type specifier 172 transmits the imaging data to the server apparatus 200 via the communicator 140. The server apparatus 200 specifies the sorting type based on the imaging data, and transmits information indicating the specified sorting type to the resource collection apparatus 100. The sorting type specifier 172 specifies the sorting type based on the information from the server apparatus 200.

[0050] The opening/closing controller 173 switches the opening/closing unit 104 from the closed state to the open state when the sorting type specified by the sorting type specifier 172 matches the sorting type associated with the opening 102. Consequently, a user can throw in the waste through the opening 102.

[0051] The opening/closing controller 173 may adjust the opening area of the opening 102 in the open state based on the size of the target waste specified or estimated using the detection result of the first detector 120. The specification or estimation of the size of the target waste may be performed by the opening/closing controller 173 or may be performed by the server apparatus 200. For example, the size of the target waste may be specified or estimated based on the sorting type specified by the sorting type specifier 172 or the product identifier. The opening area of the opening 102 in the open state is adjusted to reliably prevent waste that does not match the sorting type from being put through the opening 102.

[0052] The opening/closing controller 173 switches the opening/closing unit 104 from the open state to the closed state when a closing condition is satisfied after switching the opening/closing unit 104 from the closed state to the open state. The closing condition includes a condition that waste has been put through the opening 102 and/or a condition that a certain period of time has elapsed after the opening/closing unit 104 is switched from the closed state to the open state. Here, the opening/closing controller 173 can detect that the waste has been put through the opening 102 based on a measurement result of the measurer 110. The closing condition may include a condition that the first detector 120 has detected new waste.

[0053] When the user authentication fails, the notification controller 174 controls the display 151 and/or the sound emitter 152 to notify the user of information indicating an authentication error. When the sorting type specified by the sorting type specifier 172 does not match the sorting type associated with the opening 102, the notification controller 174 controls the display 151 and/or the sound emitter 152 to notify the user of information indicating a sorting error.

[0054] The power supply controller 175 controls the power supply 160 such that power output by the photovoltaic cell 161 included in the power supply 160 is used

[0080] Consequently, in the resource collection apparatus 100 capable of dealing with a plurality of sorting types, only the opening 102 whose sorting type matches the sorting type of waste can be made available to a user, which enables appropriate sorting of waste.

[0081] Here, the first detector 120 may detect a plurality of kinds of waste belonging to a user. The plurality of kinds of waste may be sorted into different sorting types from each other. When the first detector 120 detects the plurality of kinds of waste to be sorted into different sorting types, the controller 170 (opening/closing controller 173) of the resource collection apparatus 100 may determine the order of switching the plurality of opening/closing units 104 from the closed state to the open state based on the sorting type of each of the plurality of kinds of waste. The opening/closing controller 173 sequentially switches the opening/closing units 104 to the open state in accordance with the determined order.

[0082] Such a priority order may be determined in advance for each sorting type. For example, the priority order of an empty PET bottle container is lower than the priority order of raw garbage. When a user has two kinds of waste of an empty PET bottle container and raw garbage, the opening/closing unit 104 of the opening 102 associated with raw garbage is switched to the open state prior to the opening/closing unit 104 of the opening 102 associated with PET bottles. If raw garbage is mixed in the storage space 103 for PET bottles, it causes a trouble in a post process. Therefore, a low priority order may be set for garbage of a sorting type that is not desired to be mixed with garbage of other sorting types.

[0083] Second Embodiment

When a large-scale event such as the Olympic Games is held, a large number of unspecified people gather and a large amount of waste (garbage) such as food containers and beverage containers is generated at a venue and in a surrounding urban area. While garbage bins are desirably placed so as to collect waste, there is a problem in that the installation of garbage bins is avoided, for example, from the viewpoint of the risk of terroristic acts, such as disposal of a hazardous material in a garbage bin.

[0084] The second embodiment enables reduction or prevention of damages caused by disposal of hazardous materials.

