

of an occupying item in the passenger compartment by processing each signal into a categorization thereof signal based on data corresponding to patterns of received radiation and associated with possible occupying items of the vehicle and the absence of such occupying items.

[0319] Disclosed above is also an arrangement for controlling audio reception by at least one occupant of a passenger compartment of the vehicle which comprises a monitoring system for determining the position of the occupant(s) and sound generating means coupled to the monitoring system for generating specific sounds. The sound generating means are automatically adjustable based on the determined position of the occupant(s) such that the specific sounds are audible to the occupant(s). The sound generating means may utilize hypersonic sound, e.g., comprise one or more pairs of ultrasonic frequency generators for generating ultrasonic waves whereby for each pair, the ultrasonic frequency generators generate ultrasonic waves which mix to thereby create new audio frequencies. Each pair of ultrasonic frequency generators is controlled independently of the others so that each of the occupants is able to have different new audio frequencies created.

[0320] For noise cancellation purposes, the vehicle can include a system for detecting the presence and direction of unwanted noise whereby the sound generating means are coupled to the unwanted noise presence and detection system and direct sound to prevent reception of the unwanted noise by the occupant(s).

[0321] If the sound generating means comprise speakers, the speakers being controllable based on the determined positions of the occupants such that at least one speaker directs sounds toward each occupant.

[0322] The monitoring system may be any type of system which is capable of determining the location of the occupant, or more specifically, the location of the head or ears of the occupants. For example, the monitoring system may comprise at least one wave-receiving sensor for receiving waves from the passenger compartment, and a processor coupled to the wave-receiving sensor(s) for determining the position of the occupant(s) based on the waves received by the wave-receiving sensor(s). The monitoring system can also determine the position of objects other than the occupants and control the sound generating means in consideration of the determined position of the objects.

[0323] A method for controlling audio reception by occupants in a vehicle comprises the steps of determining the position of at least one occupant of the vehicle, providing a sound generator for generating specific sounds and automatically adjusting the sound generator based on the determined position of the occupant(s) such that the specific sounds are audible to the occupant(s). The features of the arrangement described above may be used in the method.

[0324] Another arrangement for controlling audio reception by occupants of a passenger compartment of the vehicle comprises a monitoring system for determining the presence of any occupants and sound generating means coupled to the monitoring system for generating specific sounds. The sound generating means are automatically adjustable based on the determined presence of any occupants such that the specific sounds are audible to any occupants present in the passenger compartment. The monitoring system and sound

generating means may be as in the arrangement described above. However, in this case, the sound generating means are controlled based on the determined presence of the occupants.

[0325] All of the above-described methods and apparatus may be used in conjunction with one another and in combination with the methods and apparatus for optimizing the driving conditions for the occupants of the vehicle described herein.

[0326] Although several preferred embodiments are illustrated and described above, there are possible combinations using other geometries, sensors, materials and different dimensions for the components that perform the same functions. This invention is not limited to the above embodiments and should be determined by the following claims.

We claim:

1. A vehicle including a system for obtaining information about an object in the vehicle, comprising:

at least one resonator or reflector arranged in association with the object, said at least one resonator being arranged to emit an energy signal upon receipt of a signal at an excitation frequency;

transmitter means for transmitting signals at least at the excitation frequency of each of said at least one resonator;

energy signal detector means for detecting the energy signal emitted by said at least one resonator upon receipt of the signal at the excitation frequency; and

a processor coupled to said detector means for obtaining information about the object upon analysis of the energy signal detected by said detector means.

2. The vehicle of claim 1, wherein the information obtained about the object is a distance between each of said at least one resonator and said detector means.

3. The vehicle of claim 1, wherein the object is a seat whereby the information obtained about the seat is an indication of the position of the seat.

4. The vehicle of claim 1, wherein said at least one resonator is arranged within the object.

5. The vehicle of claim 1, wherein said at least one resonator is a SAW device, antenna or RFID tag.

6. The vehicle of claim 1, wherein said at least one resonator comprises a plurality of resonators, each of said resonators being arranged to emit an energy signal upon receipt of a signal at a different excitation frequency.

7. The vehicle of claim 6, wherein the object is a seat, a first one of said resonators being arranged at a front of a seat bottom portion, a second one of said resonators being arranged at a back of the seat bottom portion and a third one of said resonators being arranged at a top of a seat back portion.

8. The vehicle of claim 1, wherein said transmitter means and said detector means are co-located constituting at least one transducer.

9. The vehicle of claim 1, wherein the object is a seatbelt whereby the information obtained about the seatbelt is an indication of whether the seatbelt is in use.

10. The vehicle of claim 1, wherein the object is a seatbelt whereby the information obtained about the seatbelt is an indication of the position of the seatbelt.