Personal Grocery Transport Container

ME9

Engineering Graphics and Design

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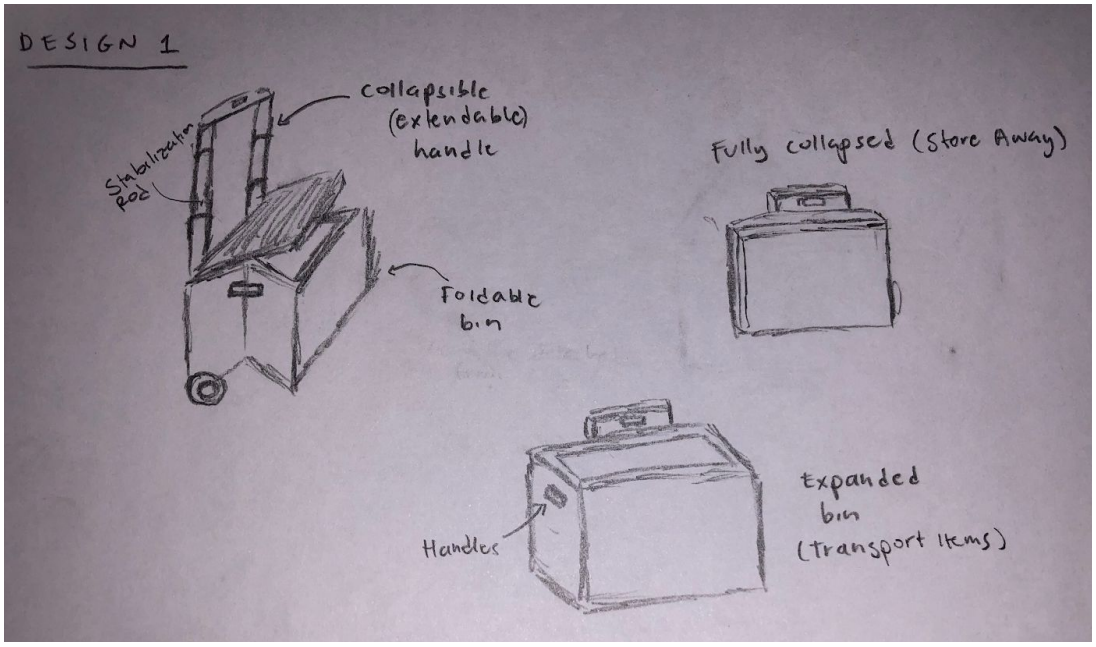
Introduction

Shopping carts are used extensively by shoppers and merchants for carrying items and merchandise while shopping. Before COVID-19, shoppers also used reusable bags instead of disposable grocery bags, as it was more environmentally friendly and sustainable. However, especially during the pandemic, sharing of public shopping carts poses a number of health risks, even after efforts to sanitize. In addition, reusable bags are now discouraged because of sanitation concerns and transportation of groceries in a hot car raises food safety concerns. Therefore, a new and improved approach for transporting groceries from the store shelves to the home pantry that addresses the food safety and handling concerns related to viruses and long-standing sustainability concerns with plastic and paper bags is necessary.

