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(54) Title of Invention

METHOD AND DEVICE FOR CONTROLLING INTELLIGENT ENVIRONMENT-FRIENDLY CAN AND THE INTELLIGENT ENVIRONMENT-FRIENDLY CAN

(57) Abstract

The invention discloses a method and device for controlling intelligent environment-friendly can and the intelligent environment-friendly can. The method comprises: controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time; detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly; controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly; controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly. According to the technical solution provided by the present invention, when someone is approaching the intelligent environment-friendly can, the upper cover is opened automatically so that the people directly throw garbage into the garbage can.

CONTROLLING AN INFRARED EMITTING TUBE TO EMIT AN INFRARED SIGNAL OF A FIRST PULSE WAVEFORM ONCE EVERY FIRST PRESET TIME

§11

DETECTING THE STATUS OF AN INFRARED RECEIVING TUBE AND DETERMINING WHETHER THE INFRARED RECEIVING TUBE FUNCTIONS PROPERLY

§11

CONTROLLING THE INFRARED EMITTING TUBE TO EMIT AN INFRARED SIGNAL OF A SECOND PULSE WAVEFORM ONCE EVERY SECOND PRESET TIME FOR CONSECUTIVE FIRST PRESET TIMES IN TOTAL WHEN THE INFRARED RECEIVING TUBE FUNCTIONS PROPERLY

§11

CONTROLLING A MOTOR TO ACT AND OPEN THE ENVIRONMENT-FRIENDLY CAN IF IT IS DETECTED FOR THE SECOND CONSECUTIVE PRESET NUMBER OF TIMES THAT THE INFRARED RECEIVING TUBE FUNCTIONS PROPERLY

§11

1. A method for controlling intelligent environment-friendly can, wherein the method comprises:
controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;
detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;
controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform; and
controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly;
wherein, detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly comprises:
detecting the output level of the infrared receiving tube for consecutive four times every fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform once; and
determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level, low level, low level and high level respectively.
2. The method according to claim 1, wherein before controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once, the method further comprises:
powering on the infrared receiving tube third preset times in advance for fourth preset times.
3. The method according to claim 1, wherein the method further comprises:
entering a standby state and continuing to control the infrared emitting tube to emit the first pulse waveform once every first preset time if within a fifth preset times, it is detected for less than the second preset times that the infrared receiving tube functions properly.
4. An intelligent environment-friendly can, wherein the can comprises:
a first control module, used for controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;
a detection module, used for detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;
a second control module, used for controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform; and
a third control module, used for controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly;
wherein, the configuration of the detection module specifically comprises:
detecting the output level of the infrared receiving tube for consecutive four times every fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform once; and determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level, low level, low level and high level respectively.
5. The device according to claim 4, wherein the device further comprises:
a fourth control module, used for powering on the infrared receiving tube the third preset time before the first control module controls the infrared emitting tube to emit an infrared signal of a first pulse waveform once, and maintaining the power-on status for a fourth preset time.

6. The device according to claim 4, wherein the device further comprises:

a fifth control module, used for entering a standby state and continuing to control the infrared emitting tube to emit the first pulse waveform once every first preset time if within a fifth preset times, it is detected for less than the second preset times that the infrared receiving tube functions properly.

7. An intelligent environment-friendly can, wherein the can comprises:

a single-chip microcomputer (SCM), an infrared emitting tube connected to the SCM, an infrared receiving tube connected to the SCM, a motor connected to the SCM, and an environmentally friendly can with an upper cover;

the operation of the SCM comprises:

controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;

detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;

controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform;

controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly;

wherein the SCM performs the process of detecting the state of the infrared receiving tube and determining whether the infrared receiving tube functions properly, the process specifically comprising:

detecting the output level of the infrared receiving tube four consecutive times at intervals of a fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform; and

determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are, in sequence, high level, low level, low level, and high level.

