CLAIMS

1. An advanced driver assistance system to be provided on board a host motor vehicle (HMV) to assist a driver of the host motor vehicle (HMV) in negotiating a roundabout, wherein the advanced driver assistance system comprises:

• an on-board location device adapted to output motor vehicle position-related data of the host motor vehicle (HMV);

• a vehicle-to-vehicle communications system disposed in the host motor vehicle (HMV) and adapted to automatically detect, identify and communicate with vehicle-to-vehicle communications systems within a communications range of the host motor vehicle (HMV) and disposed in neighbour motor vehicles (NMV) to exchange motor vehicle position-related data and motor vehicle motion-related data;

• an automotive human-machine interface adapted to provide the driver of the host motor vehicle (HMV) with driving information to assist the driver in approaching and negotiating the roundabout; and

• an electronic control unit disposed in the host motor vehicle (HMV) and connected to the on-board location device, to the vehicle-to-vehicle communications system, and to the automotive human-machine interface via an automotive on-board communication network and adapted to:

- receive and process the motor vehicle position-related and motion-related data of the host motor vehicle (HMV) and of the neighbour motor vehicles (NMV) to:

◦ determine the neighbour motor vehicles (NMV) that will enter the roundabout based on the motor vehicle position-related data of the host motor vehicle (HMV) and of the neighbour motor vehicles (NMV) and a digital road map, and

◦ provide the driver of the host motor vehicle (HMV), via the automotive human-machine interface, with driving information to assist the driver in approaching and negotiating the roundabout;

wherein the advanced driver assistance system is further adapted to:

- determine a degree of proximity to the roundabout of the

host motor vehicle (HMV) based on motor vehicle position-related data of the host motor vehicle (HMV);

- determine assistance to be provided to the driver of the host motor vehicle (HMV) based on the degree of proximity of the host motor vehicle (HMV) to the roundabout and on the motor vehicle motion-related data of the host motor vehicle (HMV) and on the motor vehicle position-related and motion-related data of the neighbour motor vehicles (NMV); and

- communicate to the driver of the host motor vehicle (HMV) to provide the determined assistance;

wherein determining assistance to be provided to the driver of the host motor vehicle (HMV) comprises:

- when it is determined that the host motor vehicle (HMV) will enter the roundabout within a predetermined threshold distance, determining the degrees of proximity to the roundabout of the neighbour motor vehicles (NMV) that will enter the roundabout; and

- determining an alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) based on the degrees of proximity to the roundabout and the motion-related data of the host motor vehicle (HMV) and of the neighbour motor vehicles (NMV) that will enter the roundabout;

and wherein providing assistance to the driver of the host motor vehicle (NMV) comprises:

- providing the driver of the host motor vehicle (HMV) with an indication of the determined alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) through the automotive human-machine interface.

2. The advanced driver assistance system of claim 1, wherein determining a degree of proximity of a motor vehicle to the roundabout comprises:

- finding on the digital road map a current link corresponding to the current position of the motor vehicle;

- checking if the current link is in a roundabout;

- if the check is positive, determining that the motor vehicle is negotiating a roundabout; and

- if the check is negative, reiterating the following operations until a given exit condition from the iteration occurs:

◦ determining the next most probable link on the digital road map;

◦ checking if the next most probable link is in a roundabout;

◦ if the check is positive, determining that the motor vehicle will enter the roundabout within a threshold distance; and

◦ if the check is negative, repeating the two preceding steps of determining and checking steps and, in addition, determining that the motor vehicle will not enter the roundabout within the threshold distance.

