

[DESCRIPTION]

[Title of Invention] STORAGE BATTERY CONTROL SYSTEM AND
STORAGE BATTERY CONTROL METHOD

[Technical Field]

5 [0001]

The present disclosure relates to, for example, a storage battery control system that performs control for an anomaly in a storage battery pack.

[Background Art]

10 [0002]

Patent Literature (PTL) 1 proposes a battery pack provided with a protection function that suspends a charging and discharging function of the battery pack for preventing the battery pack from being used when an excessive external impact such as dropping is applied to the battery pack. It should be noted that the battery pack is also referred to as a storage battery pack.

[Citation List]

[Patent Literature]

[0003]

20 [PTL 1]

Japanese Unexamined Patent Application Publication No. 2009-117163

[Summary of Invention]

[Technical Problem]

25 [0004]

However, even if impact is applied to a storage battery pack, an anomaly leading to failure may not actually occur in the storage battery pack, and the storage battery pack may be continued to be used. In such a case, suspension in use of the storage battery pack hinders effective utilization of the storage battery pack.

[0005]

In view of the above, the present disclosure provides a storage battery control system and the like that can prevent unnecessary suspension in use of a storage battery pack.

35 [Solution to Problem]

[0006]

A storage battery control system according to an aspect of the present disclosure includes: a storage battery pack including a storage battery and one or more sensors for detecting an anomaly;
5 and an information processor that notifies a user related to the storage battery pack of a check request regarding the anomaly when the anomaly is detected by the one or more sensors, obtains a check result for the check request from the user, and notifies the user of a recommended operation according to the check result.

10 [0007]

Furthermore, a storage battery control method according to an aspect of the present disclosure is a storage battery control method performed by a storage battery control system. The storage battery control method includes: when an anomaly is detected by one or
15 more sensors in a storage battery pack including a storage battery and the one or more sensors for detecting the anomaly, notifying a user related to the storage battery pack of a check request regarding the anomaly; obtaining a check result for the check request from the user; and notifying the user of a recommended operation according
20 to the check result.

[Advantageous Effects of Invention]

[0008]

A storage battery control system and the like according to an aspect of the present disclosure can prevent unnecessary suspension
25 in use of a storage battery pack.

[Brief Description of Drawings]

[0009]

[FIG. 1]

FIG. 1 is a block diagram showing a configuration of a storage
30 battery control system according to an embodiment.

[FIG. 2]

FIG. 2 is a conceptual diagram showing an appearance of the storage battery control system according to the embodiment.

[FIG. 3]

35 FIG. 3 is a block diagram showing an example of a specific

configuration of the storage battery control system according to the embodiment.

[FIG. 4]

FIG. 4 is a flowchart showing an example of an operation of the storage battery control system according to the embodiment.

[FIG. 5]

FIG. 5 is a conceptual diagram showing an example of information notified by the storage battery control system according to the embodiment.

10 [FIG. 6]

FIG. 6 is a data diagram showing check items and the like when impact is detected by the storage battery control system according to the embodiment.

[FIG. 7]

15 FIG. 7 is a data diagram showing check items and the like when a temperature anomaly is detected by the storage battery control system according to the embodiment.

[FIG. 8]

20 FIG. 8 is a data diagram showing check items and the like when an electrical anomaly is detected by the storage battery control system according to the embodiment.

[FIG. 9]

25 FIG. 9 is a conceptual diagram showing an example of information notified by the storage battery control system according to the embodiment, when an anomaly detection count is greater than or equal to a threshold value.

[FIG. 10]

30 FIG. 10 is a conceptual diagram showing an example of information that is notified when use of the storage battery pack is forcibly suspended by the storage battery control system according to the embodiment.

[FIG. 11]

35 FIG. 11 is a conceptual diagram showing an example of information that is notified when a usable capacity of the storage battery pack is reduced by the storage battery control system

according to the embodiment.

[Description of Embodiments]

[0010]

For example, an anomaly may be detected in a storage battery
5 pack provided with a lithium-ion battery or the like. In such a
situation, immediately suspension in use of the battery pack may
impede effective use of the battery pack. In view of the above, a
storage battery control system according to the present embodiment
notifies a user of the storage battery pack of a check request when an
10 anomaly of the storage battery pack is detected. Then, the storage
battery control system notifies the user of a recommended operation
according to the check result. Accordingly, the storage battery
control system can prevent the use of the storage battery pack from
being suspended unnecessarily.

15 [0011]

Hereinafter, embodiments are described in detail, with
reference to the drawings. It should be noted that each of the
embodiments described below shows a comprehensive or a specific
example. A numerical value, a shape, a material, a structural
20 component, arrangement position of the structural component, a
connection form of the structural components, an order of operations,
and the like, indicated in the embodiments below are examples, and
are not intended to limit the present disclosure. Structural
components that are not recited in independent claims among
25 structural components described in the embodiments below will be
described as optional structural components.

[0012]

In the following description, charging/discharging may mean
at least one of charging or discharging.

30 [0013]

FIG. 1 is a block diagram showing a configuration of a storage
battery control system according to an embodiment. As shown in
FIG. 1, storage battery control system 100 includes storage battery
pack 110 and information processor 120. Storage battery pack 110
35 includes storage battery 111 and one or more sensors 113. Storage

battery pack 110 may be rented or sold to users.