METHOD AND DEVICE FOR CONTROLLING INTELLIGENT ENVIRONMENT-FRIENDLY CAN AND THE INTELLIGENT ENVIRONMENT-FRIENDLY CAN

TECHNICAL FIELD

[0001] The present invention relates to the technical field of control, particularly to a method and device for controlling intelligent environment-friendly can and the intelligent environment-friendly can.

BACKGROUND ART

[0002] Environment-friendly garbage cans, which are commonly referred to as garbage cans, are used to store garbage so that the garbage is properly stored and is not discarded randomly. In daily life and production, various kinds of garbage cans are widely used. Currently, most garbage cans are designed to have no cover, allowing people to directly throw garbage into them. However, the garbage cans without cover will give off various unpleasant or pungent odors from the garbage inside them directly into the surrounding environment, thereby polluting the environment. Therefore, a garbage can with an upper cover has also been designed. Typically, the cover of the garbage can is closed to prevent the smell of garbage from escaping. People need to open the upper cover first before putting the garbage into the garbage can. The upper cover can be opened by using a foot pedal, or manually. These methods typically adopt a mechanical approach.

[0003] That is to say, at present, these garbage cans with an upper cover must be opened manually before garbage is thrown into them. However, it is understandable that sometimes people may find it inconvenient to open the upper cover, and thus it is not easy for them to throw the garbage into the can. Therefore, the current garbage cans sometimes cause inconvenience to the people.

SUMMARY OF THE INVENTION

[0004] For this reason, the present invention provides a method and device for controlling intelligent environment-friendly can and the intelligent environment-friendly can, of which upper cover can be opened automatically when someone with garbage is approaching it, making it easier to throw garbage into the can.

[0005] To achieve the foregoing objective, the present invention provides the following technical solution:

[0006] A method for controlling intelligent environment-friendly can, comprising:

[0007] controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;

[0008] detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;

[0009] controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform;

[0010] controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly.

[0011] Preferably, before the step of controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once, the method further comprises:

[0012] powering on the infrared receiving tube third preset time in advance and maintaining the power-on status for fourth preset times.

[0013] Preferably, the step of detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly comprises:

[0014] detecting the output level of the infrared receiving tube before and after the infrared emitting tube emits

the infrared signal of the first pulse waveform once;

[0015] determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level and low level respectively before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once.

[0016] Preferably, the step of detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly comprises:

[0017] detecting the output level of the infrared receiving tube for consecutive four times every fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform once;

[0018] determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level, low level, low level and high level respectively.

[0019] Preferably, the step further comprises:

[0020] entering a standby state and continuing to control the infrared emitting tube to emit the first pulse waveform once every first preset time if within a fifth preset times, it is detected for less than the second preset times that the infrared receiving tube functions properly.

[0021] A device for controlling intelligent environment-friendly can, comprising:

[0022] a first control module, used for controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;

[0023] a detection module, used for detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;

[0024] a second control module, used for controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform;

[0025] a third control module, used for controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly.

[0026] Preferably, the device further comprises:

[0027] a fourth control module, used for powering on the infrared receiving tube the third preset time before the first control module controls the infrared emitting tube to emit an infrared signal of a first pulse waveform once, and maintaining the power-on status for a fourth preset time.

[0028] Preferably, the detection module comprises:

[0029] a first detection module, used for detecting the output level of the infrared receiving tube before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once;

[0030] a first determining module, used for determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level and low level respectively before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once.

[0031] Preferably, the detection module comprises:

[0032] a second detection module, used for detecting the output level of the infrared receiving tube for consecutive four times every fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform once;

[0033] a second determining module, used for determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level, low level, low level and high level respectively.

[0034] Preferably, the device further comprises:

[0035] a fifth control module, used for entering a standby state and continuing to control the infrared emitting tube to emit the first pulse waveform once every first preset time if within a fifth preset times, it is detected for less than the second preset times that the infrared receiving tube functions properly.

