Engineering Portfolio

2018-2023

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BALL TRANSPORTATION DEVICE- TORONTO METROPOLITAN UNIVERSITY

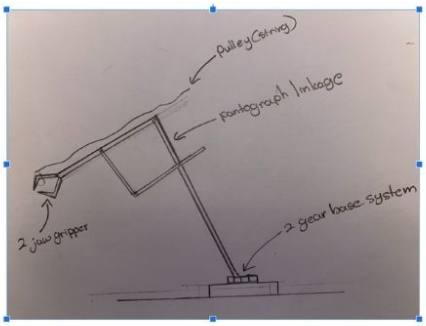
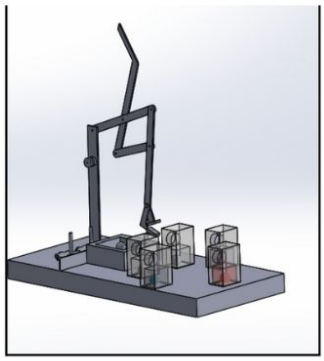


Table 3. Concept Evaluation

Design number	Maintainability	Functionality	Manufacturability	Durability	Usability	Total	Rank
A2 B2 C3 D2	0	1	0	1	2	4	#1
A3 B1 C4 D2	1	1	-1	0	1	2	#3
A2, B2 ,C2 ,D3	-1	0	1	0	1	1	#5
A2-B2-C1 -D2	0	1	1	1	0	3	#2
A4 B3 C4 D1	1	0	1	1	-2	1	#4



What?

- Designed and built a mechanism capable of transporting three distinct balls into three separate containers.
- Performed a stress analysis to ensure that the system would not fail when using the mechanism.

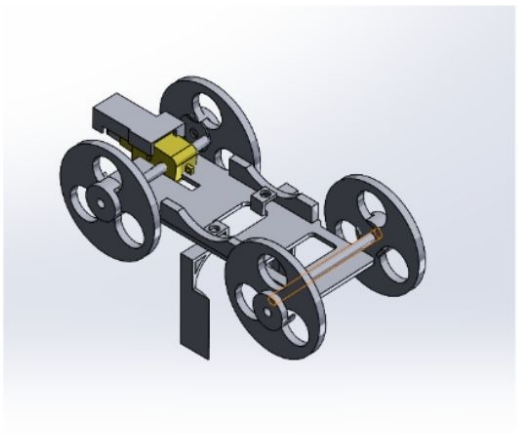
How?

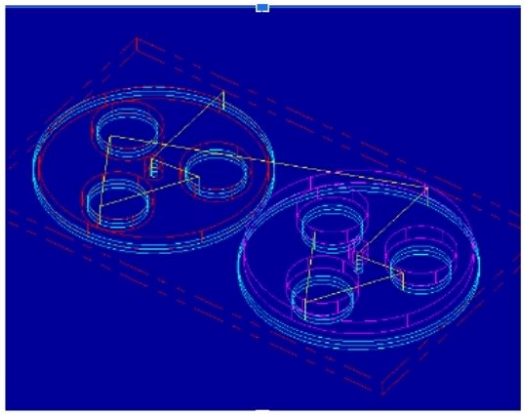
- To create the construction, just acrylic sheet, rubber band, paper clips, and **SolidWorks features** were used.
- **GD&T** was used on all designs, as well as a **decision matrix** during the review process.

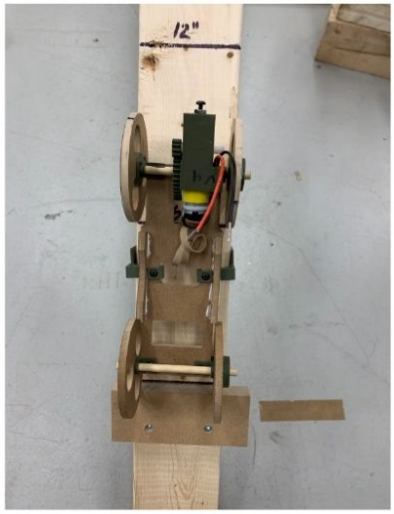
Results

- The design fulfilled its purpose with 90% accuracy and precision.

FUNICULAR VEHICLE - TORONTO METROPOLITAN UNIVERSITY







What?

- Created a miniature vehicle that travel 60 degrees wood stud while carrying a standard 355ml pop can
- The team's supplies are limited to 3 fiberboard and 50 grams of FDM (thermoplastic polymers).

