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Design of Automatic Isolated Medical Waste Bin Cover for Drying Waste

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Abstract

Background. The recent outbreak of COVID-19 has led to an increase in isolated medical waste, making the disposal of isolated medical waste a significant problem. There is the dedicated waste bin with four-sided locking-type at the top, causing contact during waste disposal. And it has infection possibility with high humidity. *Purpose*. In this article, we suggest automatic isolated medical waste bin cover for drying waste.

Keywords

biomedical engineering, ergonomics and/or human factors study, history of medicine

Introduction

Isolated medical wastes, among medical wastes, are all waste generated from medical activities for persons quarantined to protect others from infectious diseases. Negligence in the management of medical waste can adversely affect the human body and the environment, causing harm to both the medical and the public.[1]

The recent outbreak of COVID-19 increases the generation of isolated medical waste from 357.19 to 646.81.[2] As a result, the disposal of isolated medical waste has become a significant problem.

In general, dedicated containers used to treat isolated medical wastes are box-type container of synthetic resin based on the Medical Waste Management Act.[3] There is a four-sided locking-type lid at the top, causing contact during waste disposal. Therefore, continuous contacts contribute to the possibility of infection during waste disposal.[4,5]

In this article, automatic isolated medical waste bin cover for drying waste is suggested.

Methods

Figure 1 shows the parts of automatic isolated medical waste bin cover and their function. By the cooler and the UV module, the system works to dry waste, which falls inside between the double doors.

When used by the medical staff, the IR sensor detects it, and the upper doors open outer. The range of 0 to 180 degree pulse values for the servo motor is set to 544 minimum values and 2400 maximum values, and it opens the entrance automatically. The waste is placed upside of the inner doors, then the propeller and UV module for drying and disinfection activate. After drying, the servo motor at the bottom moves 100° inward to drop waste into the container automatically.

The automatic isolated medical waste bin cover's overall size is 220 mm × 215 mm × 325 mm and weighs less than 1.26 kg, not including the waste bin.

Results

To confirm that the automatic isolated medical waste bin cover dries waste well, we took the experiment about how much time for drying per waste's wet. Each 5.0 cm x 5.0 cm gauze absorbs 75% concentration colorant solution by 10 mL, 20 mL, 30 mL, 40 mL, and 50 mL. Then automatic isolated medical waste bin cover dries them one by one, and we measure the time for drying clearly.

Figure 2 shows the time for drying per waste's wet three times. The gauze taking 50 mL solution needs about

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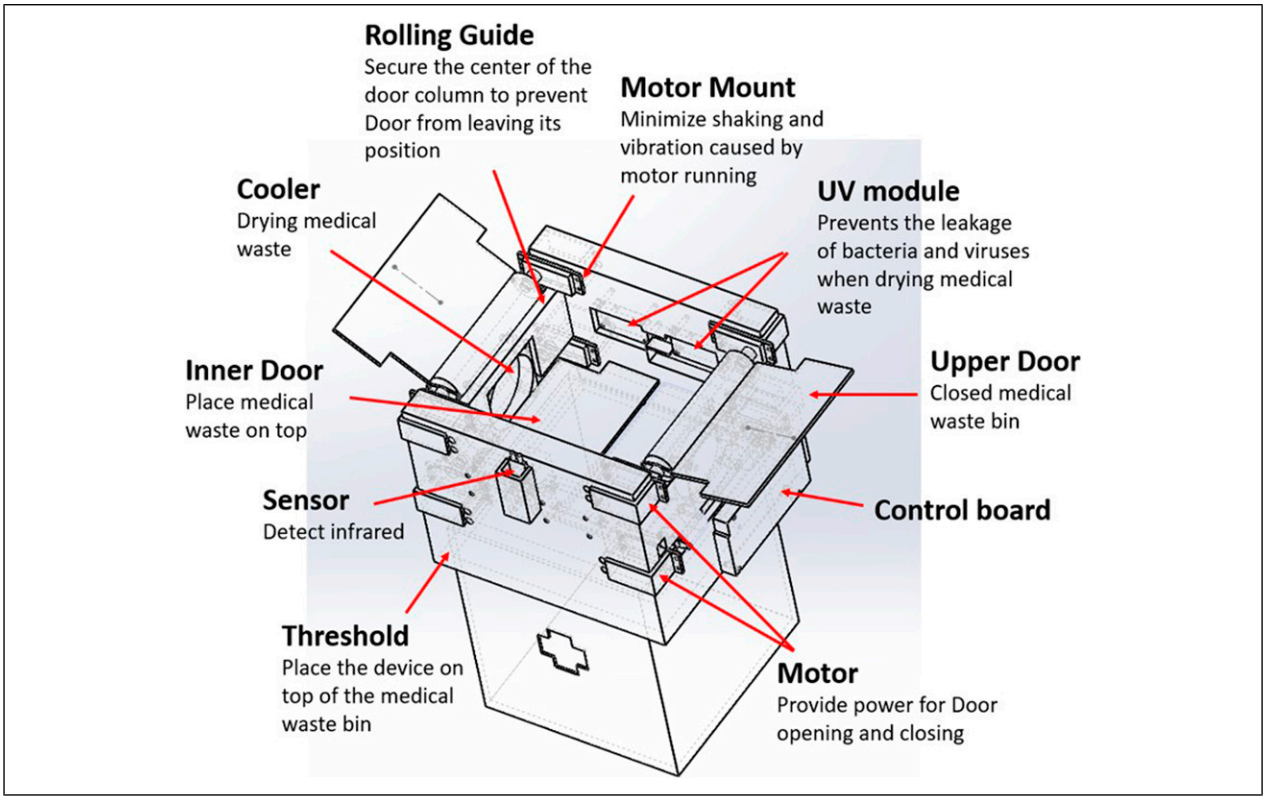