[0036] An intelligent environment-friendly can, comprising:

[0037] a single-chip microcomputer (SCM), an infrared emitting tube connected to the SCM, an infrared receiving tube connected to the SCM, a motor connected to the SCM, and an environmentally friendly can with an upper cover;

[0038] The operation of the SCM comprises:

[0039] controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;

[0040] detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;

[0041] controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform;

[0042] controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly.

[0043] It can be known from the foregoing technical solution that compared with the prior art, the present invention provides a method and device for controlling intelligent environment-friendly can and the intelligent environment-friendly can. According to the technical solution provided by the present invention, the infrared emitting tube is controlled to emit an infrared signal of a first pulse waveform once every first preset time. If someone or something blocks the infrared signal, the infrared signal will be reflected. Now the infrared receiving tube can receive the reflected infrared signal. Therefore, by detecting the status of the infrared receiving tube, it is determined whether the infrared receiving tube functions properly. When the infrared receiving tube functions properly, it can be determined that someone or something passes the intelligent environment-friendly can. Now, the infrared emitting tube is controlled to emit an infrared signal of a second pulse waveform every second preset time for consecutive first preset times. If it is detected for consecutive second preset times that the infrared receiving tube functions properly, it means that the infrared receiving tube has detected the reflected infrared signal for consecutive second preset times. That is to say, someone or something has continuously blocked the infrared signals emitted by the infrared emitting tube. Therefore, it can be determined that someone is approaching the intelligent environment-friendly can. Now the motor is automatically controlled to act and open the upper cover of the environment-friendly can so that people can directly throw garbage into the intelligent environment-friendly can. Therefore, according to the technical solution provided by the present invention, if someone with garbage is approaching the intelligent environment-friendly can, the intelligent environment-friendly can will open the upper cover automatically, making it convenient to directly throw garbage into the can, avoiding the inconvenience of the prior art that when a user throws garbage, he/she has to personally open the upper cover, thereby avoiding the inconvenience of the people for opening the upper cover, thereby throwing the garbage near the can, and further assuring a clean and tidy surrounding environment of the garbage can.

BRIEF DESCRIPTION OF THE DRAWINGS

[0044] In order to more clearly describe the technical schemes in the embodiments of the present utility model or the prior art, the drawings that need to be used in the description of the embodiments or the prior art will be briefly described below. Obviously, the drawings in the description below are just some embodiments of the present utility model. Those of ordinary skill in the art can also obtain other drawings without creative work based on these drawings.

[0045] FIG. 1 is a flow diagram of a method for controlling intelligent environment-friendly can provided in an embodiment of the present invention;

[0046] FIG. 2 is a structural diagram of a device for controlling intelligent environment-friendly can provided in an embodiment of the present invention.

DETAILED DESCRIPTION

[0047] In order that those skilled in the art better understand the solutions of the present invention, the technical solutions in the embodiments of the present invention will be clearly and completely described below in conjunction with the drawings in the embodiments of the present invention. Obviously, the described embodiments are only some, not all of the embodiments of the present invention. All other embodiments obtained by those of ordinary skill in the art without creative work based on the embodiments of the present invention are within the scope of protection of the present invention.

[0048] In order to make the foregoing objectives, features and advantages of the present invention more obvious and understandable, the present invention will be further elaborated in conjunction with the drawings and embodiments.

[0049] Embodiment

[0050] FIG. 1 is a flow diagram of a method for controlling intelligent environment-friendly can provided in an embodiment of the present invention. As shown in FIG. 1, the method comprises:

[0051] S101, controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time;

[0052] To be specific, the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform. Optionally, the first preset time is 200ms, the first preset number is 20, the first preset frequency is 38KHZ, and the duty cycle is 1/3. In this case, the time spent by the infrared emitting tube in emitting an infrared signal of the first pulse waveform is: $T=20*1/38=0.526\text{ms}$.