[0014]

Storage battery 111 is a chargeable/dischargeable battery and is also referred to as a secondary battery. Storage battery 111 may be an assembly of a plurality of cells.

[0015]

Each of one or more sensors 113 is a sensor that detects a state of storage battery pack 110. Each of one or more sensors 113 may be a sensor for detecting an anomaly in storage battery pack 110.

[0016]

For example, one or more sensors 113 may include an acceleration sensor for sensing impact on storage battery pack 110. Furthermore, one or more sensors 113 may also include a temperature sensor for detecting a temperature anomaly in storage battery pack 110. Furthermore, one or more sensors 113 may include at least one of a current sensor or a voltage sensor for detecting an electrical anomaly in storage battery pack 110.

[0017]

Information processor 120 is a processing circuit that performs information processing. Information processor 120 may be included in storage battery pack 110 or may be included in a device different from storage battery pack 110. When information processor 120 is a device different from storage battery pack 110, information processor 120 and storage battery pack 110 may be able to communicate with each other.

[0018]

Furthermore, information processor 120 may be configured by a plurality of processing circuits. A part of the plurality of processing circuits may be included in storage battery pack 110 and another part of the plurality of processing circuits may be included in a device different from storage battery pack 110.

[0019]

Specifically, when one or more sensors 113 detect an anomaly, information processor 120 notifies a user related to storage battery

pack 110 of a check request with respect to the anomaly. Then, information processor 120 obtains a check result for the check request from the user. Then, information processor 120 notifies the user of a recommended operation, according to the check result.

- 5 Information processor 120 may include an input/output interface for notifying a user of information and for obtaining information from the user.

[0020]

- 10 The recommended operation may be to suspend using storage battery pack 110 or to continue using storage battery pack 110. In addition, information processor 120 notifies a user of a method of using storage battery pack 110 as the recommended operation. Here, notifying a user of a using method as the recommended operation may be notifying the user of an operation corresponding to
- 15 the using method as the recommended operation.

[0021]

- FIG. 2 is a conceptual diagram showing an appearance of storage battery control system 100 shown in FIG. 1. In FIG. 2, storage battery pack 110, charging/discharging device 130, and
- 20 information terminal 140 are shown as a plurality of components included in storage battery control system 100.

[0022]

- Charging/discharging device 130 is a device for performing charging/discharging on storage battery pack 110. For example,
- 25 charging/discharging device 130 charges storage battery pack 110 with power supplied from a power system. In addition, charging/discharging device 130 supplies power obtained by discharging from storage battery pack 110 to other devices such as home electric appliances. Charging/discharging device 130 may
- 30 include an output terminal such as an alternating current (AC) outlet or a universal serial bus (USB) terminal to supply power to other devices such as home appliances.

[0023]

- Information terminal 140 is a terminal device that performs
- 35 information processing. Information terminal 140 may be a

computer provided with a memory, a processor, and an input/output interface.

[0024]

Storage battery pack 110 and information terminal 140 may be able to communicate with each other, for example, wirelessly. In addition, information terminal 140 may include information processor 120 and may serve as information processor 120. Although a smartphone is shown as information terminal 140 in FIG. 2, information terminal 140 is not limited to the smartphone, and may be a personal computer or a tablet terminal. Information terminal 140 is also used by a user related to storage battery pack 110.

[0025]

For example, information terminal 140 may be used to check a state of storage battery pack 110. The state of storage battery pack 110 may include a state of charge (SOC) of storage battery pack 110. Furthermore, the state of storage battery pack 110 may include information regarding an anomaly of storage battery pack 110. Specific aspects of the anomaly will be described later.

[0026]

In FIG. 2, storage battery pack 110, charging/discharging device 130, and information terminal 140 are shown as a plurality of components included in storage battery control system 100. Here, charging/discharging device 130 and information terminal 140 may not be included in storage battery control system 100. For example, charging/discharging device 130 may be included in charging/discharging system different from storage battery control system 100. Also, when information processor 120 is included in storage battery pack 110, information terminal 140 may not be included in storage battery control system 100.

[0027]

FIG. 3 is a block diagram showing an example of a specific configuration of storage battery control system 100 shown in FIG. 2. In the configuration example of FIG. 3, storage battery pack 110 includes battery 111, communicator 112, one or more sensors 113

and controller 114. Charging/discharging device 130 also includes discharging power source circuit 131, controller 132, and charging power source circuit 133.

[0028]

5 Communicator 112 is a processing circuit for communication. For example, communicator 112 wirelessly communicates with information terminal 140. Furthermore, communicator 112 may communicate with server 150 via information terminal 140 or may communicate with server 150 without information terminal 140.

10 [0029]

Controller 114 is a processing circuit that controls operations of battery pack 110. For example, controller 114 may control input/output of information to/from communicator 112, sensor 113, and the like. Controller 114 of storage battery pack 110 may be
15 able to communicate with controller 132 of charging/discharging device 130 through wire or wirelessly. Controller 114 of storage battery pack 110 may cooperate with, for example, controller 132 of charging/discharging device 130 to control charging/discharging on storage battery 111.

