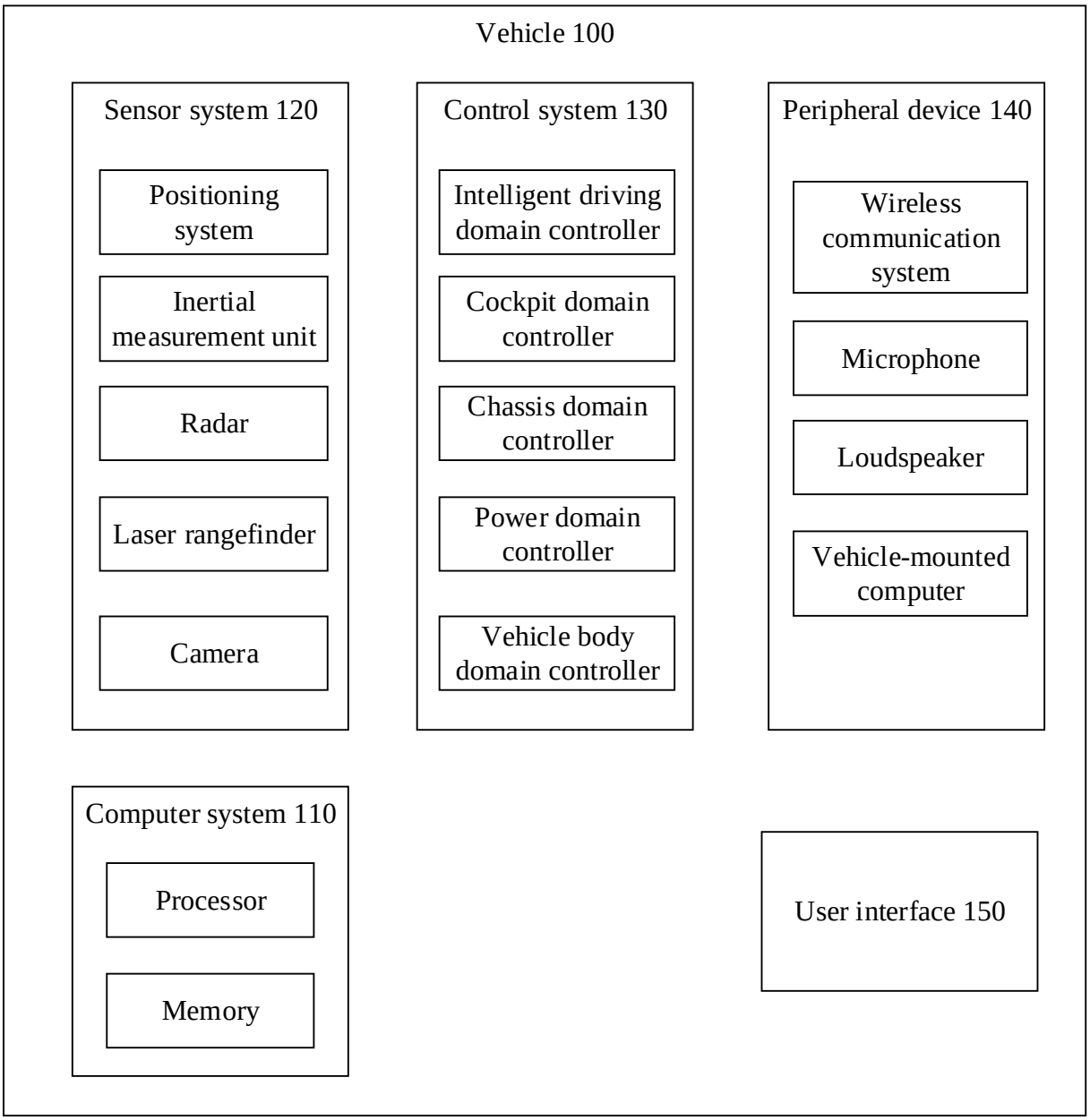

Vehicle 100
Sensor system 120
Positioning system
Inertial measurement unit
Radar
Laser rangefinder
Camera
Control system 130
Intelligent driving domain controller
Cockpit domain controller
Chassis domain controller
Power domain controller
Vehicle body domain controller
Peripheral device 140
Wireless communication system
Microphone
Loudspeaker
Vehicle-mounted computer
Computer system 110
Processor
Memory
User interface 150

