CLAIMS

What is claimed is:

1. A trash bag detection device for a smart trash receptacle, comprising a transmitter (13) for transmitting a signal and a receiver (14) for receiving a signal, both the transmitter (13) and the receiver (14) being disposed on internal surfaces of the trash receptacle, wherein

the signal received by the receiver (14) is a direct signal transmitted from the transmitter (13) or a signal from the transmitter (13) that has been reflected;

the trash bag detection device further comprising a fan (15) for evacuating the trash receptacle and a control mechanism, each of the transmitter (13), the receiver (14) and the fan (15) being communicatively coupled to the control mechanism, the control mechanism being configured to control an operational status of the fan (15) based on the signal received by the receiver, wherein

i) the signal received by the receiver (14) is the direct signal sent from the transmitter (13), and in the event of a trash bag being present between the receiver (14) and the transmitter (13), the receiver (14) produces a first sense signal based on which the control mechanism instructs the fan (15) to stop its operation; or

ii) the signal received by the receiver (14) is the signal from the transmitter (13) that has been reflected, and in the event of a trash bag being present in the receptacle and being in close proximity to both the receiver (14) and the transmitter (13), the receiver (14) produces a first sense signal based on which the control mechanism instructs the fan (15) to stop its operation.

2. The trash bag detection device according to claim1, wherein

the transmitter (13) is an infrared (IR) transmitter and the receiver (14) is an IR receiver; or

the transmitter (13) is an ultrasonic transmitter and the receiver (14) is an ultrasonic receiver.

3. The trash bag detection device according to claim 1, wherein the signal received by the receiver (14) is a direct signal sent from the transmitter (13), and wherein

i) the transmitter (13) is disposed on an internal bottom surface of the trash receptacle and the receiver (14) on an internal side surface thereof so that a central transmission axis of the transmitter (13) is oriented at an angle α of 30-50 degrees with respect to the internal bottom surface of the trash receptacle and that a central reception axis of the receiver (14) is oriented at an angle β of 38-58 degrees with respect to a vertical direction for the internal side surface of the trash receptacle; or

ii) the receiver (14) is disposed on the internal bottom surface of the trash receptacle and the transmitter (13) on the internal side surface thereof so that the central reception axis of the receiver (14) is oriented at an angle α of 30-50 degrees with respect to the internal bottom surface of the

trash receptacle and that the central transmission axis of the transmitter (13) is oriented at an angle β of 38-58 degrees with respect to the vertical direction for the internal side surface of the trash receptacle.

4. The trash bag detection device according to claim 1, wherein the signal received by the receiver (14) is a direct signal sent from the transmitter (13), and wherein

the transmitter (13) and the receiver (14) are disposed in opposition to each other on internal side surfaces of the trash receptacle and are both close to the internal bottom surface of the trash receptacle.

5. The trash bag detection device according to claim 1, wherein the signal received by the receiver (14) is a signal from the transmitter (13) that has been reflected, and wherein

i) the transmitter (13) and the receiver (14) are both disposed on the internal bottom surface of the trash receptacle, with a central transmission axis of the transmitter (13) and a central reception axis of the receiver (14) being both directed upward; or

ii) the transmitter (13) and the receiver (14) are both disposed on an internal side surface of the trash receptacle, with the central transmission axis of the transmitter (13) and the central reception axis of the receiver (14) being both directed toward the interior of the receptacle.

6. The trash bag detection device according to claim 1, wherein the transmitter (13) and the receiver (14) are fixed to the internal surfaces of the trash receptacle by means of respective poka-yokes.

7. The trash bag detection device according to claim 1, further comprising dustproof and light-shading protective hoods (16) that are attached to the internal surfaces of the trash receptacle, and the transmitter (13) and the receiver (14) are housed in the protective hoods (16) respectively.

8. A smart trash receptacle, comprising the trash bag detection device according to claim 1.

9. A method for control of automatic bag replacement for a smart trash receptacle, the smart trash receptacle comprising the trash bag detection device according to any one of claims 3-5, the method comprising the steps of:

activating the fan (15);

determining whether the receiver (14) produces a first sense signal; and

if so, deactivating the fan (15).

10. The method for control of automatic bag replacement according to claim 9, further comprising, prior to the activation of the fan (15):

opening a main dump cover of the trash receptacle and determining whether a first sense signal is produced;

if so, raising an alert; and

if not, closing the main dump cover and activating the fan (15).