Figure 1. Describe parts for automatic medical waste bin cover.

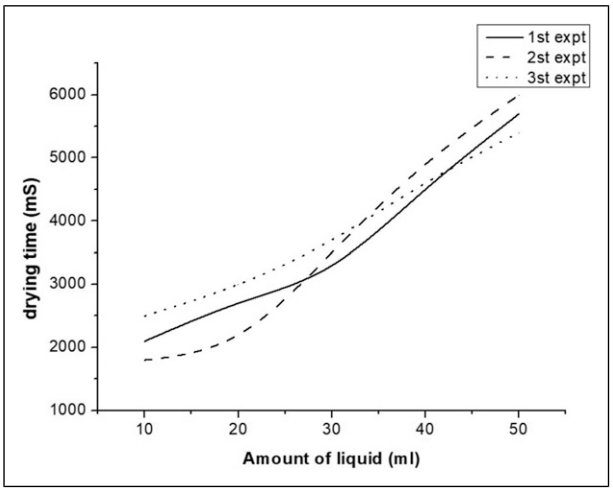

Figure 2. Drying time per amount of liquid.

6 seconds. Other materials like gloves made of latex are of less taken humidity, and it means the device's running time is enough for 6 seconds.

Conclusion and Discussion

The contact in the process of isolated waste treatment is cumbersome and has infection possibility. Therefore, in this article, automatic isolated medical waste bin cover for drying waste is suggested. Figure 3 is the image of the manufactured device. This device is expected to help the medical field by reducing the possibility of infection with isolated medical waste.

Author Contribution

Dominique Vervoort: conceptualization, writing, review, approval
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Study concept and design: Juhui Lee
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Declaration of Conflicting Interests

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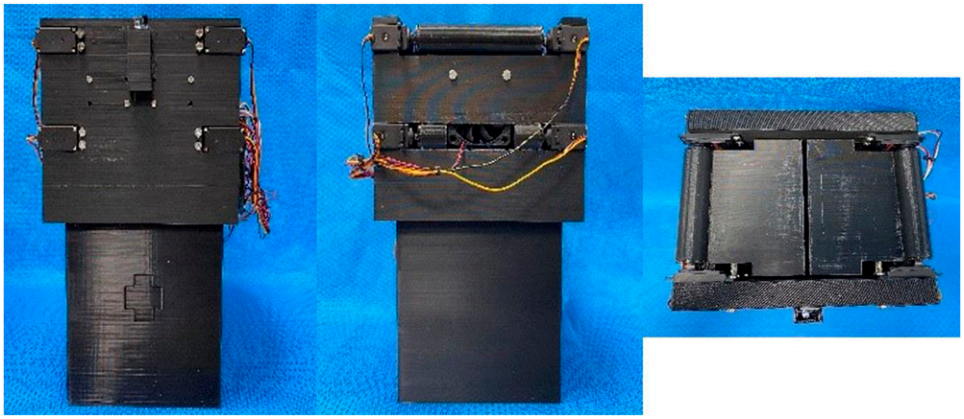

Figure 3. Fabrication of the structure.

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