FIG. 1

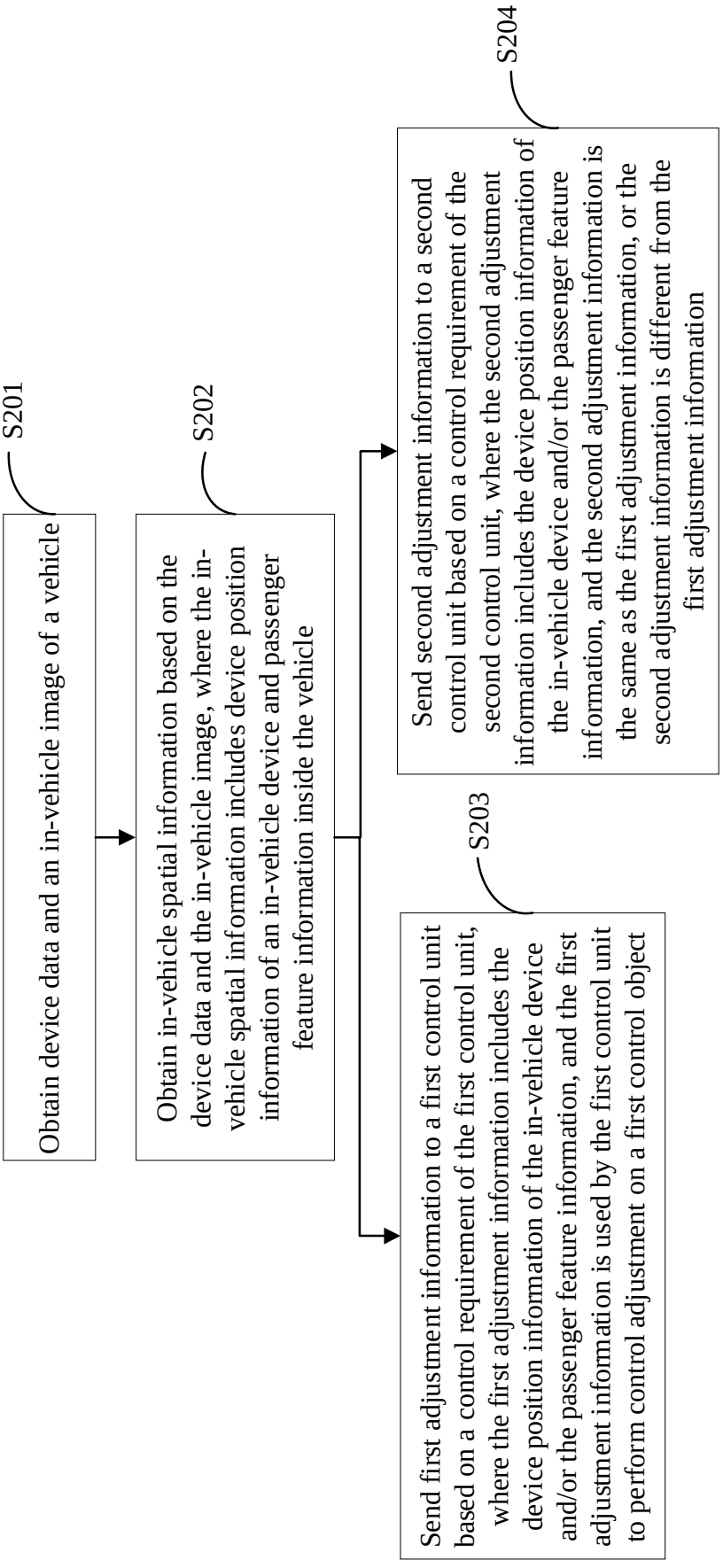

S201
Obtain device data and an in-vehicle image of a vehicle
S202
Obtain in-vehicle spatial information based on the device data and the in-vehicle image, where the in-vehicle spatial information includes device position information of an in-vehicle device and passenger feature information inside the vehicle
S203
Send first adjustment information to a first control unit based on a control requirement of the first control unit, where the first adjustment information includes the device position information of the in-vehicle device and/or the passenger feature information, and the first adjustment information is used by the first control unit to perform control adjustment on a first control object
S204
Send second adjustment information to a second control unit based on a control requirement of the second control unit, where the second adjustment information includes the device position information of the in-vehicle device and/or the passenger feature information, and the second adjustment information is the same as the first adjustment information, or the second adjustment information is different from the first adjustment information

