AutoDrive Use Cases (Regular driving)

my highway lane											other highway lane	internet		EventHelix.com/EventStudio 2.0
vehicle 1	my vehicle										vehicle 2	weather web service	map web service	
IVS subsystem 1	inter vehicle signaling subsystem	radar	obstruction detection subsystem	position mapping subsystem	automatic driving subsystem	steering	brakes	accelerator	dashboard	gps receiver	IVS subsystem 2	weather web service	map web service	05-Jul-03 16:25 (Page 1)

LEG: Preconditions: Regular driving

My vehicle is driving behind vehicle 1. Vehicle 2 is present in the other lane. The highway is about to curve by 60 degrees over a one mile stretch

LEG: GPS Position Handling (Detailed)

GPS position tracking and periodic weather, map and traffic updates

Measure distance from three GPS satellites

GPS receiver measures distance from at least three GPS satellites

Use triangulation method to determine position

Current position is determined by using triangulation.

gps_position

Current GPS position is reported to the position mapping subsystem. This process is repeated periodically

current_gps_position

The GPS position is then sent to all the modules that need to know the position of the vehicle

current_gps_position

Consult map to determine the path for the next 20 minutes

The maps are consulted and speed and direction change vectors are prepared. This information is required for automatic driving. Traffic on the route is also considered while calculating the routes

Apply current weather data to determine impact on road conditions

Calculated speed and direction vectors may be modified based on current weather conditions

vehicle_movement_plan

current_position, direction_change_vectors, speed_vectors

Store the vehicle movement plan

The vehicle movement plan is saved by the automatic driving subsystem. This information will be used to direct movement of brakes, accelerator and steering

request_map_feed

future_gps_position

Request map feed from the mapping webservice. This information is obtained for future mapping requirements

map_feed

map_data, traffic_info

Map feed with current traffic conditions is obtained

request_weather_feed

future_gps_position

Now look ahead and check the weather conditions at future locations

weather_feed

weather_info

Weather information is obtained. This will be used in computing the route and speed

LEG: Inter Vehicle Signaling (Summary)

Keep in contact with vehicle 1 and vehicle 2. Constantly monitor their coordinates and position

Keep track of neighboring vehicles. This involves monitoring their speed, size and direction of movement

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LEG: Radar Feed Handling (Detailed)

Obstruction detection subsystem filters the radar feed for known objects

begin
Sweep 360 degrees for obstruction

The radar begins a 360 sweep around the car to locate any obstructions around the car

Radar detects an object in front

obstruction_detected
relative_speed, angle

Radar reports the obstruction to the obstruction detection subsystem

Check neighboring vehicle information

The obstruction location is checked against known locations for other vehicles by checking the GPS position reported by neighboring IVS vehicles.

Ignore known obstruction (Vehicle 1)

Since this is a known object, no further action is required

Radar detects an object in the other lane

obstruction_detected
relative_speed, angle

Radar reports the obstruction to the obstruction detection subsystem

Check neighboring vehicle information

The obstruction location is checked against known locations for other vehicles by checking the GPS position reported by neighboring IVS vehicles

Ignore known obstruction (Vehicle 2)

Since this is a known object, no further action is required

LEG: No other obstruction found

end
Sweep 360 degrees for obstruction

LEG: Automatic Driving (Details)

Access vehicle movement plan

Check if recommended speed differs from current speed

Check if vehicle's speed needs to change

LEG: Recommended speed is greater than current speed

apply_acceleration

Vehicle movement plan recommeds a higher speed, so speed up the vehicle by using the accelerator (gas)

Check if recommended direction differs from current direction

Check if vehicle's direction needs to change

LEG: Recommended direction is different from current direction

move_steering

Move the steering to change direction

LEG: Postconditions: Regular driving

Vehicle has negotiated the 60 degree direction chance by automatically steering the vehicle