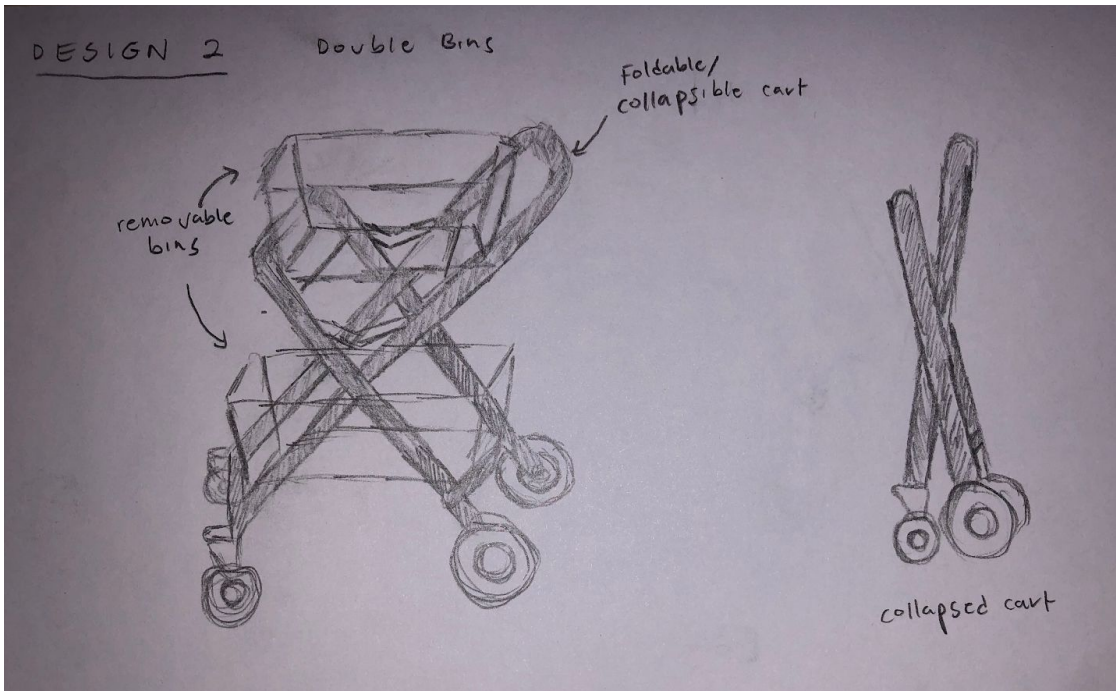
Problem Definition

Current shopping carts fail to address the sanitation concerns during the pandemic, the food safety and handling concerns, and sustainability concerns with disposable bags. To solve the problem, the proposed solution must meet the following criteria. In terms of storage size, the cart must have one or more cargo bins totaling 6000 in^3, where a third of the volume is used for insulation of cold items. The bin(s) should be able to be easily removed and the cart should be able to be easily placed in the vehicle. The time required to load or unload the cart from the vehicle must not exceed one minute. In order for the system to fit in a car trunk or SUV, the stowed volume of the cart and bins must not exceed 36 x 30 x 18 inches (18 inches in height). The unloaded cart and bins must weigh less than 30 lbs. Aside from these requirements, any surfaces that come into contact with humans or groceries must be able to be easily cleaned and disinfected. In addition, the cart must be simple, safe, reliable, and aesthetically pleasing.