FIG. 2

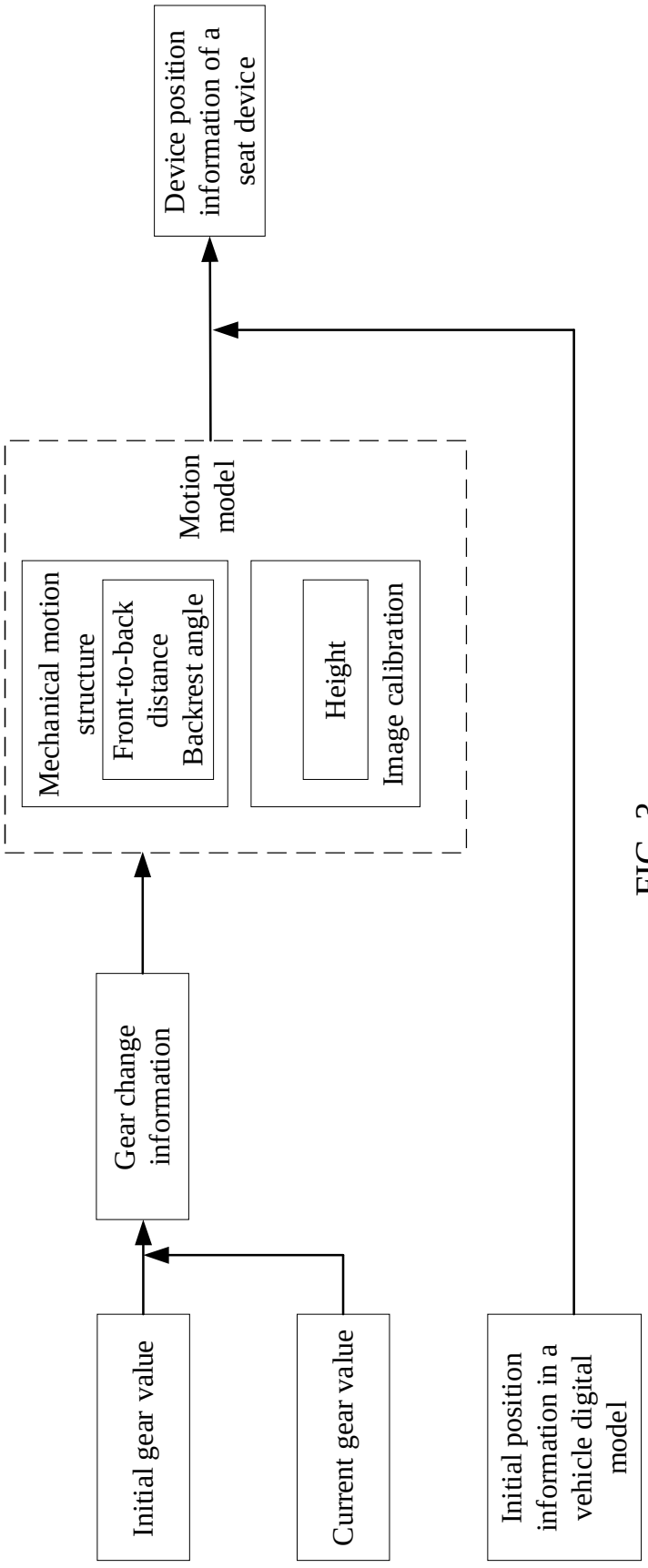

Device position information of a seat device
Motion model
Mechanical motion structure
Front-to-back distance
Backrest angle
Image calibration
Height
Gear change information
Initial gear value
Current gear value
Initial position information in a vehicle digital model

FIG. 3

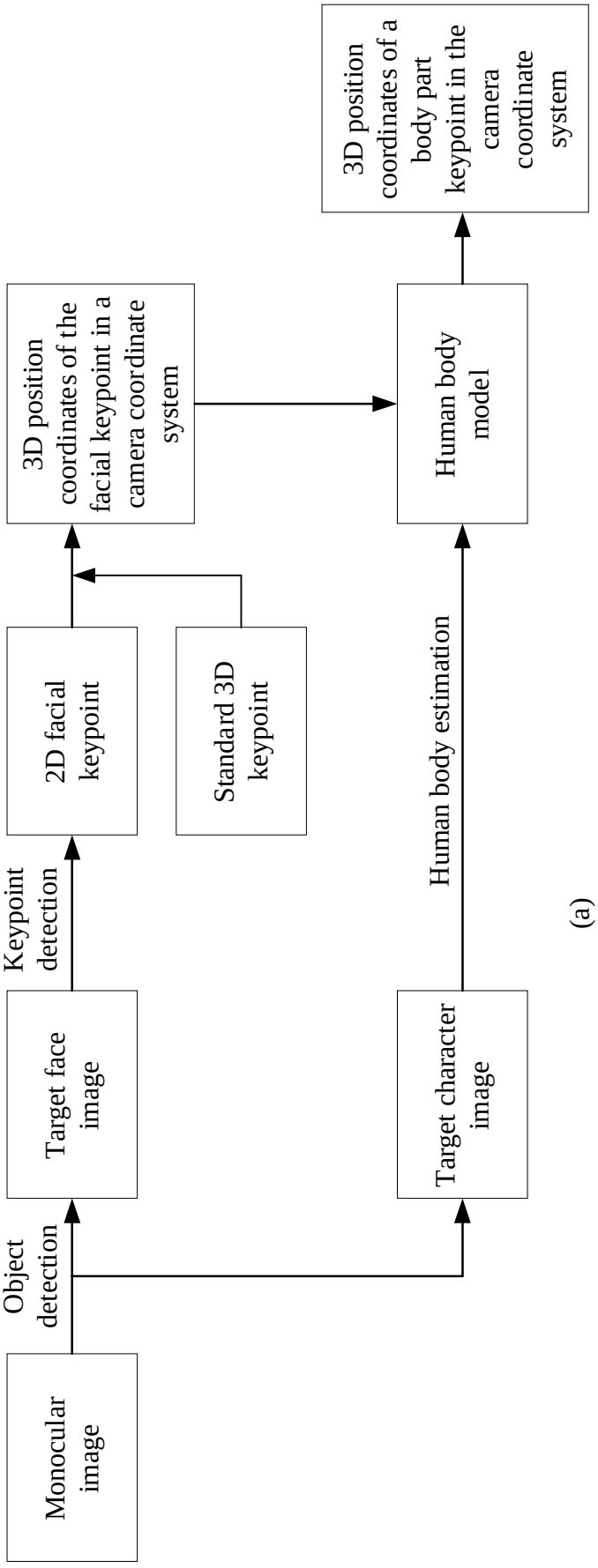

Monocular image
Object detection
Target face image
Keypoint detection
2D facial keypoint
Standard 3D keypoint
3D position coordinates of the facial keypoint in a camera coordinate system
Target character image
Human body estimation
Human body model
3D position coordinates of a body part keypoint in the camera coordinate system
(a)
Depth image
RGB image
Human body estimation
Human body model in a camera coordinate system
3D position coordinates of a facial keypoint and a body part keypoint in the camera coordinate system
(b)

FIG. 4

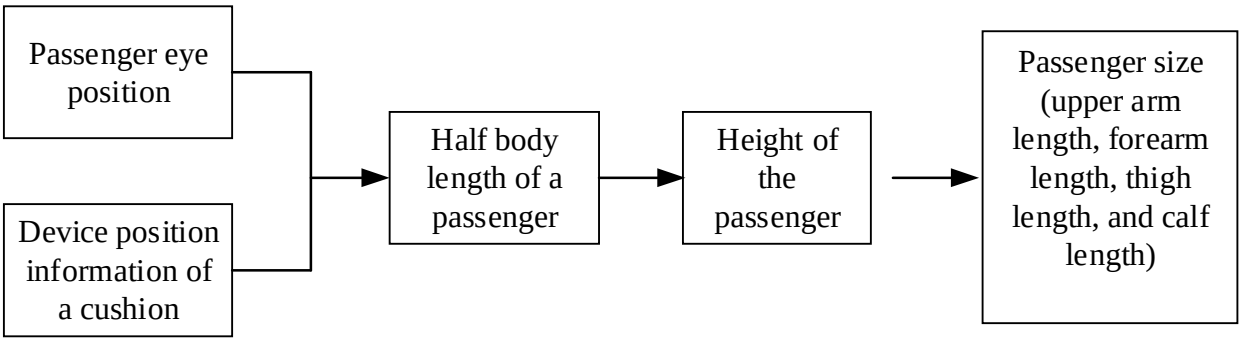

Passenger eye position
Device position information of a cushion
Half body length of a passenger
Height of the passenger
Passenger size (upper arm length, forearm length, thigh length, and calf length)