20 [0030]

Controller 114 may restrict use of storage battery pack 110 by controlling the charging/discharging of storage battery 111. The restriction of the use of storage battery pack 110 may include suspension in the use of storage battery pack 110 and reduction of a
25 usable capacity of storage battery pack 110.

[0031]

Discharging power source circuit 131 is an electric circuit for supplying, to an external device, power obtained by the discharging from storage battery pack 110. Specifically, discharging power
30 source circuit 131 converts direct current (DC) power obtained by the discharging from storage battery pack 110 into AC power, and supplies the AC power to the external device.

[0032]

Controller 132 is a processing circuit that controls operations
35 of charging/discharging device 130. For example, controller 132

controls a discharging operation of discharging power source circuit 131 and a charging operation of charging power source circuit 133. Controller 132 of charging/discharging device 130 may control the charging and discharging of storage battery pack 110. Specifically,
5 controller 132 of charging/discharging device 130 may cooperate with, for example, controller 114 of storage battery pack 110 to control the charging and discharging of storage battery 111.

[0033]

Charging power source circuit 133 is an electric circuit for
10 supplying power that is supplied from the power system, to storage battery pack 110, in order to charge storage battery pack 110. Specifically, charging power source circuit 133 converts AC power supplied from the power system into DC power, and supplies the DC power to storage battery pack 110.

15 [0034]

Server 150 is a device that performs information processing, and can also be expressed as a server device. Server 150 may be a computer provided with a memory and a processor.

[0035]

20 For example, information terminal 140 and server 150 may be able to communicate with each other. Furthermore, server 150 may communicate with storage battery pack 110 via information terminal 140 or may communicate with storage battery pack 110 without using information terminal 140. Server 150 may include
25 information processor 120 and may serve as information processor 120. Moreover, server 150 may include a part of information processor 120 and may serve as a part of information processor 120.

[0036]

For example, server 150 may manage information of storage
30 battery pack 110 and information of information terminal 140. Specifically, server 150 may hold the information of storage battery pack 110 and the information of information terminal 140 in association with each other. The information of storage battery pack 110 may include identification information and communication
35 address information of storage battery pack 110. Further, the

information of information terminal 140 may include identification information and communication address information of information terminal 140.

[0037]

5 For example, server 150 may periodically obtain information indicating a state of storage battery pack 110 via information terminal 140. Specifically, server 150 may periodically obtain detection results from one or more sensors 113 of storage battery pack 110 via information terminal 140.

10 [0038]

 FIG. 4 is a flowchart showing an example of an operation of storage battery control system 100 shown in FIG. 3. First, a user starts using storage battery pack 110 (Step S101). Then, for example, a detection result of one or more sensors 113 is transmitted to server 150 via communicator 112 or the like. Then, server 150 determines whether an anomaly has been detected by one or more sensors 113 (Step S102). If no anomaly is detected (No in Step S102), the user continues using storage battery pack 110 (Step S103).

20 [0039]

 When an anomaly is detected (Yes in Step S102), information terminal 140 notifies the user of an anomaly detection message and a check request (Step S104). For example, in this case, server 150 notifies the user of the anomaly detection message and the check request via information terminal 140.

[0040]

 The user who has received the notification of the check request checks a state of the anomaly detected in storage battery pack 110 (Step S105). Then, the check result is obtained by information terminal 140 (Step S106). At that time, for example, server 150 obtains the check result via information terminal 140.

[0041]

 Server 150 determines whether there is an anomaly leading to failure, based on the check result (Step S107). If it is determined that there is the anomaly leading to failure (Yes in Step S107),

information terminal 140 notifies the user of a use suspension request (Step S110). In this case, for example, server 150 notifies the user of the use suspension request via information terminal 140. [0042]

5 When it is determined that there is no anomaly leading to failure (No in Step S107), server 150 counts up the number of times anomaly are detected (Step S108). Then, server 150 determines whether the anomaly detection count is greater than or equal to a threshold value (Step S109). If it is determined that the anomaly
10 detection count is greater than or equal to the threshold value (Yes in Step S109), information terminal 140 also notifies the user of the use suspension request (Step S110). In this case, for example, server 150 notifies the user of the use suspension request via information terminal 140.

15 [0043]

 If it is determined that the anomaly detection count is not greater than or equal to the threshold value (No in Step S109), information terminal 140 notifies the user of usage guidance (Step S111). For example, in this case, server 150 notifies the user of the
20 usage guidance via information terminal 140. The usage guidance may include information that storage battery pack 110 can be continued to be used, and may include an appropriate method of using storage battery pack 110. Thereafter, storage battery pack 110 is continued to be used (Step S103).

25 [0044]

 After notifying the use suspension request, server 150 determines whether the use suspension request has been ignored (Step S112). For example, server 150 may determine that the use suspension request has not been ignored when the use suspension is
30 notified from the user via information terminal 140 after notification of the use suspension request. Further, when one or more sensors 113 detects that the charging/discharging of storage battery pack 110 is performed after the use suspension request is notified, server 150 may determine the notification of the use suspension request is
35 being ignored.

