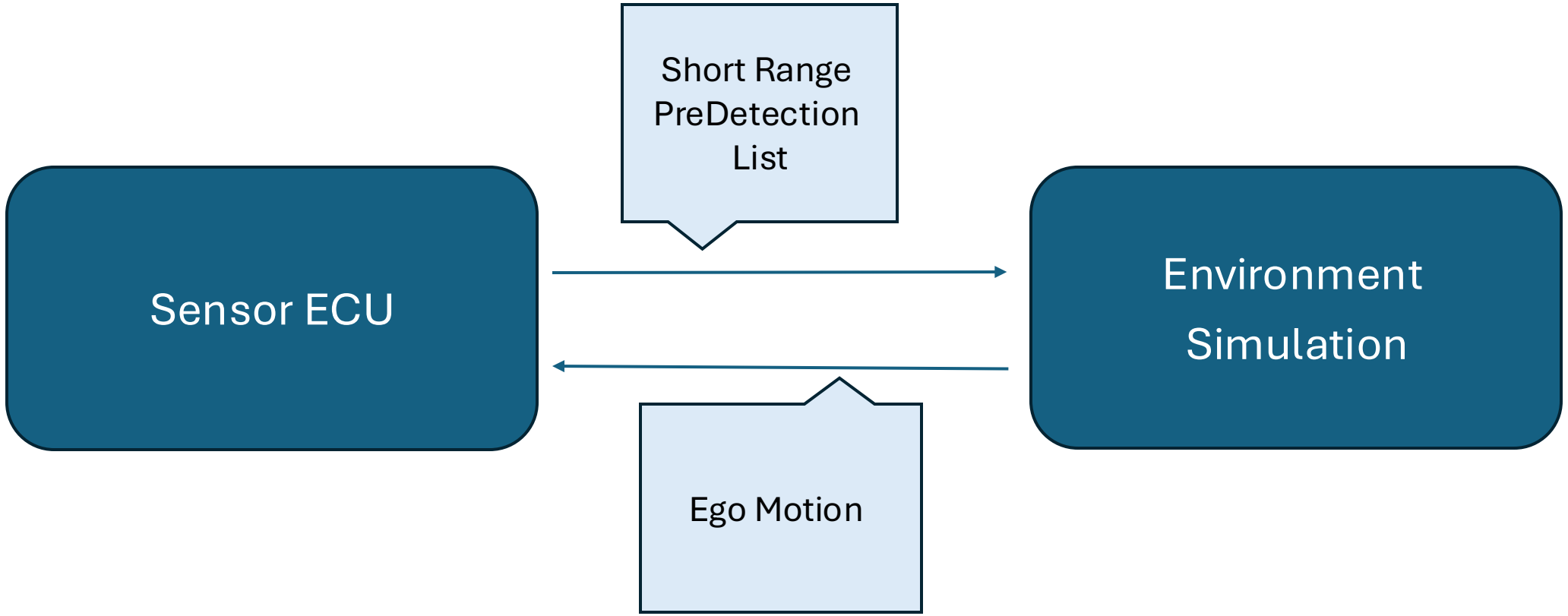


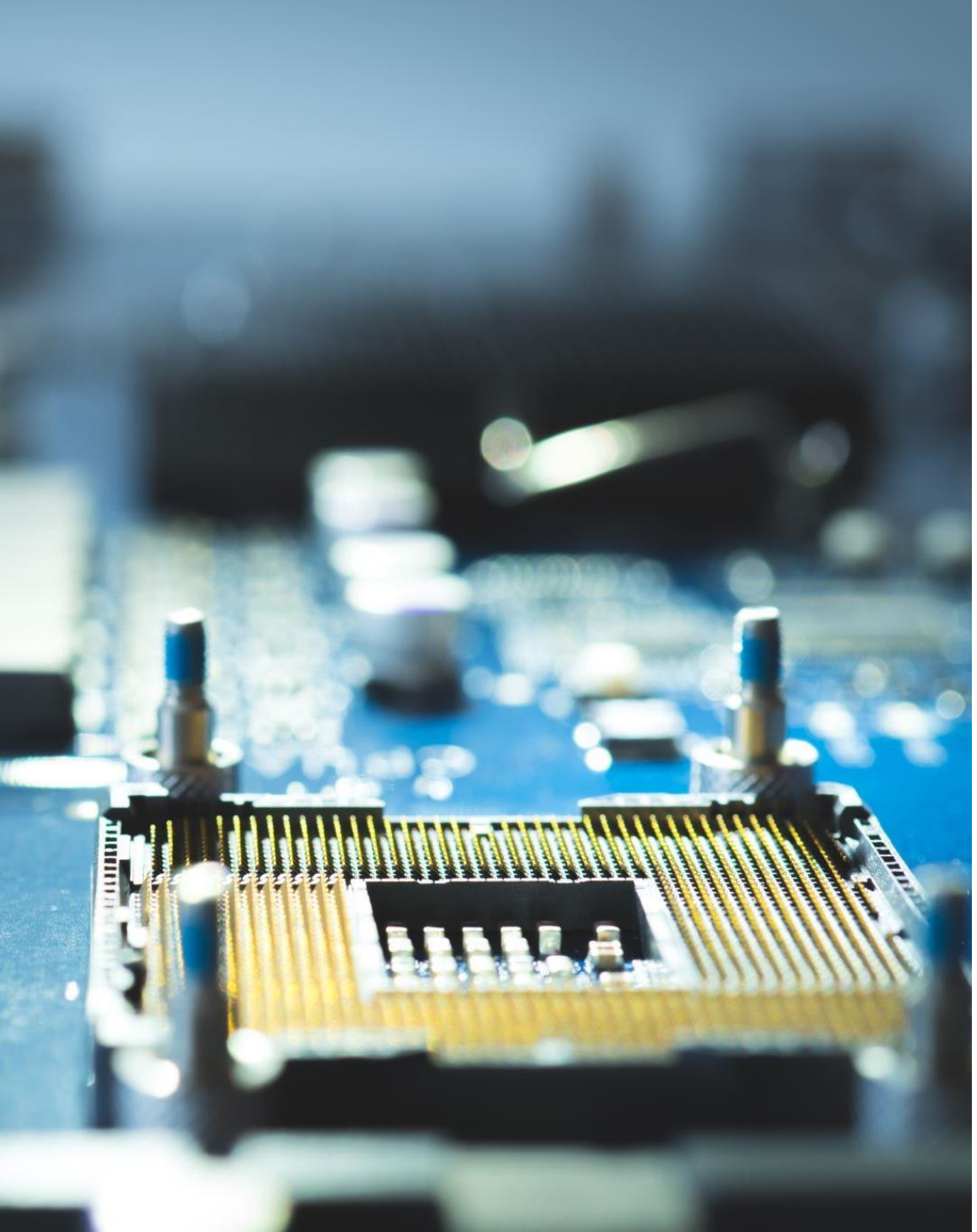
# ECU Simulation Class

Sensor ECU

Environment Simulation

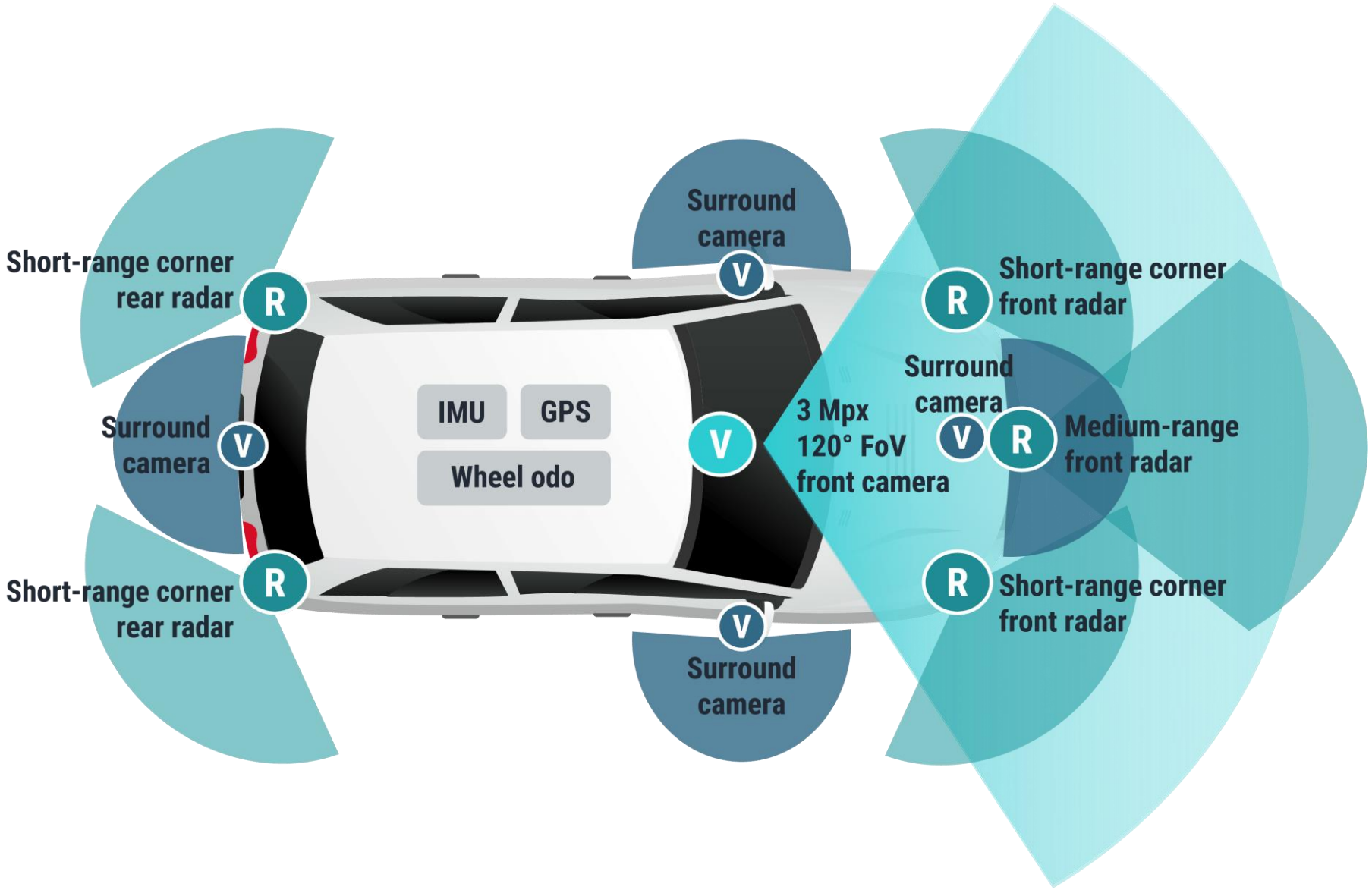
# Woking With Short Range Radar Sensor





# Sensor Data Fusion Application

- Sensor data fusion in ADAS combines inputs from radar, cameras, lidar, and other sensors to enhance accuracy and reliability.
- Sensor fusion enables advanced automation features and addresses challenges such as sensor integration and real-time processing for robust performance in varied driving conditions


Short-range corner
rear radar
R
Surround
camera
V
IMU
GPS
Wheel odo
Surround
camera
V
Short-range corner
rear radar
R
Surround
camera
V
3 Mpx
120° FoV
front camera
V
Short-range corner
front radar
R
Surround
camera
V
Medium-range
front radar
R
Short-range corner
front radar
R
Surround
camera
V

# Thank You !!