CLAIMS

[Claim 1] A gait measurement system comprising:

a foot pressure sensor which measures a foot pressure of a subject and outputs measured foot pressure data;

a foot position sensor which measures a foot position of the subject based on a reflection state of a detection wave that is horizontally irradiated at a predetermined pitch angle and outputs measured foot pressure data; and

a gait analysis device having a filter processing unit which removes noise data included in the foot position data and outputs processed foot position data obtained by removing the noise data, a storage unit which stores the foot pressure data output from the foot pressure sensor and the processed foot position data in association with measurement time, and an arithmetic unit which calculates a predetermined gait parameter of the subject based on the foot pressure data and the processed foot position data, wherein

the filter processing unit has:

a coordinate conversion section which converts the foot position data to coordinate data in an orthogonal coordinate system;

a data approximation section which approximates the

coordinate data to a predetermined number of significant digits;

a data integration section which integrates into a group of data the coordinate data that becomes the same coordinate value through the approximation by the data approximation section;

a coordinate data counting section which counts the coordinate data composing the group of data; and

a first determination section which determines the group of data as noise when the number of the coordinate data composing the group of data is less than a predetermined threshold set according to a distance from the foot position sensor to a measurement target.

[Claim 2] The gait measurement system according to claim 1, wherein the filter processing unit has:

a detection point coordinate setting section which sets, as detection point coordinates, the coordinate data composing a group of data determined to be not less than the threshold by the first determination section;

a specific detection point coordinate setting section which selects specified detection point coordinates as specific detection point coordinates from among the detection point coordinates;

an area setting section which sets a predetermined determination area centered on the specific detection point coordinates; and

a second determination section which determines the specific detection point coordinates to be a measurement target when a predetermined number of the detection point coordinates exist around the specific detection point coordinates in the determination area.

[Claim 3] The gait measurement system according to claim 1, wherein

the gait measurement system comprises a waist position sensor which measures a waist position of the subject based on a reflection state of a detection wave horizontally irradiated at a predetermined pitch angle and outputs measured waist position data, and

the filter processing unit specifies noise data included in the foot position data based on noise data included in the waist position data.

[Claim 4] The gait measurement system according to claim 1, wherein

the arithmetic unit includes

a step length measurement section which measures a step length of the subject based on the processed foot

position data stored in the storage unit corresponding to time at which a predetermined contact state of an n-th step (n is a natural number) of one of the left and right feet of the subject when walking is determined based on the foot pressure data and the processed foot position data stored in the storage unit corresponding to time at which a predetermined contact state of an (n+1)-th step of the other of the left and right feet of the subject when waling is determined based on the foot pressure data.

[Claim 5] The gait measurement system according to claim 1, wherein

the arithmetic unit includes

a stride measurement section which measures a stride of the subject based on the processed foot position data stored in the storage unit corresponding to time at which a predetermined contact state of an n-th step (n is a natural number) of one of the left and right feet of the subject when walking is determined based on the foot pressure data, the processed foot position data stored in the storage unit corresponding to time at which a predetermined contact state of an (n+1)-th step of the other of the left and right feet of the subject when walking is determined based on the foot pressure data, and the processed foot position data stored

in the storage unit corresponding to time at which a predetermined contact state of an (n+2)-th step of the one of the left and right feet of the subject when walking is determined based on the foot pressure data.

[Claim 6] The gait measurement system according to claim 1, wherein

the arithmetic unit includes

a step width measurement section which measures a step width of the subject based on the processed foot position data stored in the storage unit corresponding to time at which a predetermined contact state of an n-th step (n is a natural number) of one of the left and right feet of the subject when walking is determined based on the foot pressure data and the processed foot position data stored in the storage unit corresponding to time at which a predetermined contact state of an (n+1)-th step of the other of the left and right feet of the subject when walking is determined based on the foot pressure data.

[Claim 7] The gait measurement system according to claim 1, wherein

the arithmetic unit includes

a step measurement section which calculates the number of steps in a measurement target area based on a contact or

separation state of one and the other of the left and right feet of the subject when walking, based on the foot pressure data.

[Claim 8] A gait measurement program that causes a computer to execute:

a foot pressure receiving step of receiving foot pressure data indicating a foot pressure of a subject measured in a measurement target area;

a foot position data receiving step of receiving foot position data indicating a foot position of the subject measured in the measurement target area;

a noise detecting step of detecting noise data included in a foot position data;

a storage step of storing the foot pressure data and processed foot position data obtained by removing the detected noise data in association with measurement time; and

a calculation step of calculating a predetermined gait parameter of the subject based on the foot pressure data and the processed foot position data, wherein

the noise detecting step has:

a coordinate converting step of converting the foot position data to coordinate data in an orthogonal coordinate

system;

an approximation step of approximating the coordinate data to a predetermined number of significant digits;

an integration step of integrating into a group of data the coordinate data that becomes the same coordinate value;

a counting step of counting the coordinate data composing the group of data;

a first determination step of determining the group of data as noise when the number of the coordinate data composing the group of data is less than a predetermined threshold.

[Claim 9] The gait measurement program according to claim 8, wherein

a step of removing nose data included in the foot position data has:

a detection point coordinate setting step of setting, as detection point coordinates, the coordinate data composing the group of data determined to be not less than the threshold by the first determination step;

a specific detection point coordinate setting step of selecting specific coordinates as specific detection point coordinates from among the detection point coordinates;

an area setting step of setting a predetermined determination area centered on the specific detection point coordinates; and

a second determination step of determining the specific detection point coordinates to be a measurement target when a predetermined number of the detection point coordinates exist around the specific detection point coordinates in the determination area.

[Claim 10] A gait measurement method comprising:

a foot pressure receiving step of receiving foot pressure data indicating a foot pressure of a subject measured in a measurement target area;

a foot position data receiving step of receiving first foot position data indicating a foot position of the subject measured in the measurement target area;

a noise removing step of removing noise data included in the foot position data;

a storage step of storing the foot pressure data and processed foot position data obtained by removing the noise data, in association with measurement time; and

a calculation step of calculating a predetermined gait parameter of the subject based on the foot pressure data and the processed foot position data, wherein

the noise detecting step has:

a coordinate converting step of converting the foot position data to coordinate data in an orthogonal coordinate system;

an approximation step of approximating the coordinate data to a predetermined number of significant digits;

an integration step of integrating into a group of data the coordinate data that becomes the same coordinate value;

a counting step of counting the coordinate data composing the group of data;

a first determination step of determining the group of data as noise when the number of the coordinate data composing the group of data is less than a predetermined threshold.