FIG. 5

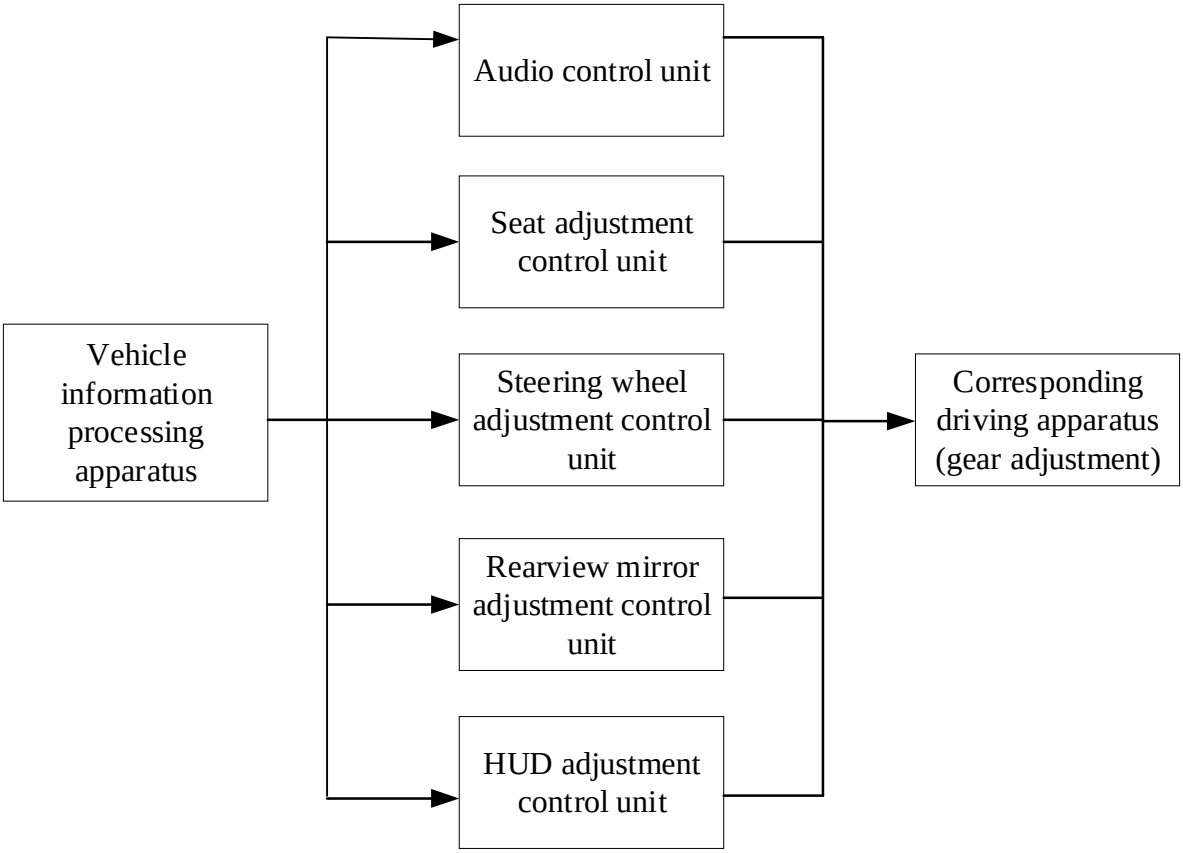

Vehicle information processing apparatus
Audio control unit
Seat adjustment control unit
Steering wheel adjustment control unit
Rearview mirror adjustment control unit
HUD adjustment control unit
Corresponding driving apparatus (gear adjustment)

