

ME40 Final Project :

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Problem Statement: Our client, Megan, has the problem of difficulty in pouring food from a measuring cup when she is baking. Our solution should deliver an effective way to pour food from a measuring cup that is affordable and require minimal force and movement.

Persona

Persona: Megan

- Megan is a young woman with Cerebral Palsy
- In a power wheelchair
- One functioning hand
- Wants to be able to cook dinner for herself - She is an aspiring cook
- Recent graduate on a budget moving into a new apartment
- Very independent! She enjoys combining ingredients herself
- Megan has some shakiness in her hands and struggles to lift heavy items



CONOPS: Pyrex Measuring Cup



Purpose: the purpose of the measuring cup is to accurately measure different volumes of liquids and cooking ingredients

Target Audience: largely intended for baking purposes but can also be generalized to measure precise amounts of any liquid or solid. The primary users would be those interested in cooking and baking

Conditions of Use: the product is primarily intended to be used in a kitchen environment with solid surfaces and good lighting (allows for accurate measurement readings)

Limitations: the product is made of glass and is therefore fragile and heavy. Additionally, the product requires fine motor skills for a smooth pouring motion and for accurately measuring ingredients.

Workflow:

1. Gather target ingredients
2. Measure the ingredients
3. Pour the ingredients
4. Afterwards, clean measuring cup
5. Return ingredients

Work Sequence (product use):

1. Firmly grasp the handle
2. Lift the measuring cup
3. Position it over target location
4. Slowly rotate arm and wrist to a horizontal position
5. Increase the pouring angle and hold position until empty
6. Rotate measuring cup back to upright position
7. Set measuring cup on a solid surface

Market Research

Product Names	Product Images	Pros	Cons
(1) Homecraft Jug Kettle Tipper (2) No-Lift Pouring Aid		- Simple (no electronics) - Dishwasher safe/easy to clean - Fits multiple size cups - Easy to add/remove cup	- Can only pour into things at certain heights - Can only handle certain items
Pouring Cups for Adaptive cooking		- Simple (no electronics) - Easy to clean - Raised cup height (to be above bowl) - Easy to attach/detach cups (velcro or magnets)	- Requires cups that fit on the stand - Takes up more space - Cups are smaller - Only one cup height
(1) Switch-activated Pouring Cup on a Flexible Mount (2) Homemade Switch-activated Pouring Arm		- Motorized/electronic - Adaptable for many heights - Adaptable for different sized cups (if put velcro on) - Stability from clip to table	- More expensive - Difficult to clean - Requires table with thin edge - Requires power source - Harder setup
Universal Adaptable Drink Holder		- Very simple & cheap - Small	- Doesn't solve the issue directly (similar handle to many measuring cups)

Down Selection

Categories	Rocking Chair (mechanical)	Motorized arm	Simple Hinged Cup	Cup on push-over wall stand	Regular Measuring Cup
Reliability	0	-1	-1	0	0
Effectiveness	0	0	-1	0	-1
Weight	0	1	-1	0	-1
Price	0	-1	0	-1	1
Ease of set up/cleanup	0	-1	0	-1	1
Versatility	0	-1	0	-1	-1
Independence	0	0	0	0	-1
Ergonomics	0	1	-1	0	-1
Total Score	0.00	-2.00	-4.00	-3.00	-3.00

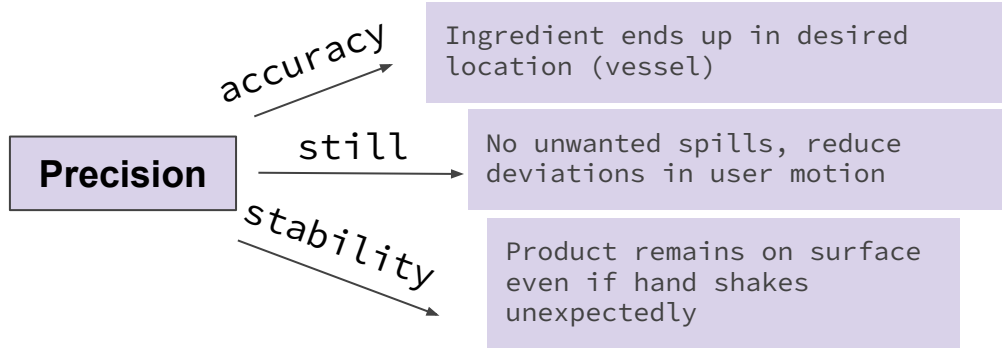
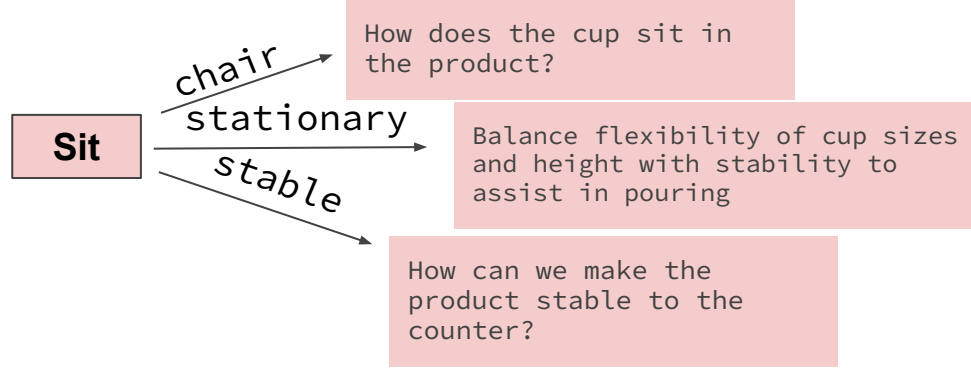
Rocking Chair is the best design!