[0053] S102, detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;

[0054] To be specific, The infrared emitting tube and the infrared receiving tube installed on the intelligent environment-friendly can are oriented in the same direction and are positioned closely adjacent to each other. This arrangement ensures that when the infrared signal emitted by the infrared emitting tube is blocked by a person or object, the reflected infrared signal can be received by the infrared receiving tube. To be specific, if the infrared emitting tube emits an infrared signal with reference data shown in S101, when someone or object blocks the infrared light, and the infrared receiving tube receives a certain amount of infrared light reflected by 38KHZ waveform, the receiving tube will automatically output a low-level pulse (optionally, the low level is maintained for approximately 0.8T-1T). Through experiments, it was found that when the infrared emitting tube emitted the 10th to 12th waveforms, the infrared receiving tube would generate a low-level pulse.

[0055] Optionally, S102 comprises:

[0056] detecting the output level of the infrared receiving tube before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once;

[0057] determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level and low level respectively before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once. That is to say, before the infrared emitting tube emits the infrared signal of the first pulse waveform once, the infrared receiving tube outputs a high level; after the infrared emitting tube emits the infrared signal of the first pulse waveform once, the infrared receiving tube outputs a low level, then it is determined that the infrared receiving tube functions properly.

[0058] S103, controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly;

[0059] To be specific, the second preset time is smaller than the first preset time. Optionally, it does not exceed 0.2 times of the first preset time. In other words, when the infrared receiving tube functions properly, the infrared emitting tube is controlled to emit an infrared signal more frequently. Optionally, the second preset time is 25ms, the first preset times are 20 times, i.e., the fast emitting time is 500ms. To be specific, when the infrared receiving tube functions properly, the infrared emitting tube is controlled to emit an infrared signal of a second pulse waveform once every 25ms, the emitting frequency is low, the consecutive emitting times are 20 times, the total time spent is 500ms, which is short. The low emitting frequency makes high receiving accuracy of the infrared receiving tube. The short time spent and the small number of emitting times of the infrared signal can save energy.

[0060] To be specific, the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform. Optionally, the second preset number is 20, the second preset frequency is 38KHZ and the duty cycle is 1/3. In this case, the time spent by the infrared emitting tube in emitting an infrared signal of the second pulse waveform is: $T=20*1/38=0.526\text{ms}$. That is to say, optionally, the second pulse waveform is the same as the first pulse waveform.

[0061] S104, controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly;

[0062] Optionally, the second preset times are 5 times.

[0063] According to the technical solution provided in an embodiment of the present invention, the infrared emitting tube is controlled to emit an infrared signal of a first pulse waveform once every first preset time. If someone or something blocks the infrared signal, the infrared signal will be reflected. Now the infrared receiving tube can receive the reflected infrared signal. Therefore, by detecting the status of the infrared receiving tube, it is determined whether the infrared receiving tube functions properly. When the infrared receiving tube functions properly, it can be determined that someone or something pass the intelligent environment-friendly can. Now, the infrared emitting tube is controlled to emit an infrared signal of a second pulse waveform every second preset time for consecutive first preset times. If it is detected for consecutive second preset times that the infrared receiving tube functions properly, it means that the infrared receiving tube has detected the reflected infrared signal for consecutive second preset times. That is to say, someone or something has continuously blocked the infrared signals emitted by the infrared emitting tube. Therefore, it can be determined that someone is approaching the intelligent environment-friendly can. Now the motor is automatically controlled to act and open the upper cover of the environment-friendly can so that people can directly throw garbage into the intelligent environment-friendly can. Therefore, according to the technical solution provided by the present invention, if someone with garbage is approaching the intelligent environment-friendly can, the intelligent environment-friendly can will open the upper cover automatically, making it convenient to directly throw garbage into the can, avoiding the inconvenience of the prior art that when a user throws garbage, he/she has to personally open the upper cover, thereby avoiding the inconvenience of the people for opening the upper cover, thereby throwing the garbage near the can, and further assuring a clean and tidy surrounding environment of the garbage can.

[0064] Optionally, according to the technical solution provided in another embodiment of the present invention, before controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once, S101 further comprises:

[0065] powering on the infrared receiving tube third preset times in advance and maintaining the power-on status for fourth preset times.

