

evaluate qualitative information expressing how much a user who uses the space is satisfied with air quality of the space. Therefore, how to quantitatively evaluate the qualitative information expressing satisfaction with the air quality remains as an issue.

[0005] Embodiments of the present disclosure calculate and evaluate qualitative information which is user's satisfaction with an air environment of a space, as a quantitative index.

Solution to Problem

[0006] According to a first aspect of the present disclosure, there is provided a satisfaction calculation device which calculates satisfaction with an air quality expressing an air environment of a space, the satisfaction calculation device including: a specific enthalpy calculation unit to acquire a temperature and a humidity of the space and to calculate a specific enthalpy of the space; an air quality satisfaction calculation unit to acquire a carbon dioxide concentration of the space, to decide a constant that takes a different value in accordance with the carbon dioxide concentration, and to calculate satisfaction with the air quality as an air quality satisfaction by using the specific enthalpy and the constant; and a control instruction unit to decide a control instruction to change control for a controller that influences the air quality, wherein the control instruction unit requests the controller to comply with the control instruction.

[0006a] According to a second aspect of the present disclosure, there is provided a satisfaction calculation method employed by a satisfaction calculation device which calculates satisfaction with an air quality expressing an air environment of a space, the satisfaction calculation method including: by a computer, acquiring a temperature and a humidity of the space and calculating a specific enthalpy of the space; by the computer, acquiring a carbon dioxide concentration of the space, deciding a constant that takes a different value in accordance with the carbon dioxide concentration, and calculating satisfaction with the air quality as an air quality satisfaction by using the specific enthalpy and the constant; and by the computer, deciding a control instruction to change control for a controller that influences the air quality, and requesting the controller to comply with the control instruction.

[0006b] According to a third aspect of the present disclosure, there is provided a satisfaction calculation program employed by a satisfaction calculation device which calculates satisfaction with an air quality expressing an air environment of a space, the satisfaction calculation program including: a specific enthalpy calculation process of acquiring a temperature and a humidity of the space and calculating a specific enthalpy of the space; an air quality satisfaction calculation process of acquiring a carbon dioxide concentration of the space, deciding a constant that takes a different value in accordance with the carbon dioxide concentration, and calculating satisfaction with the air quality as an air quality satisfaction by using the specific enthalpy and the constant; and a control instruction process of deciding a control instruction to change control for a controller that influences the air quality, wherein the control instruction process includes requesting the controller to comply with the control instruction.

Advantageous Effects of Invention

[0007] In a satisfaction calculation device according to embodiments of the present disclosure, an air quality satisfaction calculation unit determines a constant in accordance with a carbon dioxide concentration of a space, and calculates satisfaction with an air quality as an air quality satisfaction, with using a specific enthalpy in the space and the constant. Therefore, the satisfaction calculation device according to embodiments of the present disclosure has an effect of being able to calculate qualitative information expressing satisfaction with the air quality, as a quantitative index.

Brief Description of Drawings

CLAIMS

[Claim 1] A satisfaction calculation device which calculates satisfaction with an air quality expressing an air environment of a space, the satisfaction calculation device comprising:

a specific enthalpy calculation unit to acquire a temperature and a humidity of the space and to calculate a specific enthalpy of the space;

an air quality satisfaction calculation unit to acquire a carbon dioxide concentration of the space, to decide a constant that takes a different value in accordance with the carbon dioxide concentration, and to calculate satisfaction with the air quality as an air quality satisfaction by using the specific enthalpy and the constant; and

a control instruction unit to decide a control instruction to change control for a controller that influences the air quality, wherein the control instruction unit requests the controller to comply with the control instruction.

[Claim 2] The satisfaction calculation device according to claim 1,

wherein the air quality satisfaction calculation unit decides, as the constant, a first constant by which the specific enthalpy is to be multiplied and a second constant which is to be added to a value obtained by multiplying the specific enthalpy by the first constant, and calculates, as the air quality satisfaction, a value obtained by adding the second constant to the value obtained by multiplying the specific enthalpy by the first constant.