System Requirements

- **Reliability:** Can the product be used every time I need to pour while cooking
- **Effectiveness:** Will the ingredient(s) actually be poured into the vessel every time
- **Weight:** how much weight does the user have to bear while pouring (after set-up)
- **Ease of Setup/Cleanup:** is the product easy to set and clean up (how much weight & force does this require?)
- **Versatility:** can the product be used at different heights (for different bowls) or with different sized measuring cups
- **Independence:** will the user need help using the product
- **Ergonomics:** how comfortable is the product during use

Ideation (Random Words & Brainstorming)

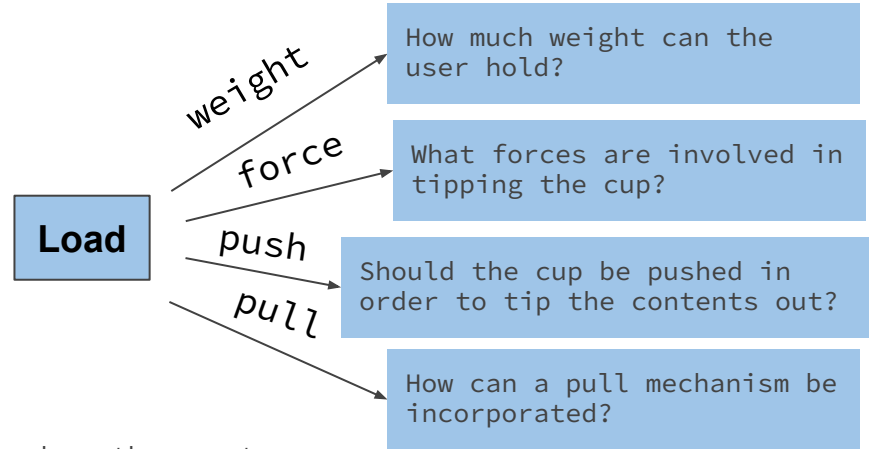


- Other Word Associations

- **Giant** → size → height → weight → space
 - Product should be lightweight and easily be stored on the counter
- **Smooth** → easy → path → simple
 - Guide-rails to reposition cup height