[0066] To be specific, the infrared receiving tube is turned on periodically and turned off after a period of time rather than it is on all the time, so it can save energy. Optionally, the third preset time is $2T$, i.e., 1.502ms, and the fourth preset time is $4T$, i.e., 2.104ms.

[0067] Optionally, according to the technical solution provided in another embodiment of the present invention, S102 comprises:

[0068] detecting the output level of the infrared receiving tube for consecutive four times every fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform once;

[0069] Optionally, the fourth preset time is $0.4T$, i.e., 0.2104ms.

[0070] determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level, low level, low level and high level respectively.

[0071] To be specific, normally, at $0.5T \sim 0.6T$, the infrared receiving tube begins to output a low level, which is maintained for $0.8T \sim 1.0T$. Therefore, if the infrared receiving tube outputs a high level at $0.4T$, it will output a low level at $0.8T$, a low level at $1.2T$ and a high level at $1.6T$. That is to say, if the output levels of the infrared receiving tube during the four consecutive four times are high level, low level, low level and high level, respectively, then it is determined that the infrared receiving tube functions properly.

[0072] The foregoing method for detecting the output level of the infrared receiving tube through four-point detection (i.e., four consecutive four times) can better eliminate interference, such as interference from transparent plastic bags, ambient light, and distant objects, thereby preventing false actions.

[0073] Optionally, according to the technical solution provided in another embodiment of the present invention, after S104, it further comprises:

[0074] entering a standby state and continuing to control the infrared emitting tube to emit the first pulse waveform once every first preset time if within the fifth preset time, it is detected for less than the second preset times that the infrared receiving tube is functioning properly.

[0075] Optionally, the fifth preset time is 500ms, that is, the infrared emitting tube emits an infrared signal every 25ms. Optionally, the second preset times are 5 times. That is to say, If it is less than five times within 500ms that the infrared receiving tube functions properly, it can be determined that it is not that a user comes and throws his/her garbage and that it is not interference. At this point, eliminating interference and entering the standby mode can effectively prevent the motor from malfunctioning (i.e., the cover of the intelligent environment-friendly can is opened by mistake), and the accuracy is relatively high.

[0076] In order to illustrate the technical solution provided by the present invention, the present invention discloses a device for controlling intelligent environment-friendly can in correspondence to the method for controlling intelligent environment-friendly can. At this point, eliminating interference and entering the standby mode can effectively prevent the motor from malfunctioning (i.e., the cover of the intelligent environment-friendly can is opened by mistake), and the accuracy is relatively high .

[0077] FIG. 2 is a structural diagram of a device for controlling intelligent environment-friendly can provided in an embodiment of the present invention. As shown in FIG. 2, the device comprises:

[0078] a first control module 201, used for controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;

[0079] a detection module 202, used for detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;

[0080] Optionally, the detection module 202 comprises:

[0081] a first detection module, used for detecting the output level of the infrared receiving tube before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once;

[0082] a first determining module, used for determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level and low level respectively before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once.

[0083] a second control module 203, used for controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform; and

[0084] a third control module 204, used for controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly.

[0085] Optionally, the device for controlling intelligent environment-friendly can provided in another embodiment of the present invention further comprises:

[0086] a fourth control module, used for powering on the infrared receiving tube the third preset time before the first control module controls the infrared emitting tube to emit an infrared signal of a first pulse waveform once, and maintaining the power-on status for a fourth preset time.

[0087] Optionally, according to the device for controlling intelligent environment-friendly can provided in another embodiment of the present invention, the detection module 202 comprises:

[0088] a second detection module, used for detecting the output level of the infrared receiving tube for consecutive four times every fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform once;

[0089] a second determining module, used for determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level, low level, low level and high level respectively.

[0090] Optionally, the device for controlling intelligent environment-friendly can provided in another embodiment of the present invention further comprises:

[0091] a fifth control module, used for entering a standby state and continuing to control the infrared emitting tube to emit the first pulse waveform once every first preset time if within a fifth preset times, it is detected for less than the second preset times that the infrared receiving tube functions properly.