[0045]

If the use suspension request is being ignored (Yes in Step S112), the use of storage battery pack 110 is restricted (Step S113). Specifically, in this case, server 150 restricts the use of storage battery pack 110 by controlling the charging and discharging of storage battery pack 110 via information terminal 140 and the like. In other words, server 150 may forcibly suspend the use of storage battery pack 110 or may reduce the usable capacity of storage battery pack 110.

10 [0046]

For example, controller 114 of storage battery pack 110 obtains an instruction of use restriction for storage battery pack 110 from server 150 via communication device 112 of storage battery pack 110, information terminal 140, and the like. Controller 114 then restricts the charging and discharging of storage battery 111 in accordance with the instruction of the use restriction. This restricts the use of storage battery pack 110.

[0047]

Server 150 may also register a user with a blacklist and impose a penalty on the user, if the use suspension request is ignored.

[0048]

If the use suspension request has not been ignored (No in Step S112), information terminal 140 notifies gratitude (Step S114). Specifically, in this case, server 150 notifies a user of the gratitude via information terminal 140. In addition, in this case, server 150 may guide the user to purchase new storage battery pack 110. Furthermore, in this case, server 150 may register the user in a cooperator list and provide the user with incentive.

30 [0049]

In the above operation, server 150 performs determination processing and the like. However, all or part of the plurality of processing performed by server 150 may be performed by information terminal 140 or by controller 114 of storage battery pack 110, for example, instead of server 150.

[0050]

A plurality of pieces of processing shown in FIG. 4 are divided into a first phase, a second phase, and a third phase. In the first phase, when an anomaly is detected, the user is notified of the check request with respect to a status of the anomaly. In the second phase, when it is determined that there is an anomaly leading to failure according to a check result, a use suspension request is sent to the user. In the third phase, when storage battery pack 110 is continued to be used after the use suspension request is notified, the use of storage battery pack 110 is restricted.

[0051]

In the second phase, when it is determined that there is no anomaly leading to failure according to the check result, the storage battery pack is continued to be used. However, if the same anomaly detection is repeated at the number of times greater than or equal to a threshold value, the user is notified of the use suspension request. In the third phase, when the use is suspended in accordance with the use suspension request, gratitude for cooperation, guidance for new purchase, and the like are provided.

[0052]

According to the operation described above, it is possible to prevent the use of storage battery pack 110 from being unnecessarily suspended.

[0053]

It should be noted that storage battery control system 100 counts up the number of times of the anomaly detection when it is determined that there is no anomaly leading to failure according to the check result in the above operation. However, storage battery control system 100 may count up the number of times of the anomaly detection before the check request is notified and the check result is obtained. Then, when the anomaly detection count is greater than or equal to a threshold value, storage battery control system 100 may notify a user of the use suspension request without notifying the check request and obtaining the check result.

[0054]

The threshold value for the anomaly detection count may be defined individually depending on a type and level of the anomaly. For example, the higher the level of an anomaly, the smaller value may be applied to the threshold value for the anomaly detection count.

[0055]

In addition, storage battery control system 100 notifies a user of a check request each time the anomaly is detected in the above operation. However, instead of such processing, storage battery control system 100 may notify the user of a check request when the anomaly detection count is greater than or equal to the threshold value.

[0056]

For example, storage battery control system 100 may notify a user of the check request when the anomaly detection count is greater than or equal to a first threshold value. Then, storage battery control system 100 may notify the user of the use suspension request when the anomaly detection count is greater than or equal to a second threshold value that is greater than the first threshold value.

[0057]

Also, if the check request is ignored, the use suspension request may be notified. Alternatively, if the check request is ignored, the use of storage battery pack 110 may be restricted with omitting the notification of the use suspension request.

[0058]

FIG. 5 is a conceptual diagram showing an example of information notified by storage battery control system 100 shown in FIG. 3. First, when an anomaly is detected, storage battery control system 100 notifies a user of information illustrated in the upper left of FIG. 5. In other words, in this case, storage battery control system 100 notifies the user of an anomaly detection message indicating that an anomaly of storage battery pack 110 has been detected. Subsequently, storage battery control system 100 notifies the user of a plurality of questions as illustrated in the upper

right of FIG. 5. In other words, storage battery control system 100 notifies a user of the check request.

[0059]

When multiple answers to the multiple questions include a Yes answer, storage battery control system 100 notifies a user of the use suspension request as illustrated in the lower left of FIG. 5. On the other hand, when the multiple answers to the multiple questions do not include the Yes answer, storage battery control system 100 notifies the user that storage battery pack 110 can be continued to be used, as illustrated in the lower right of FIG. 5. At that time, storage battery control system 100 may notify the user of an appropriate using method of storage battery pack 110.

[0060]

It should be noted, in this case, that when the Yes answer is included, storage battery control system 100 notifies the user of the use suspension request. However, even when the answer is No, storage battery control system 100 may notify a user of the use suspension request depending on the content of the question. In addition, storage battery control system 100 may notify the user of more detailed questions depending on the answers to the questions. Then, storage battery control system 100 may notify the user of a more detailed using method.

