Driver Assistive System - Assistance in Low Visibility Conditions

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Engineering & Physical Sciences/Instrumentation, Sensors & Controls
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Driver Assistive System for Low Visibility Conditions

The Driver Assistive System is a set of technologies that provide navigation assistance for road going vehicles in low visibility conditions. This system facilitates accurate navigation, lane keeping, and collision avoidance in poor conditions such as fog, snow, rain, and darkness. The surrounding environment is revealed to the driver through a Head Up Display (HUD), allowing drivers to view the HUD screen and windshield simultaneously.

Safe driving is achieved through the use of a semi-transmissive and semi-reflective HUD, a Radar and Vehicle Positioning System, and a Geospatial Database, with an optional interface that provides haptic steering feedback. The patented system creates a digital map of the local environment, including road lines, guardrails, signs, as well as moving objects. Through the use of the Differential Global Positioning System (GPS), this digital map is displayed on the HUD allowing the driver to view temporary and permanent objects in the same field, in support of driver navigation decisions.

This Driver Assistive System facilitates clear and safe driving with real-time, accurate, and clear digital maps that reveal nearby objects to allow increased driving speed under poor visibility, prevent crashes and save lives.

Note: The Driver Assistive System has been exclusively licensed. If you have questions, please contact us.

DRIVER ASSISTIVE SYSTEM FEATURES

- Increased road visibility in poor driving conditions
- Real-time imaging of the road
- View local environment as if there were no obstructions
- 'Virtual Rumble Strip' as a warning to incorrect maneuvers
- Use of sensors, radars, geospatial database, and radio frequency communication
- Capabilities to work in both fair and poor driving conditions

There are a number of patented technologies that comprise the Driver Assistive System. Each of the technologies is individually licensable, while all will be included when licensing the entire system. The components of the system are the Geospatial Database, Differential Global Positioning System, Advanced Radar Processing, Radar and Vehicle Positioning System, and Virtual Mirror. Each of these works together to create a real-time system that provides navigation for road going vehicles.

Radar and Vehicle Positioning System

This radar positioning system surveys the local environment to detect any nearby objects surrounding the vehicle. This radar is used in combination with a Differential Global Positioning System (DGPS) to inform drivers of their location and surroundings at all times. This positioning system is superior because it maintains reception and clarity throughout poor weather

conditions when satellites are unavailable. This allows drivers to remain safe and navigate accurately under the worst conditions.

Through the use of a mathematical triangulation process, the radar detects and reports street signs, pavement, road markers, stoplights, and many other things to the driver interface. This information is then stored in the Geospatial Database to be sent to the user via the HUD.

RADAR AND VEHICLE POSITIONING SYSTEM FEATURES

- Corrects drifting errors for drivers
- Radar abilities to calculate exact location and surroundings when satellites are unavailable
- Detailed object detection; roads, lines, signs, guard rails, posts, traffic lights, etc.
- Highly accurate mathematical triangulation processing

Advanced Radar Processing

This Advanced Radar Processing operates with the Radar and Vehicle Positioning System and the Geospatial Database to provide exact global location and real-time alerts to the driver. This new method of processing is unique because it utilizes the Geospatial Database to check the validity of the surroundings. False alarms can leave users unconfident in their system, resulting in wasted time and money on a system that will be ignored whenever there is an alert. This system removes that uncertainty by correlating with the database when an object is detected to determine whether or not it is a fixed object. Instead of simply alerting a driver to an object, the verification that happens within the process identifies only objects that are unforeseen and potentially dangerous.

ADVANCED RADAR PROCESSING FEATURES

- Eliminates false alerts to drivers
- Increases drivers' confidence in the system
- Identifies all local objects, including roads, signs, guard rails, traffic signals, etc.
- Improved signal processing capabilities

Real-Time Geospatial Database for Vehicle Guidance & Navigation

This high accuracy, real-time geospatial database aids vehicle navigation in poor driving conditions. This geospatial database supports the Differential Global Positioning System (GPS) used in the Driver Assistive System. This database is highly accurate and is the primary mechanism used for vehicle location tracking.

This database is unique because it possesses applications not seen in any other geospatial database. These traits are real-time access, high accuracy, and easy configuration. These attributes contain all the relevant road and geographic information needed for lateral and longitudinal navigation, guidance and control, collision avoidance, improved radar processing, and system fault detection. The versatility of this technology allows for easy updates and expansion in the future.

GEOSPATIAL DATABASE FEATURES

- Real-time results
- High accuracy
- Easily configurable
- Versatile - implemented in any vehicle's GPS system; car, truck, snow plow, public transit, etc.
- Does not encounter visibility issues in poor weather conditions that typical systems do
- Extensive database that includes pavement, street lines, signs, etc.

Virtual Mirror for Driving

This Virtual Mirror for Driving is a sensor driven computer graphics display system that replicates the optical behaviors of a standard mirror. This system assists drivers by providing visual information of the environment outside the vehicle including road features and vehicles positioned nearby.

This device eliminates the hazardous blind zones on cars, trucks, buses, and plows. Conventional mirrors often cannot observe most of the rear or sides of a vehicle, but with the help of a Differential Global Position System (GDPS), a geospatial database, and sensors on the vehicle this system is able to reveal all of the surroundings to the driver. This data is displayed in such a way the driver can see the windshield and the display simultaneously.

VIRTUAL MIRROR FEATURES

- Elimination of blind spots
- Sensor driven system that locates nearby obstacles
- Data connected to a Differential Global Positioning System and the Geospatial Database
- Emulates optical properties of a mirror

Each piece is an integral part of this complex system, yet can be used individually just the same.

Researchers: Craig Shankwitz, Driver Assistive System