Conceptual Designs

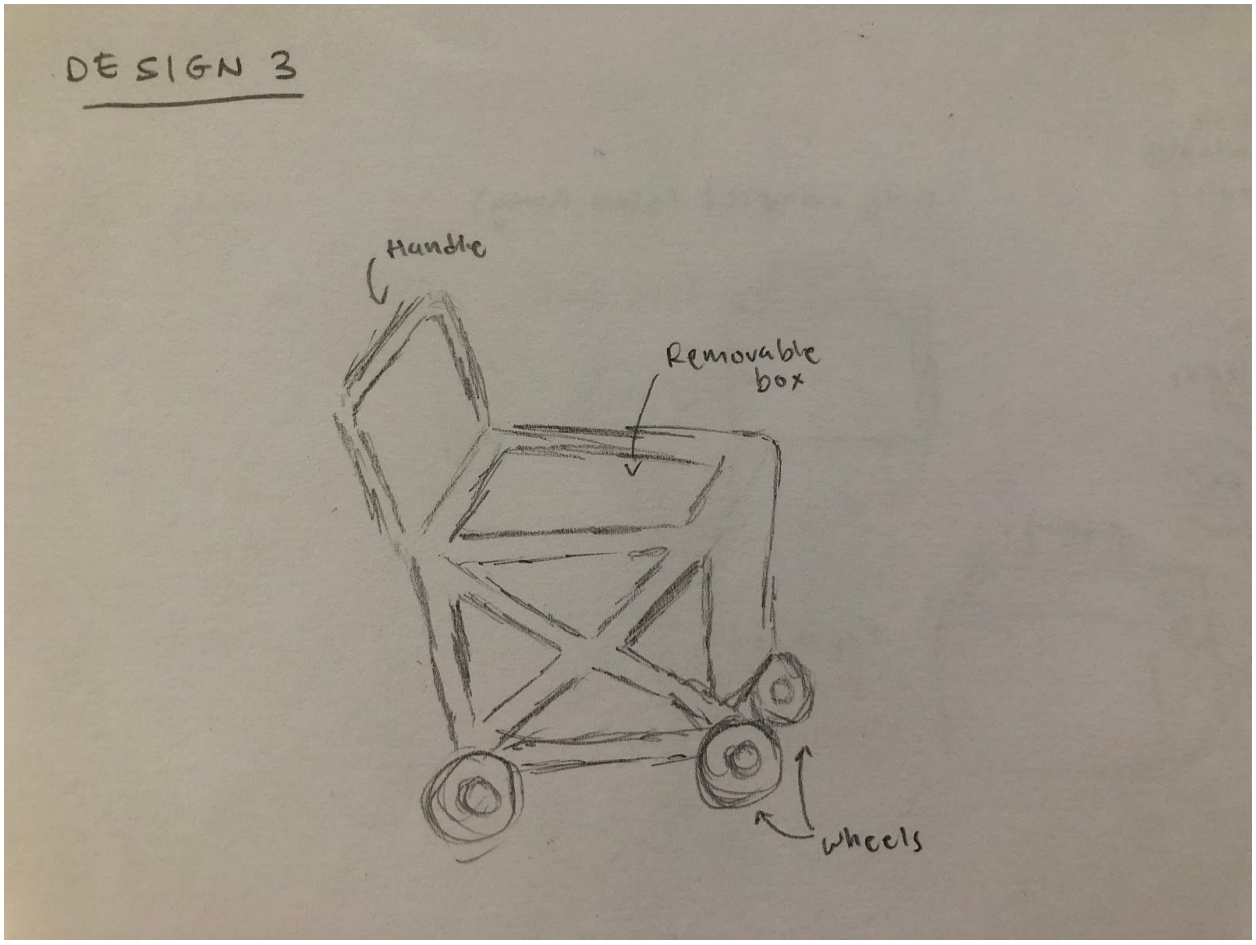


Design 1 has more emphasis on the compactness of the shopping cart. It consists of a foldable bin and collapsible handle for easy storage. In addition, the handle can be collapsed, with the bin expanded. This makes it easy for the user to transport the bin to the car and to the home without removal of any items from the bin.



Design 2 consists of a foldable cart with wheels. In addition, it has removable bins. This design has many moving parts to the shopping cart, which may hinder its ease of use. However, the

cart can be collapsed with the help of the hinges, but the bins are not able to be fold or condensed any further.



Design 3 consists mainly of the metal component that holds the removable box. The removable box sits inside the metal component. However, the device cannot be collapsed or condensed any further. Although it is not very compact, the device is more mobile and stable with the use of four wheels and even distribution.

Design Concept Selection

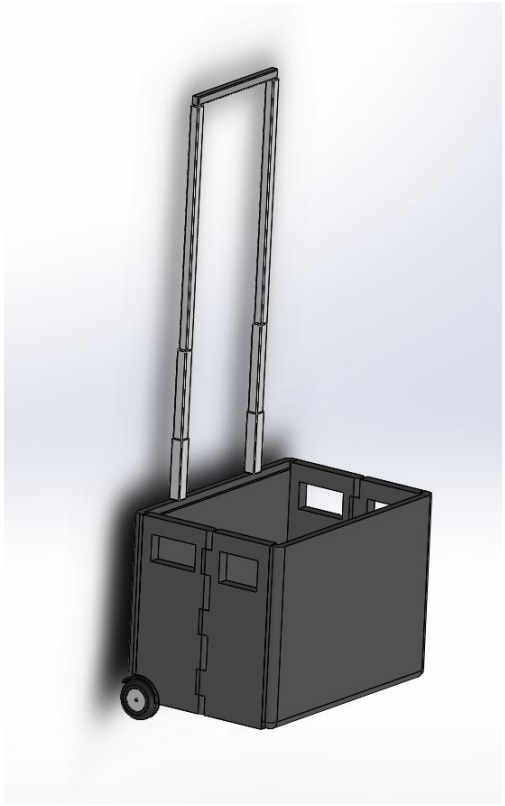
The criteria for concept selection will be based on cost, safety, weight, operational simplicity, compactness, and speed. Operational simplicity demonstrates the ease of use when stowing the device away, assembling, and transporting. Compactness demonstrates how much space or volume the device will take up once the device is fully stowed away. Cost refers to the amount of money required for the materials for the device.