[0061]

For example, when an answer to a question identifies that storage battery pack 110 is being used in a high-temperature environment, storage battery control system 100 may notify, as the using method, a user that storage battery pack 110 should not be used in the high-temperature environment. When it is identified, from the answer to the question, that a product suitable for charging/discharging device 130 is not used, storage battery control system 100 may notify, as the using method, a user that a suitable product should be used as charging/discharging device 130.

[0062]

FIG. 6 is a data diagram showing check items and the like when impact is detected by storage battery control system 100

shown in FIG. 3. For example, when impact is detected, storage battery control system 100 notifies a user of the anomaly detection message of "an unusual impact was detected on the storage battery pack with product number XX at 00:00:00 on MM/DD". Then, storage battery control system 100 notifies a user of the check request including the check items shown in FIG. 6.

[0063]

Specifically, the check items include items for checking an appearance anomaly, a temperature anomaly, an abnormal smell, an abnormal sound, an anomaly in a terminal part, and the like with respect to storage battery pack 110. When storage battery control system 100 receives an affirmative response to any of these check items, i.e., when it is affirmed that the detected anomaly is an anomaly leading to failure, storage battery control system 100 notifies a user of the use suspension request.

[0064]

A threshold value for the number of times a medium impact is detected is five, and a threshold value for the number of times a large impact is detected is two. These threshold values are used for determining whether the detection count is greater than or equal to the threshold value (Step S109) in FIG. 4. In other words, when impact smaller than the standard is detected five times or more, storage battery control system 100 notifies a user of the use suspension request. Further, when impact larger than the standard is detected twice or more, storage battery control system 100 notifies a user of the use suspension request.

[0065]

FIG. 7 is a data diagram showing the check items and the like when a temperature anomaly is detected by storage battery control system 100 shown in FIG. 3. When a temperature anomaly is detected, storage battery control system 100 notifies a user of an anomaly detection message of "an unusual temperature was detected in the storage battery pack with product number XX at 00:00:00 on MM/DD". Then, storage battery control system 100 notifies the user of the check request including the check items

shown in FIG. 7.

[0066]

Specifically, the check items include items for checking the appearance anomaly, the temperature anomaly, the abnormal smell, the abnormal sound, the anomaly of the terminal part, and the like with respect to storage battery pack 110. Furthermore, when a temperature anomaly is detected, the check items include items for checking a model anomaly, an appearance anomaly, a temperature anomaly, an abnormal smell, an abnormal sound, an anomaly of a terminal part, etc., with respect to charging/discharging device 130. Furthermore, in this case, the check items include items for checking an anomaly in a use environment of storage battery pack 110.

[0067]

When storage battery control system 100 receives an affirmative response to any of these check items, i.e., when it is affirmed that the detected anomaly is an anomaly leading to failure, storage battery control system 100 notifies a user of the use suspension request.

[0068]

Furthermore, a threshold value for the number of times the temperature anomaly is detected is two. This threshold value is used for determining whether the detection count is greater than or equal to the threshold value (Step S109) in FIG. 4. In other words, when the temperature anomaly is detected twice or more, storage battery control system 100 notifies a user of the use suspension request.

[0069]

FIG. 8 is a data diagram showing check items and the like when an electrical anomaly is detected by storage battery control system 100 shown in FIG. 3. When an electrical anomaly is detected, storage battery control system 100 notifies a user of the anomaly detection message of "an electrical anomaly was detected in the storage battery pack with the product number XX at 00:00:00 on MM/DD". Then, storage battery control system 100 notifies the user of a check request including the check items in FIG. 8.

[0070]

Specifically, the check items include items for checking the appearance anomaly, the temperature anomaly, the abnormal smell, the abnormal sound, the anomaly of the terminal part, and the like with respect to storage battery pack 110. Furthermore, when the electrical anomaly is detected, the check items include items for checking the model anomaly, the appearance anomaly, the temperature anomaly, the abnormal smell, the abnormal sound, the anomaly of the terminal part, etc., for charging/discharging device 130. Furthermore, in this case, the check items include items for checking the anomaly in the use environment of storage battery pack 110.

[0071]

When storage battery control system 100 receives an affirmative response to any of these check items, i.e., when it is affirmed that the detected anomaly is an anomaly leading to failure, storage battery control system 100 notifies the user of the use suspension request.

[0072]

The threshold value for the number of times the electrical anomaly is detected is two. This threshold value is used for determining whether the detection count is greater than or equal to the threshold value (Step S109) in FIG. 4. In other words, when the electrical anomaly is detected twice or more, storage battery control system 100 notifies the user of the use suspension request.

[0073]

Values shown as the threshold values for the detection count in FIGS. 6 to 8 are examples. The threshold values for the detection count are not limited to these examples. For example, the threshold value for the detection count may be determined according to a type or level of the anomaly, or may be determined regardless of the type and level of the anomaly.

[0074]

FIG. 9 is a conceptual diagram showing an example of information notified by storage battery control system 100 shown in

FIG. 3, when an anomaly detection count is greater than or equal to a threshold value. Storage battery control system 100 notifies a user of a use suspension request as shown in FIG. 9, when the anomaly detection count is greater than or equal to the threshold value.

