CLAIMS

[Claim 1] A fraud detection device comprising:

a first recording unit configured to receive and record first probe information including a plurality of time-series sets of first position information which is position information of a vehicle and first time information indicating a time at which the first position information is acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in the vehicle;

a second recording unit configured to receive and record second probe information including a plurality of time-series sets of second position information which is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle;

a comparison unit configured to compare the first probe information and the second probe information in which the first identification information and the second identification information match; and

a determination unit configured to determine whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result from the comparison unit,

wherein the comparison unit compares the first position information and the second position information in which a time difference between the first time information and the second time information is less than a predetermined time difference, and

wherein the determination unit determines that there is a suspicion of impersonation in the first probe information when the distance between the first position

information and the second position information which have been compared is greater than a first threshold value.

[Claim 2] A fraud detection device comprising:

a first recording unit configured to receive and record first probe information including a plurality of time-series sets of first position information which is position information of a vehicle and first time information indicating a time at which the first position information is acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in the vehicle;

a second recording unit configured to receive and record second probe information including a plurality of time-series sets of second position information which is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle;

a comparison unit configured to compare the first probe information and the second probe information in which the first identification information and the second identification information match; and

a determination unit configured to determine whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result from the comparison unit,

wherein the comparison unit compares the first time information and the second time information in which a distance between the first position information and the second position information is less than a predetermined distance, and

wherein the determination unit determines that there is a suspicion of impersonation in the first probe information when the time difference between the first time information and the second time information which have been compared is greater than a second threshold value.

[Claim 3] The fraud detection device according to claim 1 or 2, wherein the first probe information includes first acceleration information indicating acceleration of the vehicle,

wherein the second probe information includes second acceleration information indicating acceleration of the vehicle,

wherein the comparison unit compares the first acceleration information and the second acceleration information in which a time difference between the first time information and the second time information is less than a predetermined time difference or/and compares the first acceleration information and the second acceleration information in which a distance between the first position information and the second position information is less than a predetermined distance, and

wherein the determination unit determines that there is a suspicion of impersonation in the first probe information when a difference between the first acceleration information and the second acceleration information which have been compared is greater than a third threshold value.

[Claim 4] The fraud detection device according to any one of claims 1 to 3, wherein the onboard device transmits the second probe information to a roadside antenna device which is provided on a roadside of a road on which the vehicle is traveling,

wherein the second recording unit receives and records the second probe information from the onboard device via the roadside antenna device,

wherein the fraud detection device further comprises a third recording unit configured to receive and record third probe information including position information or/and identification information of the roadside antenna device via which the second probe information has been received, the second identification information corresponding to the onboard device which is a transmission source of the second probe information, and third time information corresponding to a time at which the second probe information has been received from the roadside antenna device,

wherein the comparison unit compares the first probe information and the third probe information in which the first identification information and the second identification information included in the third probe information match, and

wherein the determination unit determines that there is a suspicion of impersonation in the first probe information when a distance between the first position information and the position information of the roadside antenna device is greater than a fourth threshold value or a time difference between the first time information and the third time information is greater than a fifth threshold value.

[Claim 5] A fraud detection system comprising: a fraud detection device including

a first recording unit configured to receive and record first probe information including a plurality of time-series sets of first position information which is position information of a vehicle and first time information indicating a time at which the first position information is acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in the vehicle,

a second recording unit configured to receive and record second probe information including a plurality of time-series sets of second position information which

is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle,

a comparison unit configured to compare the first probe information and the second probe information in which the first identification information and the second identification information match, and

a determination unit configured to determine whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result from the comparison unit; and

the onboard device,

wherein the comparison unit compares the first position information and the second position information in which a time difference between the first time information and the second time information is less than a predetermined time difference, and

wherein the determination unit determines that there is a suspicion of impersonation in the first probe information when the distance between the first position information and the second position information which have been compared is greater than a first threshold value.

[Claim 6] A fraud detection method comprising:

a step of receiving and recording first probe information including a plurality of time-series sets of first position information which is position information of a vehicle and first time information indicating a time at which the first position information is acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in the vehicle;

a step of receiving and recording second probe information including a plurality of time-series sets of second position information which is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle;

a step of comparing the first probe information and the second probe information in which the first identification information and the second identification information match; and

a step of determining whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result,

wherein, in the step of comparing, comparing the first position information and the second position information in which a time difference between the first time information and the second time information is less than a predetermined time difference, and

wherein, in the step of determining, determining that there is a suspicion of impersonation in the first probe information when the distance between the first position information and the second position information which have been compared is greater than a first threshold value.

[Claim 7] A program causing a computer to perform:

a step of receiving and recording first probe information including a plurality of time-series sets of first position information which is position information of a vehicle and first time information indicating a time at which the first position information is acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in the vehicle;

a step of receiving and recording second probe information including a plurality of time-series sets of second position information which is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle;

a step of comparing the first probe information and the second probe information in which the first identification information and the second identification information match; and

a step of determining whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result,

wherein, in the step of comparing, comparing the first position information and the second position information in which a time difference between the first time information and the second time information is less than a predetermined time difference, and

wherein, in the step of determining, determining that there is a suspicion of impersonation in the first probe information when the distance between the first position information and the second position information which have been compared is greater than a first threshold value.

[Claim 8] A fraud detection system comprising: a fraud detection device including

a first recording unit configured to receive and record first probe information including a plurality of time-series sets of first position information which is position information of a vehicle and first time information indicating a time at which the first position information is acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in

the vehicle,

a second recording unit configured to receive and record second probe information including a plurality of time-series sets of second position information which is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle,

a comparison unit configured to compare the first probe information and the second probe information in which the first identification information and the second identification information match, and

a determination unit configured to determine whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result from the comparison unit; and

the onboard device,

wherein the comparison unit compares the first time information and the second time information in which a distance between the first position information and the second position information is less than a predetermined distance, and

wherein the determination unit determines that there is a suspicion of impersonation in the first probe information when the time difference between the first time information and the second time information which have been compared is greater than a second threshold value.

[Claim 9] A fraud detection method comprising:

a step of receiving and recording first probe information including a plurality of time-series sets of first position information which is position information of a vehicle

and first time information indicating a time at which the first position information is acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in the vehicle;

a step of receiving and recording second probe information including a plurality of time-series sets of second position information which is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle;

a step of comparing the first probe information and the second probe information in which the first identification information and the second identification information match; and

a step of determining whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result,

wherein, in the step of comparing, comparing the first time information and the second time information in which a distance between the first position information and the second position information is less than a predetermined distance, and

wherein, in the step of determining, determining that there is a suspicion of impersonation in the first probe information when the time difference between the first time information and the second time information which have been compared is greater than a second threshold value.

[Claim 10] A program causing a computer to perform:

a step of receiving and recording first probe information including a plurality of time-series sets of first position information which is position information of a vehicle and first time information indicating a time at which the first position information is

acquired and first identification information which is identification information of the vehicle from a portable information terminal placed in the vehicle;

a step of receiving and recording second probe information including a plurality of time-series sets of second position information which is position information of the vehicle and second time information indicating a time at which the second position information is acquired and second identification information which is identification information of the vehicle from an onboard device installed in the vehicle;

a step of comparing the first probe information and the second probe information in which the first identification information and the second identification information match; and

a step of determining whether there is a suspicion of impersonation in the first probe information on the basis of a comparison result,

wherein, in the step of comparing, comparing the first time information and the second time information in which a distance between the first position information and the second position information is less than a predetermined distance, and

wherein, in the step of determining, determining that there is a suspicion of impersonation in the first probe information when the time difference between the first time information and the second time information which have been compared is greater than a second threshold value.