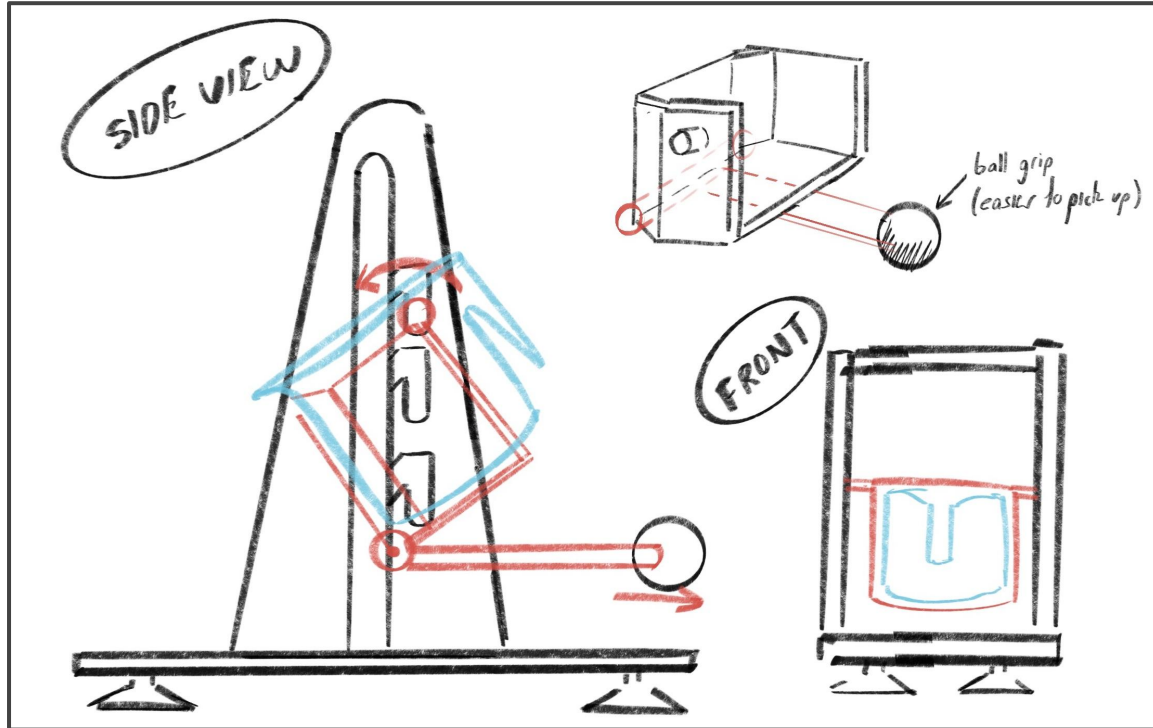
Brainstorming

- Method to raise/lower it
- Handle cups of different sizes
- Easy to tip forward (mechanical advantage)
- Stable base
- Need to keep the product at an affordable price
- Need the product to be lightweight and easy to clean (purely mechanical instead of motorized)



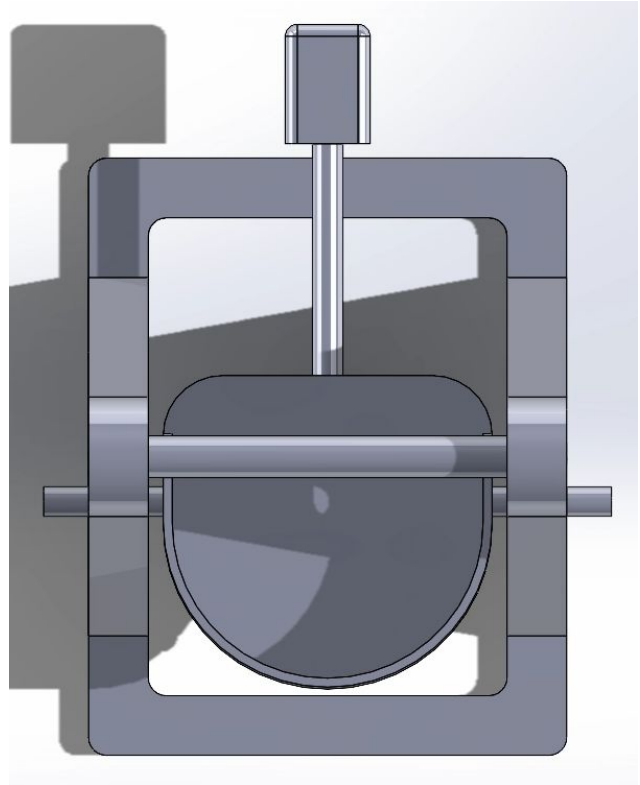
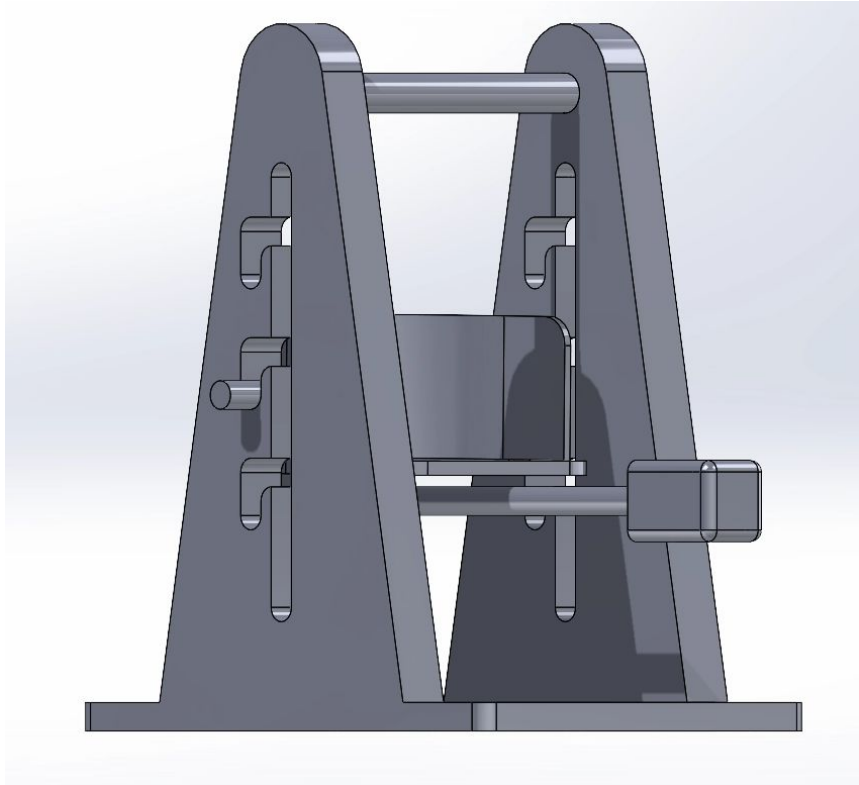
Prototyping