[0075]

For example, the use suspension request shown in the lower left of FIG. 5 is a use suspension request notified when it is determined that there is an anomaly leading to failure according to the check result (Yes in S107 of FIG. 4). On the other hand, the use suspension request shown in FIG. 9 is a use suspension request that is notified when an anomaly detection count is greater than or equal to the threshold value (Yes in Step S109 of FIG. 4).

[0076]

A message of the use suspension request, which is notified when the anomaly detection count is greater than or equal to a threshold value, is different from a message of the use suspension request, which is notified when it is determined that there is an anomaly leading to failure according to the check result. Accordingly, storage battery control system 100 can notify a user of appropriate information and prompt the user to perform appropriate operations.

[0077]

FIG. 10 is a conceptual diagram showing an example of information notified when the use of storage battery pack 110 is forcibly suspended by storage battery control system 100 shown in FIG. 3. If the use suspension request is ignored, storage battery control system 100 may forcibly suspend the use of storage battery pack 110. In this case, storage battery control system 100 may notify information as shown in FIG. 10.

[0078]

For example, storage battery control system 100 can forcibly suspend the use of storage battery pack 110, to thereby prompt a user to take appropriate operations such as replacing storage battery pack 110.

[0079]

FIG. 11 is a conceptual diagram showing an example of information notified when a usable capacity of storage battery pack 110 is reduced by storage battery control system 100 shown in FIG.

5 3. When the use suspension request is ignored, storage battery control system 100 may reduce the usable capacity of battery pack 110. In this case, storage battery control system 100 may notify information as shown in FIG. 11.

[0080]

10 For example, storage battery control system 100 can reduce a risk of failure by reducing the usable capacity. In addition, storage battery control system 100 can prompt a user to take appropriate operations such as replacing storage battery pack 110 by reducing the usable capacity.

15 [0081]

Storage battery control system 100 may switch processing between processing of reducing the usable capacity of storage battery pack 110 and processing of forcibly suspending the use of storage battery pack 110, depending on the detection count, type, and level of the anomaly. In addition, when the first use suspension request due to the detection of an anomaly is ignored, for example, storage battery control system 100 may reduce the usable capacity of storage battery pack 110. Then, when the second use suspension request due to new anomaly detection is ignored, storage battery control system 100 may forcibly suspend the use of storage battery pack 110.

[0082]

As described above, storage battery control system 100 according to an aspect of the present disclosure has been described according to the embodiment and the like, but the aspects of storage battery control system 100 are not limited to the embodiment and the like. Modifications conceived by those skilled in the art may be applied to the embodiments and the like, and a plurality of structural elements in the embodiments and the like may be combined optionally. For example, processing performed by a specific

component in the embodiment and the like may be performed by another component instead of the specific component. Furthermore, the order of the plurality of processing may be changed, and the plurality of processing may be executed in parallel.

5 [0083]

In the above description, the impact, the temperature anomaly, and the electrical anomaly are described as examples of the anomaly in storage battery pack 110. However, the anomalies in storage battery pack 110 are not limited to these anomalies. Storage battery control system 100 may similarly perform processing to another anomaly.

[0084]

Furthermore, information processor 120 may be information terminal 140 or may be included in storage battery pack 110, for example. Alternatively, a plurality of processing circuits forming information processor 120 may be arranged in a plurality of devices.

[0085]

Moreover, a storage battery control method including the steps performed by each component of storage battery control system 100 may be performed by any device or system. In other words, this storage battery control method may be performed by storage battery control system 100, or may be performed by another device or system.

[0086]

For example, the storage battery control method described above may be performed by a computer system including a processor, a memory, an input/output circuit, and the like. At this time, the computer system may execute a program for causing the computer system to execute the storage battery control method. It should be noted that the computer system may be simply expressed as a computer.

[0087]

Moreover, the above program may be recorded in a non-transitory computer-readable recording medium. The recording medium may be an optical disk such as a CD-ROM, a

magnetic disk such as a hard disk drive, a magneto-optical disk (MO), a semiconductor memory such as a flash memory, or other non-transitory computer-readable recording media. Furthermore, the program may be recorded on a recording medium in advance, or
5 may be supplied to a recording medium via a communication network so as to be recorded on the recording medium.

[0088]

For example, the above described storage battery control method may be performed by executing a program using hardware
10 resources such as a processor, a memory, and an input/output circuit, which are included in a computer system. In other words, the storage battery control method described above may be performed by the processor obtaining data from a memory, an input/output circuit, or the like, performing calculations, or outputting the
15 calculation results to the memory, the input/output circuit, or the like. Any type of processor can be used as the processor for executing the program.

[0089]

Furthermore, each of the plurality of components included in
20 storage battery control system 100 and the like may be embodied as a dedicated or general purpose circuit. These components may be embodied as a single circuit or as a plurality of circuits.

[0090]

Furthermore, a plurality of components included in storage
25 battery control system 100 and the like may be embodied as a large scale integration (LSI) chip, which is an integrated circuit (IC). These components may be made into a single chip individually, or may be made into a single chip so as to include some or all of them. These components may be provided on one or more chips of one
30 device, or may be provided on multiple chips of multiple devices.