How?

- Designed on **SolidWorks**
- Joined the components together that make up the can holder via **MasterCAM** and **CNC machine**
- Fabricated customs gears for the wheels using a **3D machine** and **G-Code software**

Results

- The car successfully navigated a 30 degree incline.
- The weight was distributed uniformly along the length rather than being concentrated in one spot.

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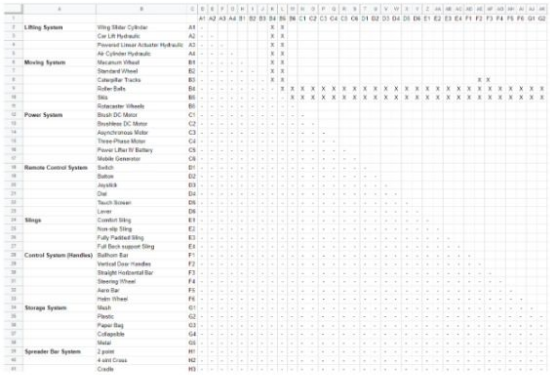
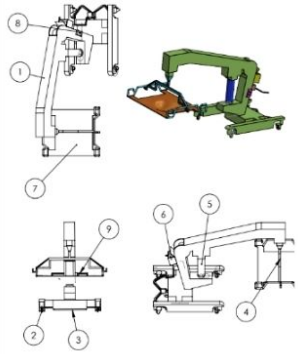
HOMECARE PATIENT DEVICE - TORONTO METROPOLITAN UNIVERSITY





What?

- Designed a device that can transport people with limited abilities.
- The gadgets are intended to protect the patient and other participants before, during, and after the transportation procedure.

How?

- Used **SolidWorks** to design structure
- Used **Microsoft Excel and Google Spreadsheet** to organize and evaluate concept design
- Implemented **Persona and Human Factor** principles to simulate real life situations ,reducing errors

Results

- Understand the critical process of product design and educated the team about the demands of users and co-users..

RAMA DESIGN FOOD CHOPPER-TORONTO METROPOLITAN UNIVERSITY

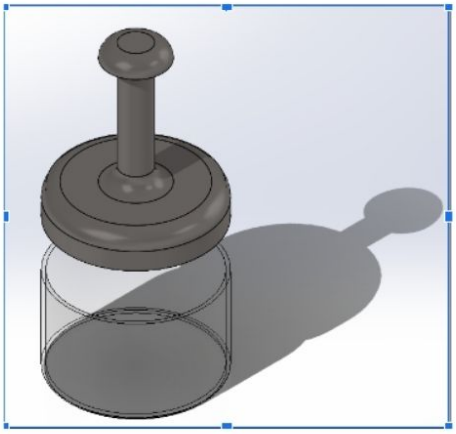
DFMA® - Boothroyd Dewhurst, Inc.
Design for Assembly
Assembly Totals for Design for Assembly (DFA)
November 29, 2022

DFMA BOOTHROYD DEWHURST
New (1).dfax

Entries including repeats	Original
Parts meet minimum part criteria	7
Parts are candidates for elimination	23
Analyzed subassemblies	4
Separate assembly operations	0
Total entries	34

Assembly labor time, s	
Parts meet minimum part criteria	28.71
Parts are candidates for elimination	137
Insertion of analyzed subassemblies	14.16
Separate assembly operations	0
Total assembly labor time	180

Design efficiency	
DFA Index	13.96



What?

- Reverse engineered a food chopper to make it more efficient and user-friendly
- Reduced any parts that are deemed unnecessary

How?

- Used **SolidWorks** to design the final concept
- Used **Lucas method** to reduce the every part during the insertion and handling phases
- Used **DFMA method** to reduce the assembly time and cost of the overall product

Results

- Reduced production costs by 10%
- Reduced assembly part by 50%, while increased the functional efficiency from 70.8 to 80%.