3. The advanced driver assistance system of claim 2, wherein determining a roundabout travelling-related alert level for the host motor vehicle (HMV) comprises:

- creating a list of the neighbour motor vehicles (NMV) that will enter the same roundabout as the one that will be entered by the host motor vehicle (HMV);

- determining a first alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) when it is determined that there are no neighbour motor vehicles (NMV) on the list or that all of the neighbour motor vehicles (NMV) on the list will enter the roundabout beyond a threshold distance;

- when it is determined that there are neighbour motor vehicles (NMV) on the list, determining the degrees of proximity to the roundabout of the neighbour motor vehicles (NMV); and

- when it is determined that not all of the neighbour motor vehicles (NMV) on the list will enter the roundabout beyond a threshold distance, determining a second alert level, higher than the first alert level, for the negotiation of the roundabout by the host motor vehicle (HMV).

4. The advanced driver assistance system of claim 3, wherein determining a second alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) comprises:

- determining a third alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) in relation to only the neighbour motor vehicles (NMV) on the list for which it is determined that they will enter the roundabout within a threshold distance;

- determining a fourth alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) in relation to only the neighbour motor vehicles (NMV) for which it is determined that they are already negotiating the roundabout; and

- determining the second alert level as the highest of the third and the fourth alert levels.

5. The advanced driver assistance system of claim 4, wherein determining a third alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) in relation to only the neighbour motor vehicles (NMV) on the list for which it is determined that they will enter the roundabout within a threshold distance comprises:

- creating a list (L) of only neighbour motor vehicles (NMV) for which it is determined that they will enter the roundabout within a threshold distance and whose first link on the digital map of the roundabout is different from that of the host motor vehicle (HMV);

- determining the first alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) when it is determined that there are no neighbour motor vehicles (NMV) on the list (L);

- when it is determined that there are neighbour motor vehicles (NMV) on the list (L), computing the times to enter the roundabout (Tin) of the neighbour motor vehicles (NMV) and ordering the list according to the roundabout times-to-enter (Tin);

- identifying a previous neighbour motor vehicle (NMV_Prev) in the ordered list of neighbour motor vehicles (NMV) for which it determined that it will enter the roundabout just before the host motor vehicle (HMV);

- computing the roundabout time-to-enter margin (TP) between the roundabout times-to-enter of the host motor vehicle (HMV) and of the previous neighbour motor vehicle (NV_Prev);

- comparing the roundabout time-to-enter margin (TP) with a threshold (T_Th); and

- determining the third alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV)

based on the outcome of the comparison.

6. The advanced driver assistance system of claim 5, wherein determining the third alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) based on the outcome of the comparison comprises:

- assigning a higher value to the third alert level if the roundabout time-to-enter margin (TP) is lower the threshold (T_Th), and a lower value if the roundabout time-to-enter margin (TP) is equal to or greater than the threshold (T_Th).

7. The advanced driver assistance system of claim 4, wherein determining a fourth alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) in relation to only the neighbour motor vehicles (NMV) that have been determined as already negotiating the roundabout comprises:

- creating a list (M) of the neighbour motor vehicles (NMV) that have been determined as already negotiating the roundabout;

- determining the first alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) if it determined that there are no neighbour motor vehicles (NMV) on the list (M);

- if there are neighbour motor vehicles (NMV) on the list (L), determining the end points on the digital road map, in the driving direction, of the current links that the neighbour motor vehicles (NMV) are negotiating;

- checking if the end point of at least one of the identified links coincides with the end point of the link currently travelled by the host motor vehicle (HMV); and

- determining the fourth alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) based on the outcome of the comparison.

8. The advanced driver assistance system of claim 7, wherein determining the fourth alert level associated with the negotiation of the roundabout by the host motor vehicle (HMV) based on the outcome of the comparison comprises:

- assigning a higher value to fourth alert level if an end point of at least one of the identified links coincides with the end point of the link currently travelled by host motor vehicle

(HMV), and a lower value if no end point of at least one of the identified links coincides with the end point of the link currently travelled by host motor vehicle (HMV).

9. Software loadable in electronic processing means of an advanced driver assistance system and designed to cause, when executed, the advanced driver assistance system to become configured as claimed in claim 1.