[0091]

The LSI is sometimes referred to as system LSI, super LSI, or ultra LSI, depending on the degree of integration. An integrated circuit may also be embodied with a dedicated circuit or a general
35 purpose processor. A field programmable gate array (FPGA) that

can be programmed, or a reconfigurable processor that can reconfigure connections and settings inside thereof may be used.

[0092]

5 Furthermore, if an integrated circuit technique that replaces LSI appears due to advances in semiconductor technique or another derived technique, it is natural that a plurality of components included in storage battery control system 100 and the like may be integrated using those technique.

[0093]

10 Finally, several aspects of storage battery control system 100 and the like are shown as examples. These aspects may be combined as appropriate. Also, any configuration or the like described, for example, in the above embodiment may be added.

[0094]

15 (First aspect)

Storage battery control system 100 according to an aspect of the present disclosure includes storage battery pack 110 and information processor 120. Storage battery pack 110 includes storage battery 111 and one or more sensors 113 for detecting an
20 anomaly. When one or more sensors 113 detect an anomaly, information processor 120 notifies a user related to storage battery pack 110 of a check request regarding the anomaly. Then, information processor 120 obtains a check result of the check request from the user. Then, information processor 120 notifies the
25 user of a recommended operation according to the check result.

[0095]

Accordingly, storage battery control system 100 can prompt the user to perform checking when an anomaly is detected. Storage battery control system 100 can prompt a user to perform appropriate
30 operations according to the check result. Therefore, storage battery control system 100 can prevent the use of storage battery pack 110 from being suspended unnecessarily.

[0096]

(Second aspect)

35 For example, one or more sensors 113 may include an

acceleration sensor for detecting impact on storage battery pack 110. With this configuration, storage battery control system 100 can detect the impact on storage battery pack 110 as the anomaly. Then, when the impact is detected as the anomaly, storage battery control system 100 can prompt a user to perform checking. Furthermore, storage battery control system 100 can prompt a user to take appropriate operations according to the check result regarding the impact.

[0097]

10 (Third aspect)

For example, one or more sensors 113 may also include a temperature sensor for detecting a temperature anomaly in storage battery pack 110. With this configuration, storage battery control system 100 can detect the temperature anomaly in storage battery pack 110. Then, when the temperature anomaly is detected, storage battery control system 100 can prompt the user to perform checking. In addition, storage battery control system 100 can prompt the user to perform an appropriate operation according to the check result regarding the temperature anomaly.

20 [0098]

(Fourth aspect)

For example, one or more sensors 113 may include at least one of a current sensor or a voltage sensor for detecting an electrical anomaly in storage battery pack 110. With this configuration, storage battery control system 100 can detect the electrical anomaly in storage battery pack 110. Then, when the electrical anomaly is detected, storage battery control system 100 can prompt a user to perform checking. In addition, storage battery control system 100 can prompt the user to take appropriate operations according to the check result regarding the electrical anomaly.

[0099]

(Fifth aspect)

For example, information processor 120 may notify a user to suspend use of storage battery pack 110 as a recommended operation when the check result indicates that the anomaly leads to

failure. Accordingly, when the detected anomaly is recognized as the anomaly leading to failure based on the check result, storage battery control system 100 can prompt the user to suspend the use of storage battery pack 110. In other words, storage battery control system 100 can appropriately prompt the user to suspend the use of storage battery pack 110.

[0100]

(Sixth aspect)

For example, when the check result does not indicate that the anomaly leads to failure, information processor 120 may notify the user to continue use of storage battery pack 110 as the recommended operation. As a result, when the detected anomaly is not recognized to lead to failure based on the check result, storage battery control system 100 can prompt the user to continue using storage battery pack 110. In other words, storage battery control system 100 can appropriately encourage to continue use of storage battery pack 110.

[0101]

(Seventh aspect)

For example, information processor 120 may notify a user to suspend use of storage battery pack 110 as the recommended operation when an anomaly detection count is greater than or equal to a threshold value.

[0102]

Accordingly, storage battery control system 100 can prompt a user to suspend using storage battery pack 110 regardless of the check result when an anomaly detection count is great. If the anomaly detection count is great, it is assumed that storage battery pack 110 is being used in a situation where it is likely to fail. Storage battery control system 100 can appropriately prompt the user to suspend the use of storage battery pack 110 under such a use condition.

[0103]

(Eighth aspect)

For example, a threshold value for the anomaly detection

count may be determined according to at least one of a type or level of the anomaly. Accordingly, storage battery control system 100 can prompt a user to suspend the use of storage battery pack 110 in accordance with the anomaly detection count, type, level, and so on, regardless of the check result when the anomaly detection count is great.

[0104]

(Ninth aspect)

For example, one or more sensors 113 may include an acceleration sensor for detecting impact on storage battery pack 110 as the anomaly. In addition, information processor 120 may apply a first value to the threshold value when the impact is of a first level. Then, information processor 120 may apply a second value that is less than the first value to the threshold value when the impact is of a second level that is greater than the first level.

[0105]

Accordingly, storage battery control system 100 can prompt a user to suspend the use of storage battery pack 110 for a relatively large impact, regardless of a result of the check, even if the anomaly detection count detected is small.

