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(54) [Title of the invention] Seating Detecting Apparatus

(57) [Abstract]

[Object] To provide a seating detecting apparatus which is inhibited from erroneously determining that a human is seated in a case where an object is placed on a seat

[Means to solve] A seating detecting apparatus that is inhibited from erroneously determining that a human is seated by vibration that is generated when an object is placed on a seat cushion 4 may be provided because of a vibration detecting means 1 disposed at a seatback 4a of a seat 4 to determine presence or absence of a human in the seat 4. In addition, in a case where the seating detecting apparatus is mounted to an automobile equipped with an airbag so as to control the airbag, a system that prohibits an operation of the airbag at a time of absence of the human or the human is seated in an irregular sitting manner is achievable.

[Scope of the claims]

[Claim 1] A seating detecting apparatus characterized by comprising a vibration detecting means provided at a seatback of a seat, a signal processing means processing an output signal of the vibration detecting means, and a determining means determining presence or absence of a human in the seat based on an output of the signal processing means.

[Claim 2] The seating detecting apparatus according to claim 1, wherein the determining means is configured to determine the presence of the human in the seat in a case where a time period in which the output of the signal processing means exceeds a predetermined seating signal threshold value continues for equal to or greater than a predetermined seating time threshold value.

[Claim 3] The seating detecting apparatus according to claim 1, wherein the determining means is configured to determine the absence of the human in the seat in a case where a time period in which the output of the signal processing means falls below a predetermined away signal threshold value continues for equal to or greater than a predetermined away time threshold value.

[Claim 4] The seating detecting apparatus according to claim 1, wherein the seat is mounted at a vehicle including an automobile and an airplane equipped with an auxiliary occupant restraint apparatus that restrains and protects an occupant in the seat

by operating at a time of an accident, and the determining means is configured to output a signal for permitting an operation of the auxiliary occupant restraint apparatus in a case where the determining means determines the presence of the human in the seat.

[Claim 5] The seating detecting apparatus according to claim 1, wherein the seat is mounted at a vehicle including an automobile and an airplane equipped with an auxiliary occupant restraint apparatus that restrains and protects an occupant in the seat by operating at a time of an accident, and the determining means is configured to output a signal for prohibiting an operation of the auxiliary occupant restraint apparatus in a case where the determining means determines the absence of the human in the seat.

[Claim 6] A seating detecting apparatus characterized by comprising a seat cushion vibration detecting means provided at a seat cushion of a seat, a seat cushion signal processing means processing an output signal of the seat cushion vibration detecting means, a seatback vibration detecting means provided at a seatback of the seat, a seatback signal processing means processing an output signal of the seatback vibration detecting means, and a determining portion determining presence or absence of a human in the seat based on an output of the seat cushion signal processing means and an output of the seatback signal processing means.

[Claim 7] The seating detecting apparatus according to claim 6, wherein the determining portion is configured to immediately determine the presence of the human in the seat regardless of a duration time of the signal in a case where the output of the seat cushion signal processing means exceeds a predetermined seat cushion seating signal threshold value and the output of the seatback signal processing means exceeds a predetermined seatback seating signal threshold value.

[Claim 8] The seating detecting apparatus according to claim 6, wherein the determining portion is configured to include a seat cushion determining means determining the presence or absence of the human in the seat based on the output signal of the seat cushion signal processing means and a seatback determining means determining the presence or absence of the human in the seat based on the output signal of the seatback signal processing means.

[Claim 9] The seating detecting apparatus according to claim 8, wherein the determining portion is configured to determine the presence of the human in the seat in a case where the seat cushion determining means determines the presence of the human in the seat and the seatback determining means determines the presence of the human in the seat.

[Claim 10] The seating detecting apparatus according to claim 8, wherein the determining portion is configured to maintain a last determination in a case where the

seat cushion determining means determines the presence of the human in the seat and the seatback determining means determines the absence of the human in the seat.