FIG. 6

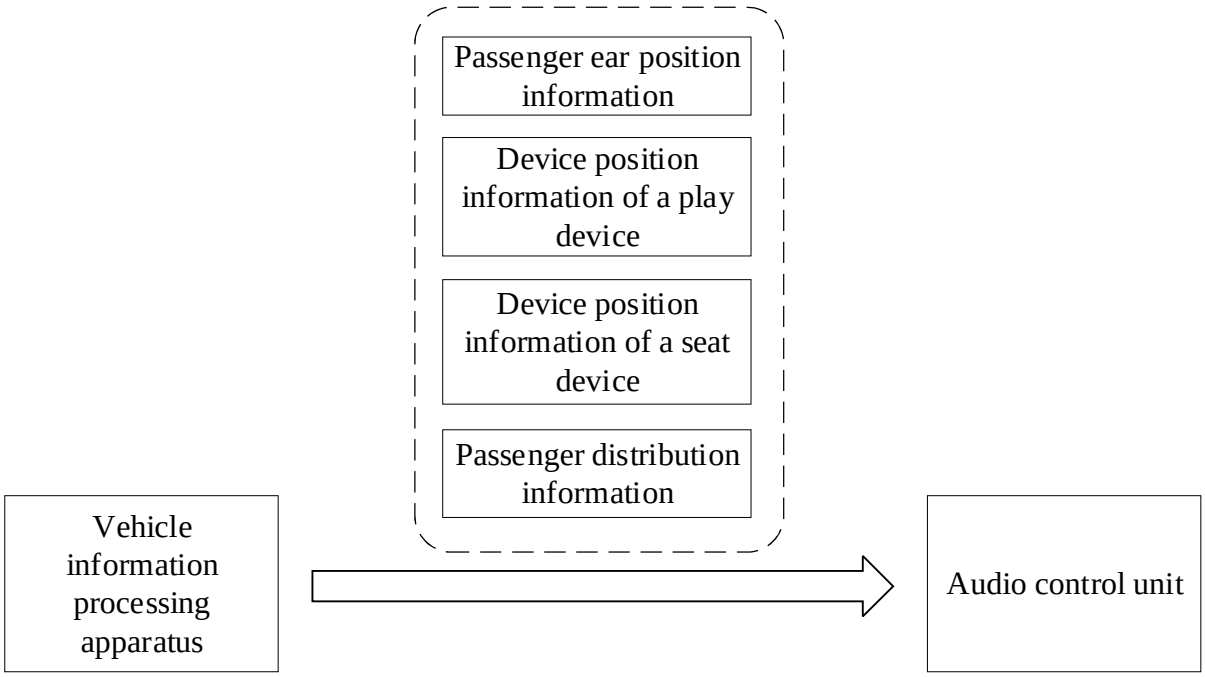

Passenger ear position information
Device position information of a play device
Device position information of a seat device
Passenger distribution information
Vehicle information processing apparatus
Audio control unit

FIG. 7

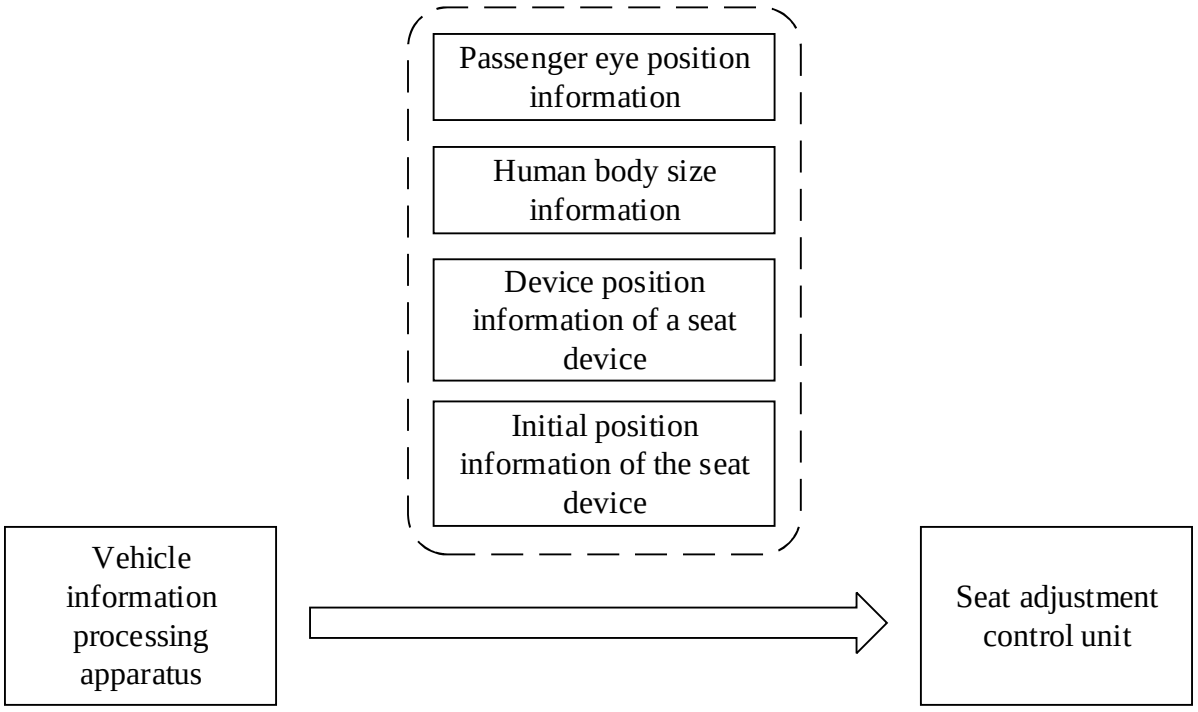

Passenger eye position information
Human body size information
Device position information of a seat device
Initial position information of the seat device
Vehicle information processing apparatus
Seat adjustment control unit