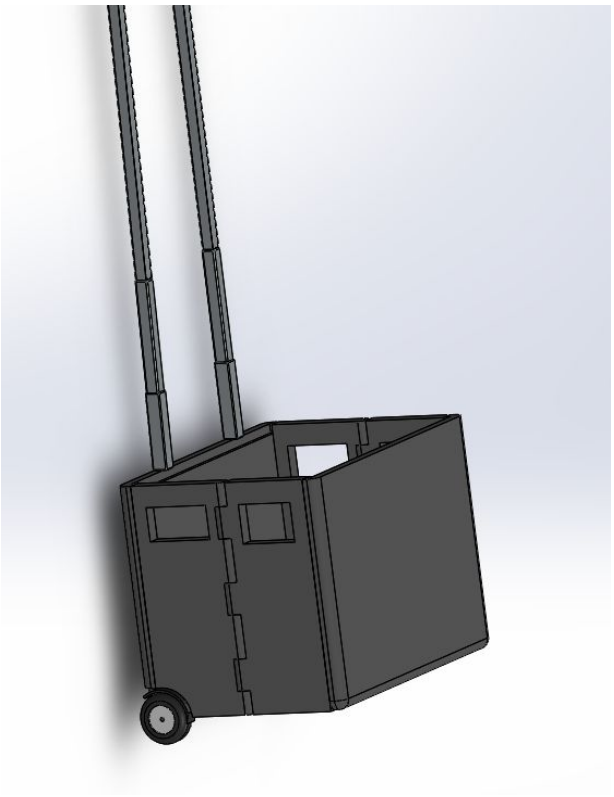
Decision Matrix

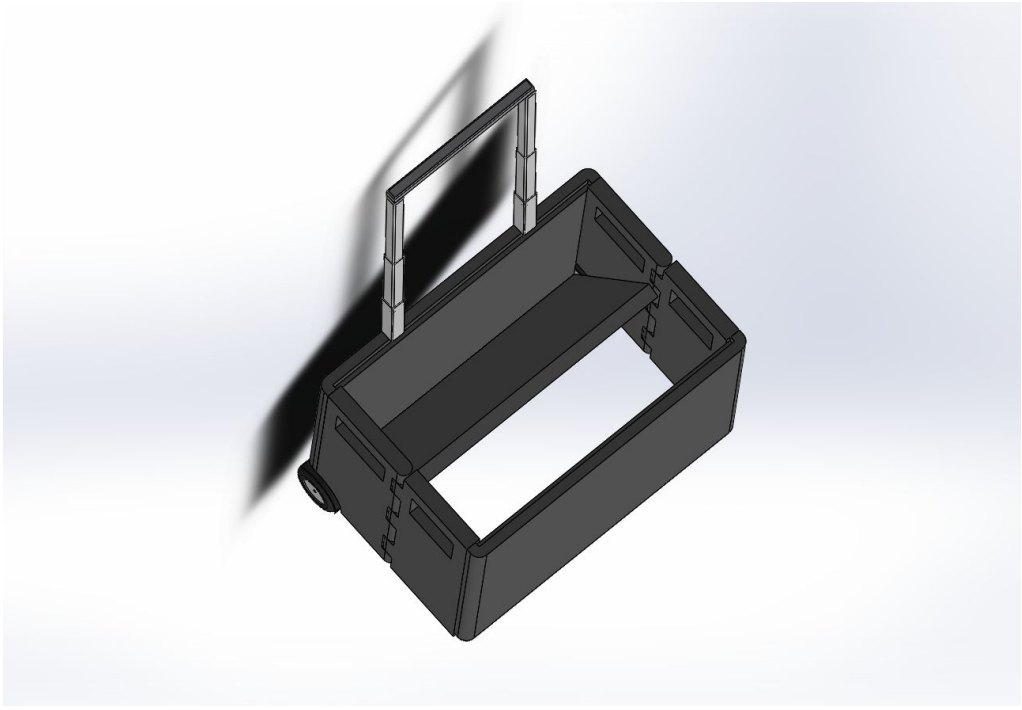
Criteria	Weighted Value	Design 1	Design 2	Design 3
Cost	6	Datum	+	+
Safety	8	Datum	-	+
Weight	5	Datum	-	-
Operational Simplicity	10	Datum	-	-
Compactness	9	Datum	-	-
Speed	4	Datum	+	+
Unweighted Total		Datum	-2	0
Weighted Total		Datum	-22	-6

Because design 2 and 3 have a negative weighted total value in the decision matrix than design 1, design 1 is the optimal design.