[0085] The second embodiment will be described focusing on differences from the first embodiment, and the description of similar or same configuration is omitted.

controller 170 compares the image or the feature amount of a hazardous material determined in advance with the image data output by the camera 124, and determines the waste is a hazardous material when the degree of coincidence is high. The controller 170 may perform hazardous material determination using the camera 124 only for waste whose tag information cannot be recognized by the tag reader 121.

[0117] The reader 125 reads information for specifying waste from the electronic tag 52 or a code (barcode or two-dimensional code) attached to the waste, and outputs the read result to the controller 170. The reader 125 includes a tag reader and/or a code reader. The tag reader may be integrated with the tag reader 121 described above.

[0118] The controller 170 may control image recognition based on the information read by the reader 125. For example, the controller 170 specifies the product type of waste based on the information read by the reader 125, and acquires an image corresponding to the specified product type or the feature amount thereof. Here, the controller 170 may acquire the image corresponding to the specified product type or the feature amount thereof from the server apparatus 200 via the communicator 140. The controller 170 compares the image corresponding to the specified product type or the feature amount thereof with the image data output by the camera 124, and determines that the waste is a hazardous material when the degree of coincidence is low. That is, when a general shape corresponding to the product type and the shape of the waste are different from each other, the controller 170 may determine that the waste is a hazardous material.

[0119] The weight sensor 126 measures the weight of waste and outputs the measurement result to the controller 170. The weight sensor 126 may measure a difference between the weight of waste before disposal and the weight of the waste after disposal as the weight of the waste. When the weight measured by the weight sensor 126 exceeds a weight threshold value, the controller 170 determines that the waste is a hazardous material. That is, when the weight measured by the weight sensor 126 is too heavy compared to the weight of general waste, the controller 170 may determine that the waste is a hazardous material.

[0120] The controller 170 may control a weight threshold value based on the information read by the reader 125. For example, the controller 170 specifies the product type of waste based on the information read by the reader 125, and acquires a weight threshold value corresponding to the specified product type. Here, the controller 170 may acquire and determine the weight threshold value

120), and the detection result of the second detector 130 (that is, information for specifying the user).

[0142] The resource collection apparatus 100 may include an injection mechanism injecting liquid nitrogen into the storage space 103. In that case, in step S108, the controller 170 may control the injection mechanism to inject liquid nitrogen so as to perform cooling with the liquid nitrogen. The resource collection apparatus 100 may include wheels and a motor that enable automatic travel. In that case, in step S108, the resource collection apparatus 100 may automatically move along a predetermined route to, for example, a place with less people.

[0143] When the waste stored in the storage space 103 is determined not to be a hazardous material (step S107: NO), in step S109, the controller 170 determines whether or not a closing condition has been satisfied. The closing condition may be a condition that a certain period of time has elapsed after the switching of the opening/closing unit 104 from the closed state to the open state. The closing condition may be a condition that the first detector 120 has detected a new waste. When the closing condition is not satisfied (step S109: NO), the controller 170 keep the opening/closing unit 104 in the open state.

[0144] On the other hand, when the closing condition is satisfied (step S109 : YES), the controller 170 switches the opening/closing unit 104 from the open state to the closed state in step S110.

[0145] FIG. 13 is a diagram illustrating an operation example 2 of the resource collection apparatus 100 according to the second embodiment. In the operation example 2, it is assumed that the controller 170 detects a hazardous material before waste is discarded. At the start of this operation, the opening/closing unit 104 is in the closed state. For the same operations as the operations in the operation example 1, duplicate descriptions will be omitted.

[0146] As illustrated in FIG. 13, in step S201, the controller 170 controls the second detector 130 to perform a detection operation for a user or his/her belongings.

[0147] In step S202, the controller 170 performs authentication of a user in cooperation with the server apparatus 200, based on the detection result of the second detector 130. When the user authentication fails (step S203: NO), in step S204, the controller 170 controls the outputter 150 to notify the user that the opening/closing unit 104 is not allowed to be switched to the open state.