FIG. 8

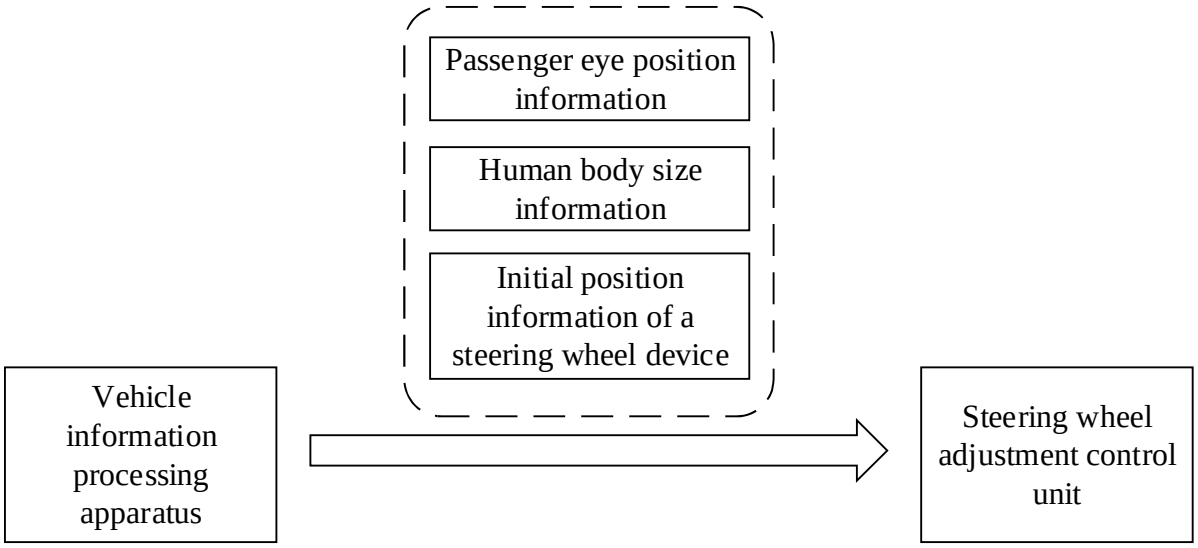


FIG. 9

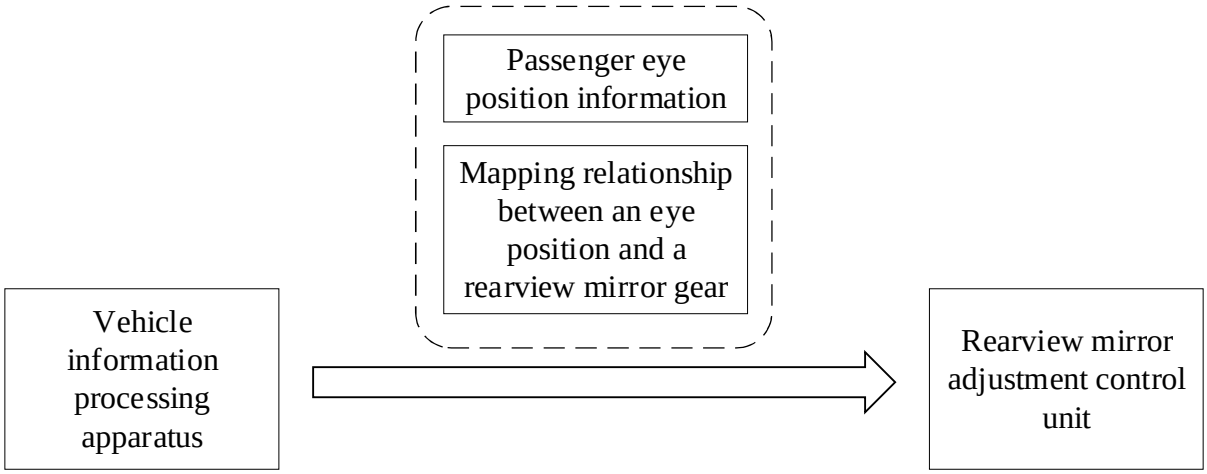


FIG. 10

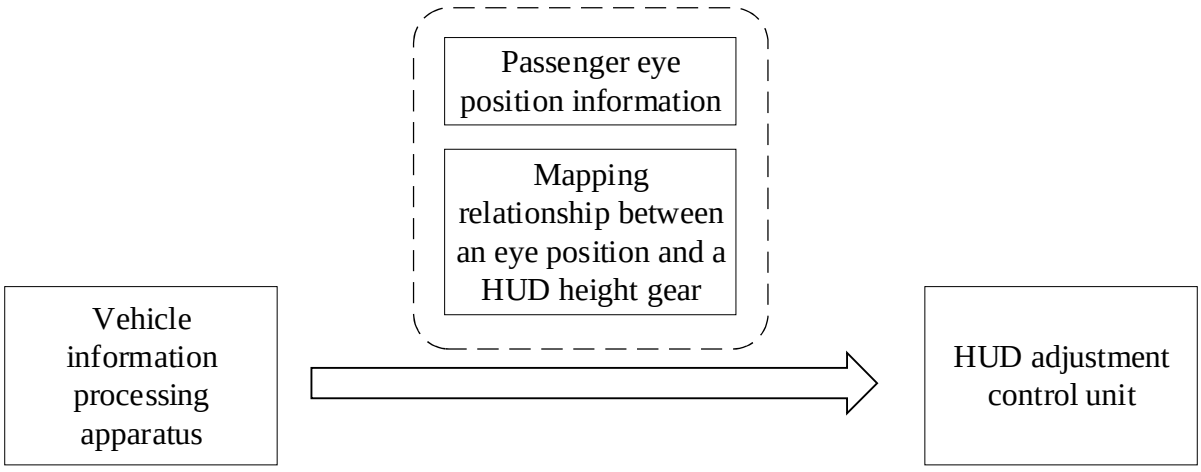


FIG. 11

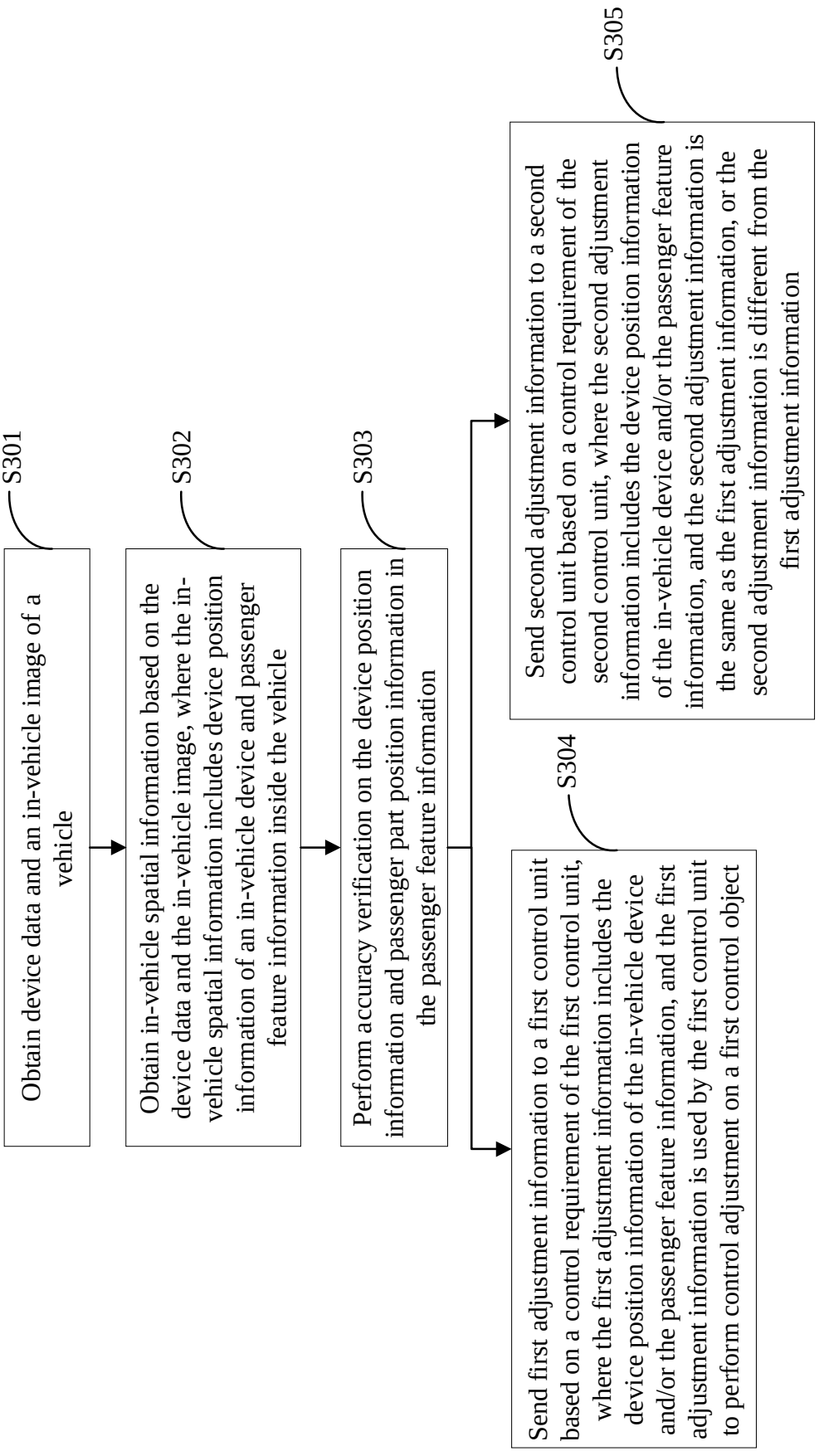

S301
Obtain device data and an in-vehicle image of a vehicle
S302
Obtain in-vehicle spatial information based on the device data and the in-vehicle image, where the in-vehicle spatial information includes device position information of an in-vehicle device and passenger feature information inside the vehicle
S303
Perform accuracy verification on the device position information and passenger part position information in the passenger feature information
S304
Send first adjustment information to a first control unit based on a control requirement of the first control unit, where the first adjustment information includes the device position information of the in-vehicle device and/or the passenger feature information, and the first adjustment information is used by the first control unit to perform control adjustment on a first control object
S305
Send second adjustment information to a second control unit based on a control requirement of the second control unit, where the second adjustment information includes the device position information of the in-vehicle device and/or the passenger feature information, and the second adjustment information is the same as the first adjustment information, or the second adjustment information is different from the first adjustment information