Design Solution







To collapse and close the cart:

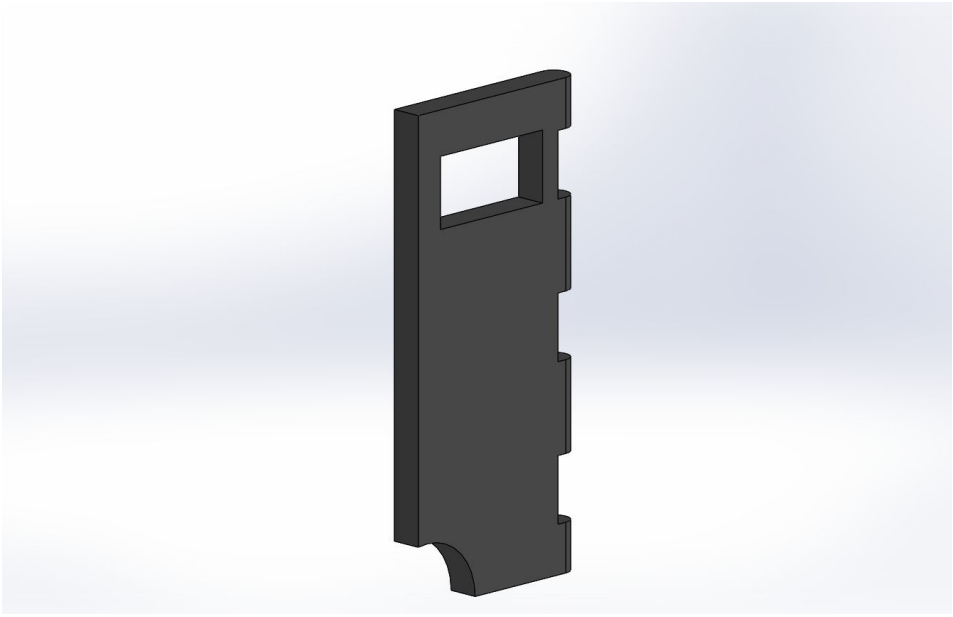
Step 1: Lift the bottom lid towards the backside of the cart.

Step 2: Push the front of the cart towards the back of the cart for the sides to fold.

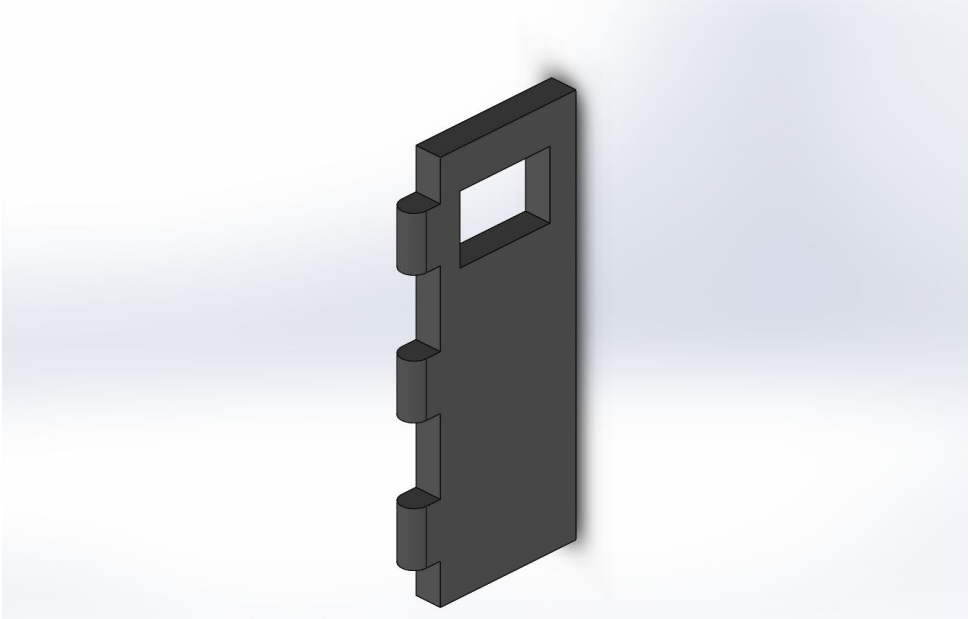
Step 3: Next, the handle can collapse by pushing down on the handle bar.