[0092] According to the device for controlling intelligent environment-friendly can provided in an embodiment of the present invention, if someone with garbage is approaching the intelligent environment-friendly can, the intelligent environment-friendly can will open the upper cover automatically, making it convenient to directly throw garbage into the can, avoiding the inconvenience of the prior art that when a user throws garbage, he/she has to personally open the upper cover, thereby avoiding the inconvenience of the people for opening the upper cover, thereby throwing the garbage near the can, and further assuring a clean and tidy surrounding environment of the garbage can.

[0093] In order to more comprehensively protect the technical solution provided by the present invention, the present invention discloses an intelligent environment-friendly can in correspondence to the method for controlling intelligent environment-friendly can provided in an embodiment of the present invention.

[0094] The intelligent environment-friendly can provided by the present invention, comprises:

[0095] an SCM, an infrared emitting tube connected to the SCM, an infrared receiving tube connected to the SCM, a motor connected to the SCM, and an environmentally friendly can with an upper cover;

[0096] The operation of the SCM comprises:

[0097] controlling an infrared emitting tube to emit an infrared signal of a first pulse waveform once every first preset time, wherein the first pulse waveform includes a first preset number of consecutive sub-waveforms with a first preset frequency; the sub-waveform is one period of waveform;

[0098] detecting the status of an infrared receiving tube and determining whether the infrared receiving tube functions properly;

[0099] controlling the infrared emitting tube to emit an infrared signal of a second pulse waveform once every second preset time for consecutive first preset times in total when the infrared receiving tube functions properly, wherein the second pulse waveform includes a second preset number of consecutive sub-waveforms with a second preset frequency; the sub-waveform is one period of waveform;

[0100] controlling a motor to act and open the upper cover of the environment-friendly can if it is detected for the second consecutive preset number of times that the infrared receiving tube functions properly.

[0101] Optionally, according to the intelligent environment-friendly can provided in another embodiment of the present invention, the operation of the SCM further comprises:

[0102] powering on the infrared receiving tube third preset times in advance and maintaining the power-on status for fourth preset times before the infrared emitting tube is controlled to emit an infrared signal of a first pulse waveform once each time.

[0103] The infrared emitting tube and the infrared receiving tube installed on the intelligent environment-friendly can are oriented in the same direction and are positioned closely adjacent to each other so that after the infrared signal emitted by the infrared emitting tube is blocked by a person or object, the reflected infrared signal can be received by the infrared receiving tube.

[0104] Optionally, the motor is connected to the upper cover through a gear. When the motor rotates in the forward direction, the upper cover is opened; when it rotates in the reverse direction, the upper cover is closed.

[0105] Optionally, for the intelligent environment-friendly can provided in an embodiment of the present invention, the operation that the SCM detects the status of an infrared receiving tube and determines whether the infrared receiving tube functions properly comprises:

[0106] detecting the output level of the infrared receiving tube before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once;

[0107] determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level and low level respectively before and after the infrared emitting tube emits the infrared signal of the first pulse waveform once.

[0108] It should be noted that for the intelligent environment-friendly can provided in an embodiment of the present invention, the operation that the SCM detects the status of an infrared receiving tube and determines whether the infrared receiving tube functions properly can be achieved by other methods, too and specifically comprises:

[0109] detecting the output level of the infrared receiving tube for consecutive four times every fourth preset time when the infrared emitting tube begins to emit the infrared signal of the first pulse waveform once;

[0110] determining that the infrared receiving tube functions properly if the output levels of the infrared receiving tube are high level, low level, low level and high level respectively.

[0111] Optionally, for the intelligent environment-friendly can provided in another embodiment of the present invention, the operation of the SCM further comprises:

[0112] entering a standby state and continuing to control the infrared emitting tube to emit the first pulse waveform once every first preset time if within a fifth preset times, it is detected for less than the second preset times that the infrared receiving tube functions properly.

[0113] Optionally, for the intelligent environment-friendly can provided in another embodiment of the present invention, when the infrared emitting tube and the infrared receiving tube are not in operation, the SCM automatically enters a sleep mode, which is more energy-efficient.