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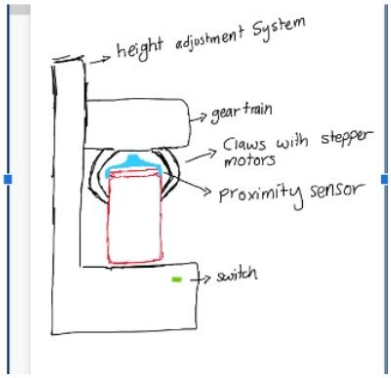
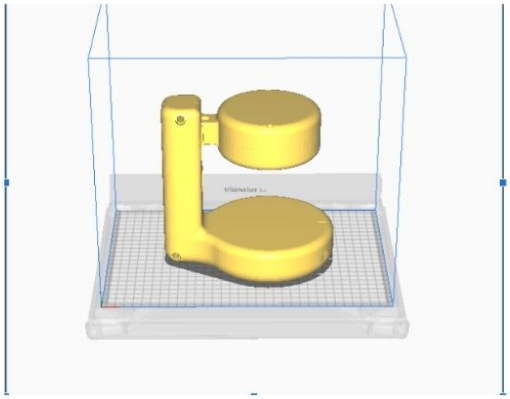
AUTOMATIC JAR OPENER (CAPSTONE PROJECT)- TORONTO METROPOLITAN UNIVERSITY





What?

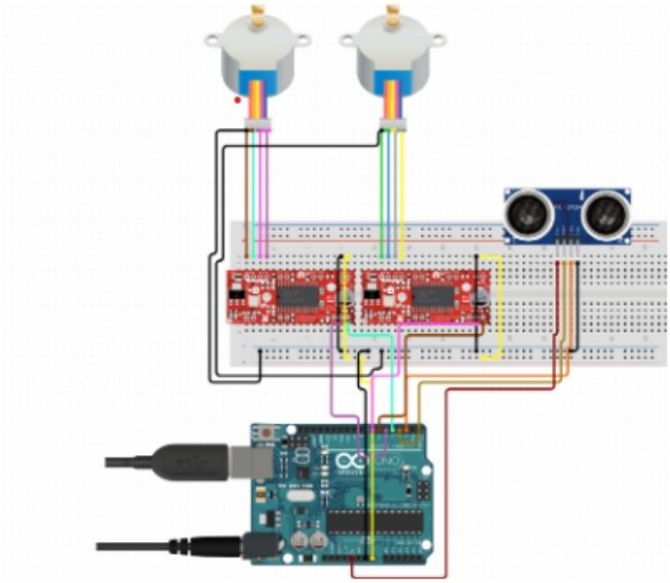
- Created a compact, motorized device that can open various jar sizes and shapes
- The device must be user-friendly and accessible to all user
- The design incorporates an adjustable body to create friction, which is powerful enough to open a variety of jar sizes.

How?

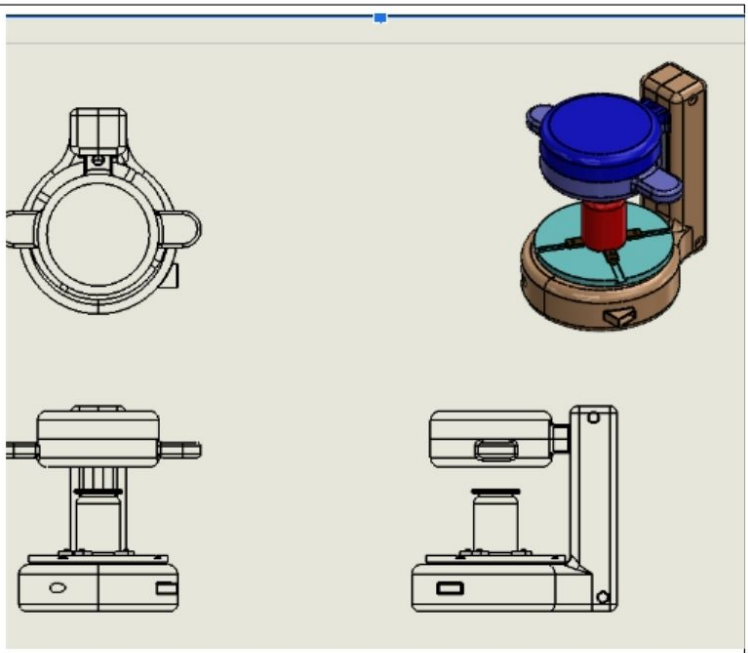
- Created initial design based reference design and Situation Use Case
- Applied **Morphological Chart** to pick the most optimal design
- Designed initial framework using **SolidWork**
- Used **Arduino** for electrical structure
- Implemented **DFA** principles to reduce product assembly cost

Results

- Created a final design consists of a total of 14 CAD parts
- The final product is created using **3d printed filament** also known as PLA.



CIRCUIT DESIGN OF TOP COMPONENT /HEIGHT ADJUSTMENT MECHANISM



FINAL ASSEMBLY OF AUTOMATIC JAR OPENER