[0148] When the user authentication is successful (step S203: YES), in step S205, the controller 170 determines whether or not the user is a dangerous person, based

CLAIMS

1. A resource collection apparatus for collecting wastes to be reused as a resource, the resource collection apparatus comprising:

an opening associated with a predetermined sorting type;

an opening/closing unit configured to open and close the opening;

a first detector configured to perform an operation to detect a target waste belonging to a user; and

a controller configured to:

specify a sorting type of the target waste using a result detected with the first detector; and

switch the opening/closing unit from a closed state to an open state when the sorting type is specified as the sorting type of the opening.

2. The resource collection apparatus according to claim 1, wherein

the first detector is configured to include at least one selected from the group consisting of:

a tag reader configured to read information from an electronic tag attached to the target waste;

a camera configured to capture an image of the target waste; and

a code reader configured to read a barcode or a two-dimensional code, attached to the target waste.

3. The resource collection apparatus according to claim 1 or 2, wherein

the controller is further configured to:

identify or estimate a size of the waste using the result detected with the first detector; and

adjust an opening area of the opening in the open state, based on a size of the target waste, the size being specified or estimated using the result detected with the first detector.

4. The resource collection apparatus according to any one of claims 1 to 3, further comprising:

a communicator configured to communicate with a server apparatus; and

a second detector configured to perform an operation to detect the user or an operation to detect belongings of the user other than the target waste, wherein

the controller is further configured to switch the opening/closing unit from the closed state to the open state based on a result of the second detector when the sorting type specified from purchase history information of a commercial product purchased by the user matches the predetermined sorting type of the opening.

5. The resource collection apparatus according to claim 4, wherein

the second detector is configured to include at least one selected from the group consisting of:

a camera configured to capture an image of the user;

a code reader configured to read a barcode or a two-dimensional code attached to the belongings; and

a communication interface configured to communicate with the belongings.

6. The resource collection apparatus according to claim 4 or 5, wherein

the resource collection apparatus is placed in an area where an event is held or an area surrounding the area, and

the belongings include a ticket belong to a participant of the event.

7. The resource collection apparatus according to any one of claims 4 to 6, wherein

the controller is configured to switch the opening/closing unit from the closed state to the open state when a first sorting type specified using the result detected with the first detector and/or a second sorting type specified using the purchase history information matches the predetermined sorting type of the opening.

8. The resource collection apparatus according to claim 7, wherein

the controller is configured to switch the opening/closing unit from the closed state to the open state when both of the first sorting type and the second sorting type match the predetermined sorting type of the opening.

9. The resource collection apparatus according to claim 7 or 8, wherein

the controller is configured to control the opening/closing unit based on the second sorting type specified using the purchase history information, when specification of the first sorting type using the result detected with the first detector fails.

10. The resource collection apparatus according to any one of claims 1 to 9, wherein

the controller switches the opening/closing unit from the open state to the closed state, when a closing condition is satisfied after the opening/closing unit is switched from the closed state to the open state, and

the closing condition includes a condition that the waste has been put through the opening and/or a condition that a certain time period has elapsed after the opening/closing unit is switched from the closed state to the open state.

11. The resource collection apparatus according to any one of claims 1 to 10, further comprising:

a plurality of openings including the opening, each of the plurality of openings being associated with a corresponding sorting type; and

a plurality of opening/closing units including the opening/closing unit, each of the plurality of opening/closing units being provided to respective one of the plurality of openings, wherein

the controller is configured to switch the opening/closing unit provided to the one opening from the closed state to the open state, when the sorting type specified using the result detected with the first detector matches a sorting type associated with one opening of the plurality of openings.

12. The resource collection apparatus according to claim 11, wherein

the controller is configured to determine an order of switching the plurality of opening/closing units from the closed state to the open state, based on a sorting type of each of a plurality of kinds of wastes, when the first detector detects the plurality of kinds of waste that are to be sorted into different sorting types.

13. A control method for a resource collection apparatus for collecting wastes to be reused as a resource, the control method comprising:

performing a detection operation for a target waste belonging toa user;

specifying a sorting type of the target waste is to be sorted, by using a result of the detection operation; and

opening and closing an opening associated with a predetermined sorting type, wherein

the opening and closing is configured to include switching from a closed state to an open state when the sorting type is specified as the sorting type of the opening.