[0114] It can be known from the foregoing technical solution that compared with the prior art, the present invention provides a method and device for controlling intelligent environment-friendly can and the intelligent environment-friendly can. According to the technical solution provided by the present invention, the infrared emitting tube is controlled to emit an infrared signal of a first pulse waveform once every first preset time. If someone or something blocks the infrared signal, the infrared signal will be reflected. Now the infrared receiving tube can receive the reflected infrared signal. Therefore, by detecting the status of the infrared receiving tube, it is determined whether the infrared receiving tube functions properly. When the infrared receiving tube functions properly, it can be determined that someone or something pass the intelligent environment-friendly can. Now, the infrared emitting tube is controlled to emit an infrared signal of a second pulse waveform every second preset time for consecutive first preset times. If it is detected for consecutive second preset times that the infrared receiving tube functions properly, it means that the infrared receiving tube has detected the reflected infrared signal for consecutive second preset times. That is to say, someone or something has continuously blocked the infrared signals emitted by the infrared emitting tube. Therefore, it can be determined that if someone is approaching the intelligent environment-friendly can. Now the motor is automatically controlled to act and open the upper cover of the environment-friendly can so that people can directly throw garbage into the intelligent environment-friendly can. Therefore, according to the technical solution provided by the present invention, if someone with garbage is approaching the intelligent environment-friendly can, the intelligent environment-friendly can will open the upper cover automatically, making it convenient to directly throw garbage into the can, avoiding the inconvenience of the prior art that when a user throws garbage, he/she has to personally open the upper cover, thereby avoiding the inconvenience of the people for opening the upper cover, thereby throwing the garbage near the can, and further assuring a clean and tidy surrounding environment of the garbage can.

[0115] Lastly, it should be noted that the relational terms herein such as first and second are only used to distinguish one entity or operation from another entity or operation and do not necessarily require or imply any such actual relation or sequence among these entities or operations. Furthermore, the terms “comprise,” “include” and any other equivalent expressions are intended to cover non-exclusive inclusion so that a process, method, object or device comprising a series of factors not only includes these factors but also includes other factors not expressly listed, or also includes factors inherent with the process, method, object or device. Under the condition of no further limitations, the factors delimited by expression “comprise a...” do not exclude other same factors in the process, method, object or device including said factors.

[0116] The embodiments in the description are all described in a progressive manner, each embodiment focuses on the differences from other embodiments and the same or similar parts among the embodiments can be mutually referred to. The device and intelligent environment-friendly can disclosed in embodiments correspond to the method disclosed in an embodiment, so they are simply described and for the relevant parts, please refer to the description in the method embodiments.

[0117] The steps of the method or algorithm described in the embodiments disclosed in this article can be directly implemented using hardware, software modules executed by a processor, or a combination of both. The software modules can be stored in a random access memory (RAM), memory, read-only memory (ROM), electrically programmable ROM, electrically erasable programmable ROM, register, hard disk, removable disk, CD-ROM, or any other form of storage medium known in the technical field.

[0118] The above description of the disclosed embodiments enables those skilled in the art to realize or use the present invention. Various modifications to these embodiments will be obvious to those skilled in the art. The general principle defined herein can be implemented in other embodiments without departing from the spirit or scope of the present invention. Therefore, the present invention will not be limited to the embodiments provided herein, but should conform to the widest scope consistent with the principles and novel features disclosed herein.