[Claim 3] The satisfaction calculation device according to claim 2, comprising

a storage unit to store a first threshold value and a second threshold value, as a threshold value of the carbon dioxide concentration,

wherein the air quality satisfaction calculation unit decides the first constant

and the second constant in accordance with which case the carbon dioxide concentration corresponds to, among: a case where the carbon dioxide concentration is lower than the first threshold value; a case where the carbon dioxide concentration is equal to or higher than the first threshold value and lower than the second threshold value; and a case where the carbon dioxide concentration is equal to or higher than the second threshold value.

[Claim 4] The satisfaction calculation device according to claim 3, comprising a display unit to display a display screen showing the air quality satisfaction.

[Claim 5] The satisfaction calculation device according to claim 3 or 4, comprising a video output interface to display the air quality satisfaction onto an external display device.

[Claim 6] The satisfaction calculation device according to any one of claims 3 to 5,

 wherein the storage unit stores a history of control information in the controller and a history of the air quality satisfaction in the controller, and holds information of a power consumption in accordance with a control content of the controller in advance, and

 wherein the control instruction decision unit estimates a change amount of the air quality satisfaction resulting from control by the controller, from the history of the control information in the controller and the history of the air quality satisfaction, per control content for the controller, and decides a control content that can be achieved with a smallest power consumption increase, as the control instruction, among control contents that improve the air quality satisfaction from a current state by combination of the change amount of the air quality satisfaction with a power consumption of when the control contents are practiced.

[Claim 7] The satisfaction calculation device according to any one of claims 3-5,

wherein the storage unit stores a history of control information in the controller, a history of the air quality satisfaction, and a history of power consumption information in the controller, and

wherein the control instruction decision unit estimates a change amount of the air quality satisfaction caused by the control instruction, and a power consumption increase caused by the control instruction, by using the history of the control information, the history of the air quality satisfaction, and the history of the power consumption information, and decides a control content that can be achieved with a smallest power consumption increase, as the control instruction, among control contents that improve the air quality satisfaction from a current state.

[Claim 8] The satisfaction calculation device according to claim 6 or 7,

wherein, in a situation where a manipulation is inputted to the controller, the satisfaction calculation device does not decide the control instruction for a device to which the manipulation is inputted in the controller, and decides the control instruction for a device to which a manipulation is not inputted in the controller.

[Claim 9] The satisfaction calculation device according to any one of claims 1 to 8, comprising:

a subjective evaluation input interface to accept input of a subjective evaluation about the air quality satisfaction; and

a satisfaction index generation unit to generate a correction term to be used for calculating the air quality satisfaction on a basis of the subjective evaluation.

[Claim 10] The satisfaction calculation device according to claim 9,

wherein the satisfaction index generation unit generates the correction term by a multiple regression analysis technique.

[Claim 11] The satisfaction calculation device according to claim 9,

wherein the satisfaction index generation unit generates the correction term by a machine learning technique.

[Claim 12] A satisfaction calculation method employed by a satisfaction calculation device which calculates satisfaction with an air quality expressing an air environment of a space, the satisfaction calculation method comprising:

by a computer, acquiring a temperature and a humidity of the space and calculating a specific enthalpy of the space;

by the computer, acquiring a carbon dioxide concentration of the space, deciding a constant that takes a different value in accordance with the carbon dioxide concentration, and calculating satisfaction with the air quality as an air quality satisfaction by using the specific enthalpy and the constant; and

by the computer, deciding a control instruction to change control for a controller that influences the air quality, and requesting the controller to comply with the control instruction.

[Claim 13] A satisfaction calculation program employed by a satisfaction calculation device which calculates satisfaction with an air quality expressing an air environment of a space, the satisfaction calculation program comprising:

a specific enthalpy calculation process of acquiring a temperature and a humidity of the space and calculating a specific enthalpy of the space;

an air quality satisfaction calculation process of acquiring a carbon dioxide concentration of the space, deciding a constant that takes a different value in accordance with the carbon dioxide concentration, and calculating satisfaction with the air quality as an air quality satisfaction by using the specific enthalpy and the constant; and

a control instruction process of deciding a control instruction to change control for a controller that influences the air quality, wherein the control instruction process includes requesting the controller to comply with the control instruction.