FIG. 12

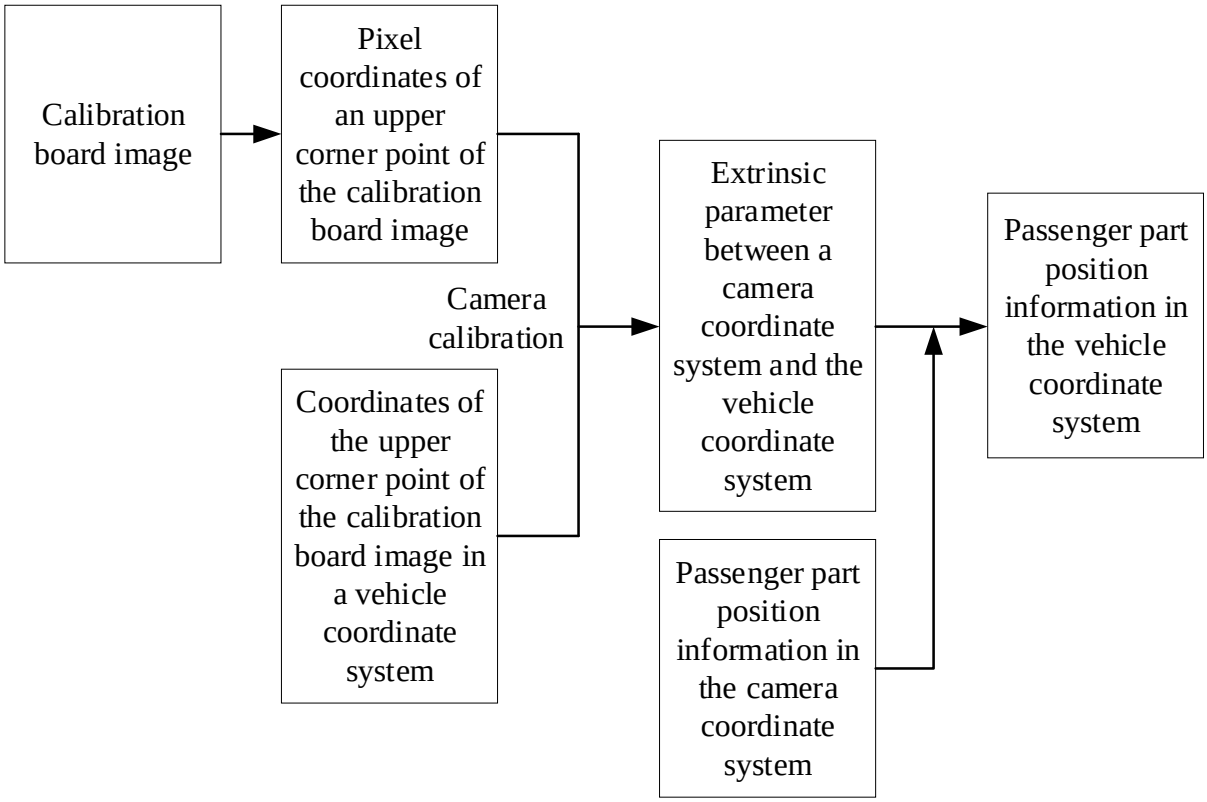

Calibration board image
Pixel coordinates of an upper corner point of the calibration board image
Camera calibration
Coordinates of the upper corner point of the calibration board image in a vehicle coordinate system
Extrinsic parameter between a camera coordinate system and the vehicle coordinate system
Passenger part position information in the camera coordinate system
Passenger part position information in the vehicle coordinate system

FIG. 13

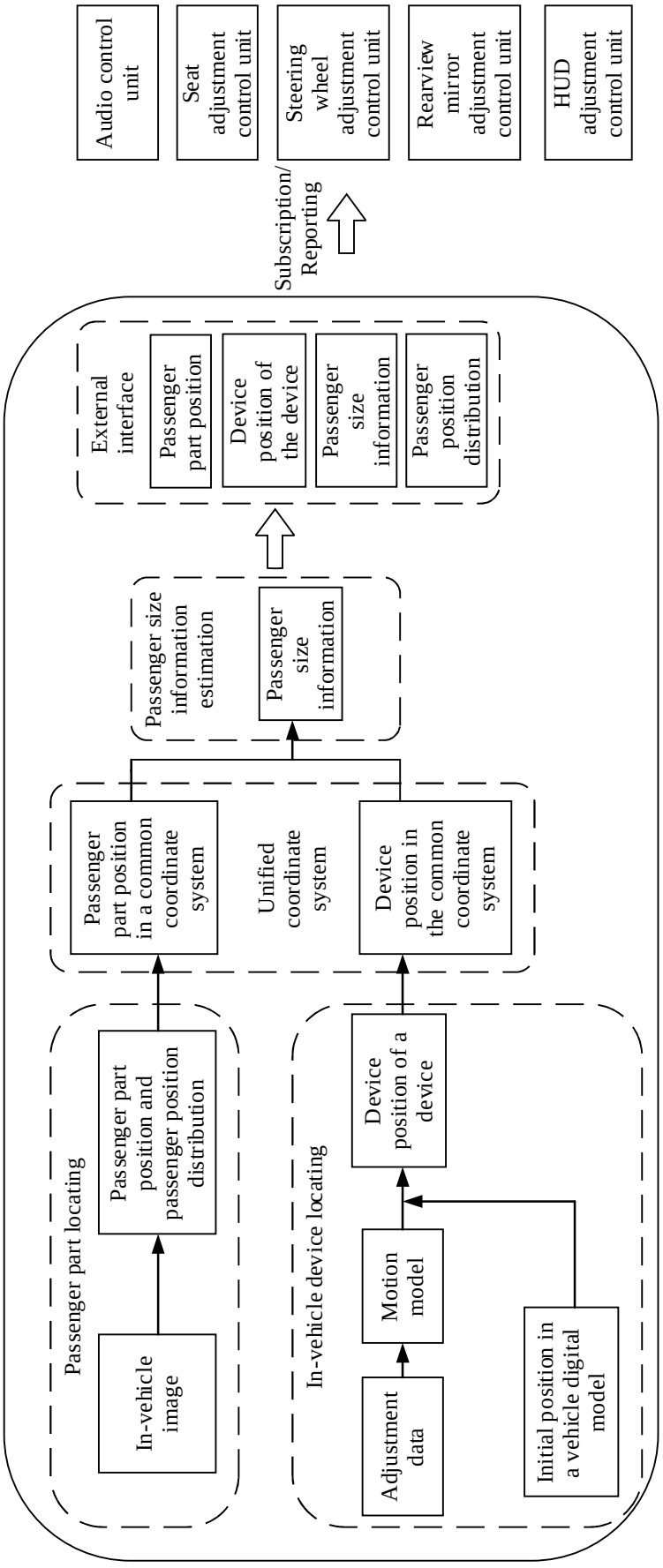

Audio control unit
Seat adjustment control unit
Steering wheel adjustment control unit
Rearview mirror adjustment control unit
HUD adjustment control unit
Subscription/ Reporting
External interface
Passenger part position
Device position of the device
Passenger size information
Passenger position distribution
Passenger size information estimation
Passenger size information
Passenger part position in a common coordinate system
Unified coordinate system
Device position in the common coordinate system
Passenger part locating
In-vehicle image
Passenger part position and passenger position distribution
In-vehicle device locating
Adjustment data
Motion model
Device position of a device
Initial position in a vehicle digital model

FIG. 14