[Claim 11] The seating detecting apparatus according to claim 8, wherein the determining portion is configured to determine that one of or both of the seat cushion vibration detecting means and the seatback vibration detecting means is abnormal in a case where a state in which the seat cushion determining means determines the absence of the human in the seat and the seatback determining means determines the presence of the human in the seat continues for equal to or greater than an abnormality time threshold value.

[Claim 12] The seating detecting apparatus according to claim 8, wherein the determining portion is configured to determine the absence of the human in the seat in a case where the seat cushion determining means determines the absence of the human in the seat and the seatback determining means determines the absence of the human in the seat.

[Claim 13] The seating detecting apparatus according to claim 8, wherein the determining portion is configured to determine that the human is seated in the seat with a child's auxiliary seat in a case where the seat cushion determining means determines the absence of the human in the seat and the seatback determining means determines the presence of the human in the seat.

[Claim 14] The seating detecting apparatus according to claim 8, wherein the determining portion is configured to determine that the human is seated in an irregular sitting manner in the seat in a case where the seat cushion determining means determines the presence of the human in the seat and the seatback determining means determines the absence of the human in the seat.

[Claim 15] The seating detecting apparatus according to claim 6, wherein the seat is mounted at a vehicle including an automobile and an airplane equipped with an auxiliary occupant restraint apparatus that restrains and protects an occupant in the seat by operating at a time of an accident, the determining means is configured to output a signal for permitting an operation of the auxiliary occupant restraint apparatus in a case where the determining means determines the presence of the human in the seat, and the determining means is configured to output a signal for prohibiting the operation of the auxiliary occupant restraint apparatus in a case where the determining means determines the absence of the human in the seat.

[Claim 16] The seating detecting apparatus according to claim 6, wherein the seat is mounted at a vehicle including an automobile and an airplane equipped with an auxiliary occupant restraint apparatus that restrains and protects an occupant in the seat

by operating at a time of an accident, and the determining means is configured to output a signal for permitting an operation of the auxiliary occupant restraint apparatus in a case where the determining means determines the presence of the human in the seat.

[Claim 17] The seating detecting apparatus according to claim 6, wherein the seat is mounted at a vehicle including an automobile and an airplane equipped with an auxiliary occupant restraint apparatus that restrains and protects an occupant in the seat by operating at a time of an accident, and the determining means is configured to output a signal for prohibiting an operation of the auxiliary occupant restraint apparatus in a case where the determining means determines the absence of the human in the seat.

[Claim 18] The seating detecting apparatus according to claim 6, wherein the seat is mounted at a vehicle including an automobile and an airplane equipped with an auxiliary occupant restraint apparatus that restrains and protects an occupant in the seat by operating at a time of an accident, and the determining means is configured to output a signal to the auxiliary occupant restraint apparatus to inform the auxiliary occupant restraint apparatus that the human is seated in the seat in an irregular sitting manner in a case where the determining portion determines that the human is seated in the irregular sitting manner in the seat.

[Detailed explanation of the invention]

[0001]

[Technical field of the invention] The present invention relates to a seating detecting apparatus, more particularly, a seating detecting apparatus detecting presence or absence of a human body in a seat. The present invention is usable for a system providing a service such as information communication, for example, only at a time a human is seated, for a sound control or an air-conditioning control in a cabin, for a grasp of passengers at a transport system, for example, and for a control of an airbag apparatus that inhibits a damage of an occupant by restraining the occupant at a time of an accident of an automobile.

[0002]

[Prior art] A seating detecting apparatus in the aforementioned type is conventionally configured as illustrated in Fig. 7. That is, the seating detecting apparatus includes a piezoelectric element 1 including flexibility, a signal processing means 2, and a determining means 3. The signal processing means 2 includes an amplifying means 2-a amplifying an output signal of the piezoelectric element 1, a filter 2-b filtering a specific frequency component of an output of the amplifying means 2-a, and a smoothing means 2-c smoothing an output signal from the filter 2-b.

[0003] In a case where a human is seated in a seat 4, the piezoelectric element 1

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