Parts

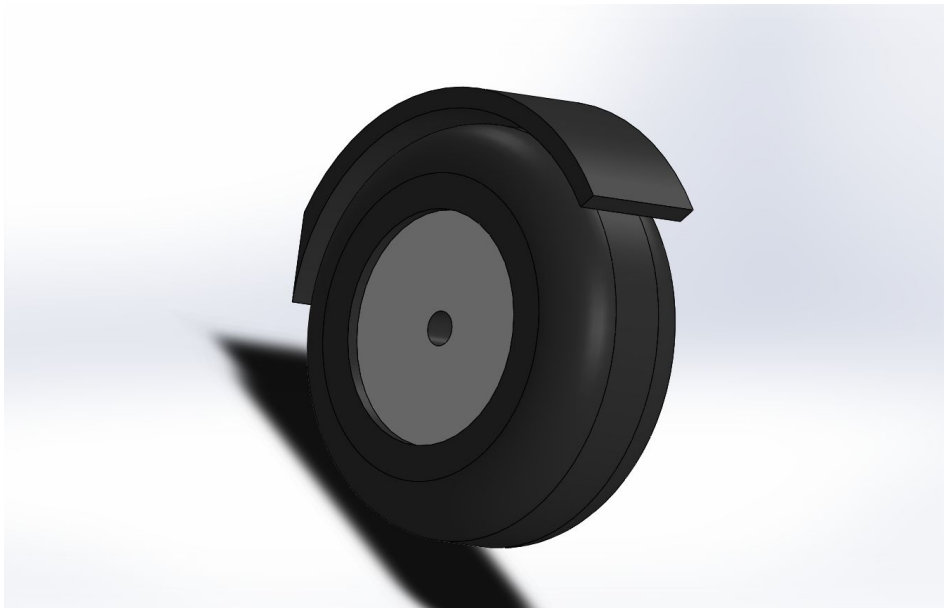
Side Part 1



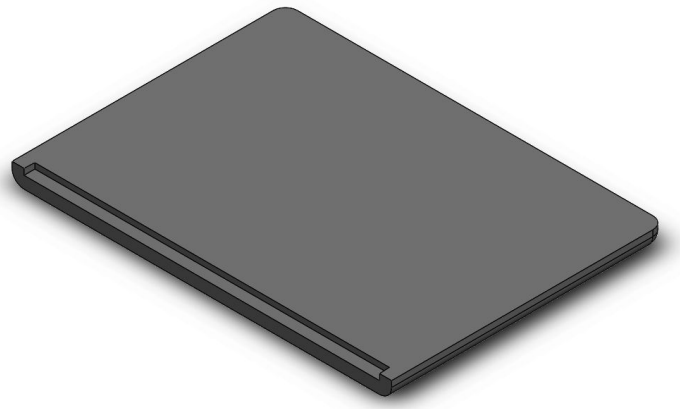
Side Part 2



Wheel



Cart Front and Back Part



Summary

Design 1 is the most optimal grocery container that satisfies the criteria listed in the problem definition. Its ease of use allows users to collapse and store the device away. The stowed volume of the cart and bins does not exceed 36 x 30 x 18 inches. In addition, it allows users to easily transport groceries from the store to the user's car and home. In addition, it also can be easily sanitized between uses and is relatively safe, simple, and reliable.

Conclusion and Recommendation

Although the created design does meet the engineering requirements, improvements can be made. For example, additional wheels can be incorporated toward the front of the cart, so the device would be able to move with a total of four wheels. This would increase the longevity and stability of the device.