[0106]

(Tenth aspect)

For example, when storage battery pack 110 is continued to be used after a user is notified that the use of storage battery pack 110 is suspended as the recommended operation, information processor 120 may restrict the use of storage battery pack 110. Specifically, in this case, information processor 120 may restrict the use of storage battery pack 110 by controlling at least one of charging or discharging of storage battery pack 110.

[0107]

With this configuration, storage battery control system 100 can restrict the use of storage battery pack 110 when storage battery pack 110 is continued to be used after the suspension of use is recommended. Therefore, storage battery control system 100 can prevent occurrence of a damage due to failure of storage battery

pack 110.

[0108]

(Eleventh aspect)

For example, information processor 120 may notify a user of a
5 using method of storage battery pack 110 as the recommended
operation for the user, according to the check result. Accordingly,
storage battery control system 100 can prompt the user to
appropriately use storage battery pack 110.

[0109]

10 (Twelfth aspect)

Storage battery control method according to an aspect of the
present disclosure is a storage battery control method performed by
storage battery control system 100. In the storage battery control
method, when an anomaly is detected by one or more sensors 113 of
15 storage battery pack 110 including storage battery 111 and one or
more sensors 113 for detecting the anomaly, the following
processing is performed.

[0110]

First, a user related to storage battery pack 110 is notified of
20 a check request with respect to an anomaly (Step S104). Thereafter,
a result of the check for the check request is obtained from the user
(Step S106). Then, according to the check result, a recommended
operation is notified to the user (Steps S110 and S111).

[0111]

25 Accordingly, when an anomaly is detected, it is possible to
prompt the user to perform checking. Then, it is possible to prompt
the user to perform an appropriate operation, according to the check
result. Therefore, it is possible to prevent the use of storage battery
pack 110 from being suspended unnecessarily.

30 [Reference Signs List]

[0112]

100	storage battery control system
110	storage battery pack
111	storage battery
35 112	communicator

	113	sensor
	114, 132	controller
	120	information processor
	130	charging/discharging device
5	131	discharging power source circuit
	133	charging power source circuit
	140	information terminal
	150	server

[CLAIMS]

[Claim 1]

A storage battery control system comprising:

a storage battery pack including a storage battery and one or
5 more sensors for detecting an anomaly; and

an information processor that notifies a user related to the
storage battery pack of a check request regarding the anomaly when
the anomaly is detected by the one or more sensors, obtains a check
result for the check request from the user, and notifies the user of a
10 recommended operation according to the check result.

[Claim 2]

The storage battery control system according to claim 1,
wherein

15 the one or more sensors include an acceleration sensor for
detecting impact on the storage battery pack as the anomaly.

[Claim 3]

The storage battery control system according to claim 1 or 2,
20 wherein

the one or more sensors include a temperature sensor for
detecting a temperature anomaly in the storage battery pack as the
anomaly.

25 [Claim 4]

The storage battery control system according to any one of
claims 1 to 3, wherein

the one or more sensors include at least one of a current
sensor or a voltage sensor for detecting an electrical anomaly in the
30 storage battery pack as the anomaly.

[Claim 5]

The storage battery control system according to any one of
claims 1 to 4, wherein

35 the information processor notifies the user to suspend use of

the storage battery pack as the recommended operation, when the check result indicates that the anomaly leads to failure.

[Claim 6]

5 The storage battery control system according to any one of claims 1 to 5, wherein

 the information processor notifies the user to continue use of the storage battery pack as the recommended operation, when the check result does not indicate that the anomaly leads to failure.

10

[Claim 7]

 The storage battery control system according to any one of claims 1 to 6, wherein

 the information processor notifies the user to suspend use of
15 the storage battery pack as the recommended operation, when an anomaly detection count is greater than or equal to a threshold value.

[Claim 8]

20 The storage battery control system according to claim 7, wherein

 the threshold value is determined according to at least one of a type or a level of the anomaly.

25 [Claim 9]

 The storage battery control system according to claim 7 or 8, wherein

 the one or more sensors include an acceleration sensor for detecting impact on the storage battery pack as the anomaly, and

30 the information processor applies a first value to the threshold value when the impact is of a first level, and applies a second value less than the first value to the threshold value when the impact is of a second level greater than the first level.

35 [Claim 10]

The storage battery control system according to any one of claims 1 to 9, wherein

the information processor restricts use of the storage battery pack by controlling at least one of charging or discharging of the storage battery pack, when the storage battery pack is continued to be used after the user is notified to suspend the use of the storage battery pack as the recommended operation.

[Claim 11]

The storage battery control system according to any one of claims 1 to 10, wherein

the information processor notifies the user of a method of using the storage battery pack as the recommended operation according to the check result.

[Claim 12]

A storage battery control method performed by a storage battery control system, the storage battery control method comprising:

when an anomaly is detected by one or more sensors in a storage battery pack including a storage battery and the one or more sensors for detecting the anomaly,

notifying a user related to the storage battery pack of a check request regarding the anomaly;

obtaining a check result for the check request from the user; and

notifying the user of a recommended operation according to the check result.