

4.8 GPS and Sensor information

Abstraction

For IVI system, Positioning information is a very essential one as it is moving. Positioning information includes a variety of information. For example, it includes the vehicle's longitude and latitude position coordinates obtained from the GPS signal, as well as the vehicle's direction, speed data. These information shall be provided by the IVI platform. Additionally the IVI system has the most intelligent and powerful computing resources ever and geographical information of map data. By acquiring and using Sensor data such as gyroscopes, acceleration, and vehicle speed pulses, IVI platform is expected to provide coordinated location information with dead reckoning navigation and map matching to the required applications. With these backgrounds, IVI system needs to provide functions that can provide GPS and Sensor data to necessary applications.

This chapter describes the use cases with GPS and Sensor communication module, the functional requirements for realizing the use cases, and the functions of the Basesystem that can be used as a sample implementation.

Use case

In the Table 1, use cases which need GPS and Sensor Communication module are described.

Table 1

#	Item	Description
UC. GS. 1	Utilization of current location information	The driver uses the navigation application and sets the destination. The user starts the application, enters the destination, and the time required and route are displayed.
UC. GS. 2	Acquisition of GPS time	IVI system obtains the GPS time and corrects the display of the time on the IVI display screen. It can also be used for other way as "expiration date" for credentials by openssl or abs time of linux, etc. as examples.
UC. GS. 3	DeadReckoning	A driver drives a car to a destination. If the driver enters a tunnel or other place where it is difficult to receive a signal and GPS information cannot be obtained, the driver can use the Sensor information obtained to position the car.
UC. GS. 4	Retention of GPS information	When the driver presses the button for ACC-OFF, the IVI system retains the GPS information. When the driver presses the button for ACC-ON, the current location information will be displayed based on the retained information.

Functional Requirements

The Table 2 includes the functional requirements of GPS and Sensor Communication module.

Figure 2

#	Item	Related use case	Description
RQ. GS. 1	GPS and Sensor data distribution registration	UC.GS.1, UC.GS.2	GPS and Sensor communication module shall be able to register the delivery of GPS(including time) and Sensor data to the application that wants to receive them.
RQ. GS. 2	Utilization of the function from the application	UC.GS.1, UC.GS.2	GPS and Sensor communication module shall send the necessary GPS(including time) and Sensor data to the registered applications.
RQ. GS. 3	Acquisition of GPS data and Sensor data	US.GS.3	GPS and Sensor communication module shall receive GPS and Sensor data transmission requests from applications. Dead Reckoning function is not provided by this system, and needs to be implemented separately. Since acquired GPS and Sensor data, etc. are required, the data will be provided when the request is sent from the system owning Dead Reckoning function.
RQ. GS. 4	Provision of GPS data and Sensor data	UC.GS.3	GPS and Sensor communication module shall receive the GPS and Sensor data transmission request from the application and provide the necessary data.
RQ. GS. 5	Retention of GPS information	UC.GS.4	GPS and Sensor communication module retains GPS information when the ACC is turned OFF from ON, and provides GPS information when the ACC is turned ON.

GPS or Sensor information in Basesystem

In the Basesystem implementation, the functional module that handles GPS and Sensor data is Positioning. Positioning provides the following functions.

- Provide location information (longitude, latitude, altitude, heading) and speed information to the required application/service.
- Provide GPS data and GPS time to required applications/services, and reset GPS.
- Provide Sensor data (gyroscope, acceleration, vehicle speed pulse, vehicle reverse information, etc.)

Application/Service requests GPS and Sensor data from Positioning, and returns the information obtained from Vehicle.

Positioning

<https://gerrit.automotivelinux.org/gerrit/gitweb?p=staging/basesystem.git;a=tree;f=service/vehicle/positioning;h=6573a2b89dc948502838480dcbaae18995f29fd4;hb=refs/heads/master>