Drawing of Product

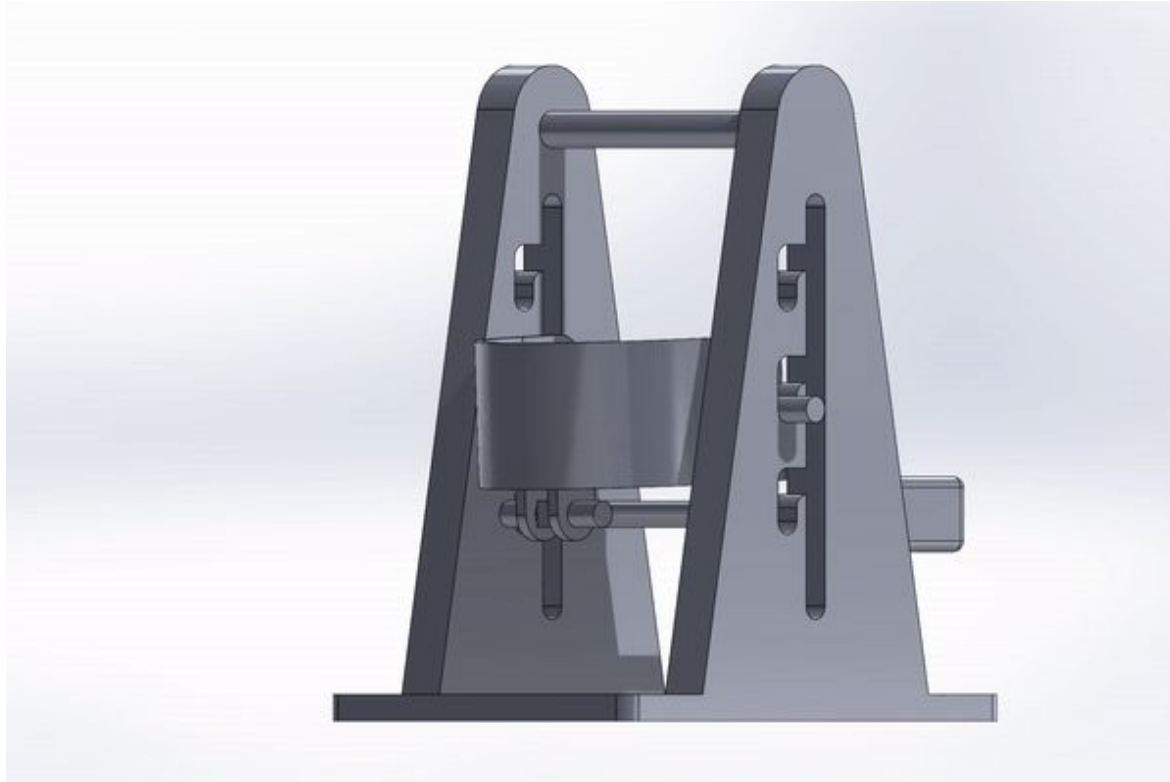


Our product is a small frame that the user can insert a measuring cup into. The frame has an interior guide that allows the user to raise the height of the platform where the cup sits, allowing the user to pour ingredients into bowls of different heights. The frame also has suction cups on the bottom side to ensure that the product will not move along the counter during use. There is a small handle for the user to pull in order to tip the cup platform and start pouring out of the cup.

Final CAD Model



Final CAD Model with Motion



Resources

Natalie's Video

- <https://youtu.be/63hMa972hZs>

Existing Products Used for our Ideation

- [Pouring Cups for Adapted Cooking](#)
- [Switch Activated During Mechanism](#)
- [Homemade Switch-activated pouring arm](#)
- [Universal Adaptable Drink Holder](#)
- [Homecraft Jug Kettle Tipper](#)
- [Amazon.com: Sammons Preston Pour Thing, No Lift Pouring Aid for Half Gallon and 2 Liter Jugs, Easily Pour Heavy Liquids, Spill Prevention Assist for Disabled, Handicapped, Limited Mobility, Injured, and Children](#)