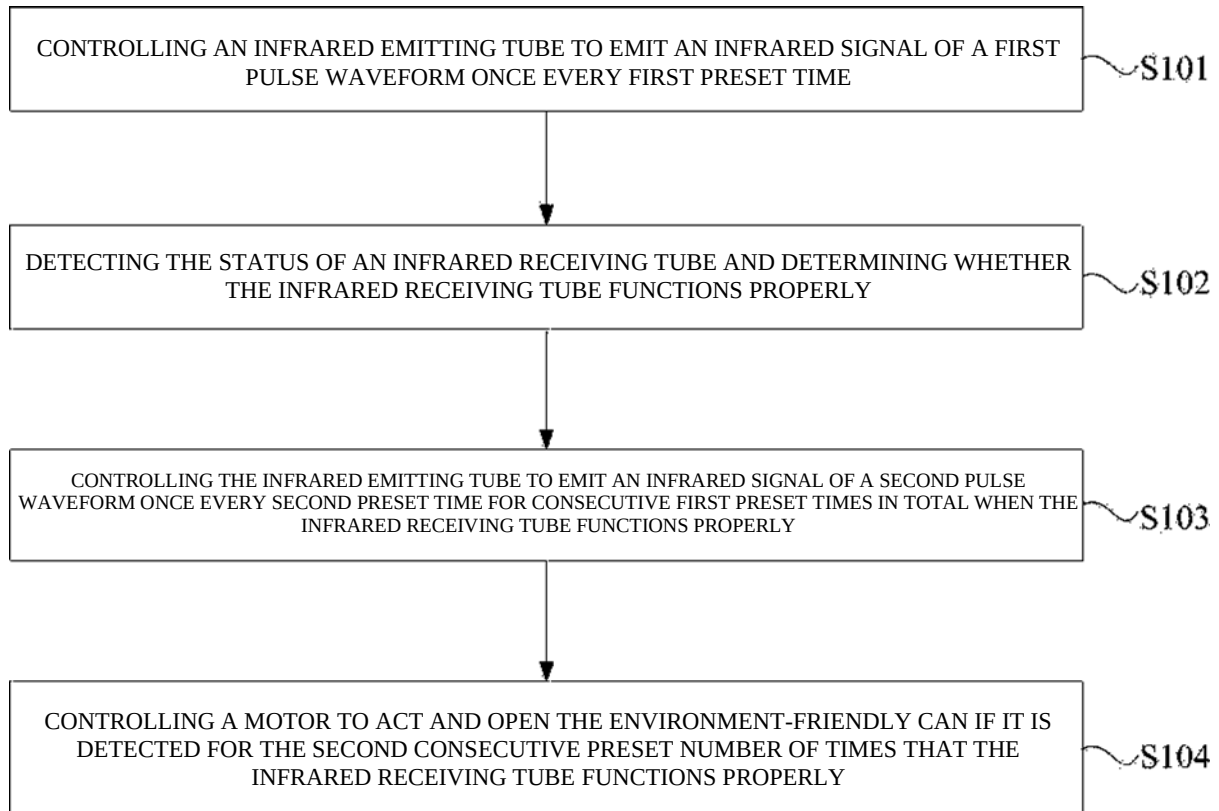


FIG. 1

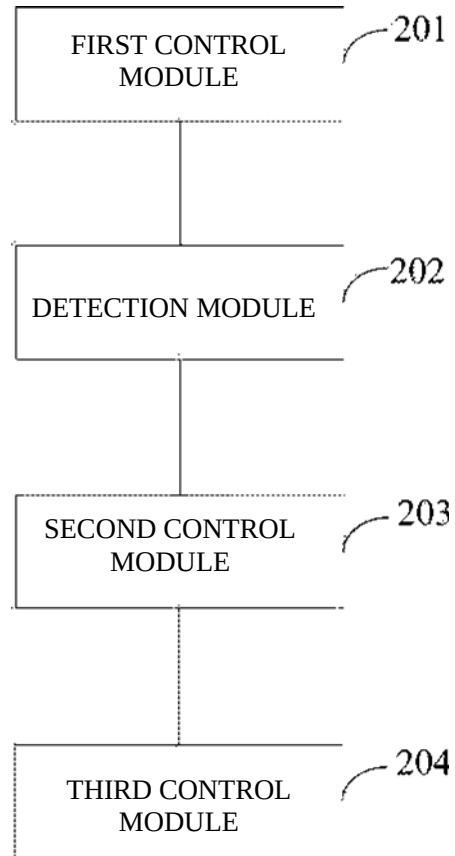


FIG. 2