



# A Fresh Scoop - A Spoon for those with Hand Tremors

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## Problem Statement

Many people suffering from hand or elbow tremors experience difficulties when eating food due to shaking knocking food off the utensil. Although there are spoons out on the market, they are often too expensive and cumbersome. Some existing spoons require too much maintenance while others are too heavy for others to use.

## Requirements

| #  | Requirement Type | Requirement Statement   |
|----|------------------|---|
| 1  | Functional       | Must hold at least 1/2 tablespoon of food                     |
| 2  | Functional       | Must keep 90% of the food in the bowl during a typical tremor |
| 3  | Physical         | Must be portable and fit into an average bag                  |
| 4  | Physical         | Follows health and safety protocols                           |
| 5  | Cost             | Costs \$25 or less  |
| 6  | Functional       | Materials must last a year before breaking down               |
| 7  | User             | User can transport .25 kg to their mouth                      |
| 8  | Documentation    | The device includes instructions                              |
| 9  | Physical         | The device is dishwasher safe                                 |
| 10 | Physical         | The device is durable for a year                              |
| 11 | Physical         | People with reduced motor skills can use it                   |
| 12 | Functional       | Can be used by left and right-handed users                    |
| 13 | User             | Can be used by independent and dependent users                |
| 14 | Physical         | Can fit into the average person's mouth                       |
| 15 | Physical         | The device is indistinguishable from a normal spoon           |

## Preliminary Designs

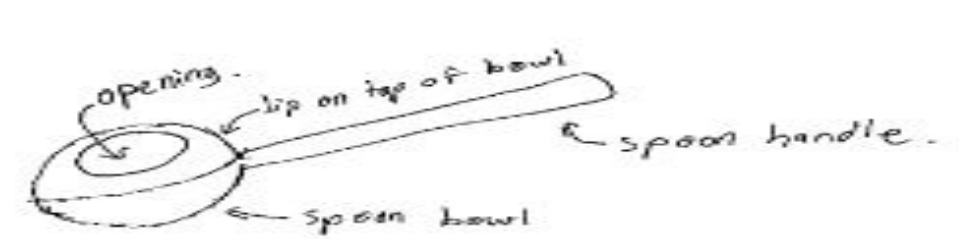


Figure 1: A spoon with a lip to direct food back into the bowl of the spoon

- The lip made the spoon uncomfortable to eat from
- Did not use it in successive designs

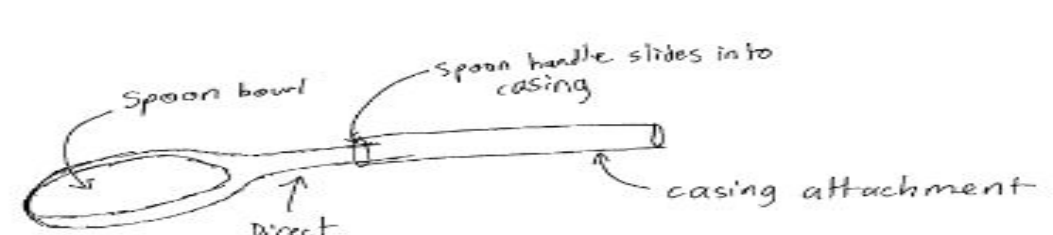


Figure 2: This design has a rotating handle that twists but keeps the bowl of the spoon in place

- Was a good low-tech way to keep the bowl of the spoon stable
- Proceeded with this design

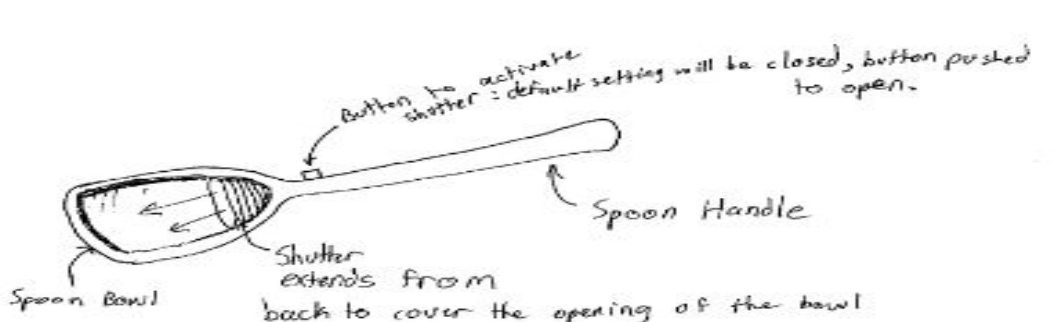


Figure 2: This spoon has a button that would open a shutter when the food it transferred to one's mouth

- People who suffer from hand tremors typically have poor fine motor skills
- This was not a good design for them, so this design was not used

## Design Study 1: Spoon Bowl Size



Figure 4: Image of different spoon iterations with different bowl sizes

- There are 3 different bowl sizes used
- The first size was too small only holding 1/2 teaspoon
- The next bowl was too deep and couldn't fit into someone's mouth
- The very bottom bowl was a good size that could fit 1/2 tablespoon

## Design Study 2: Spoon Swing

- The spoons were not swinging very well at first
- The radius of the cylinder at the top of the spoon was decreased by 2 mm
- There is more room for the spoon to swing in the grip in the bottom spoon

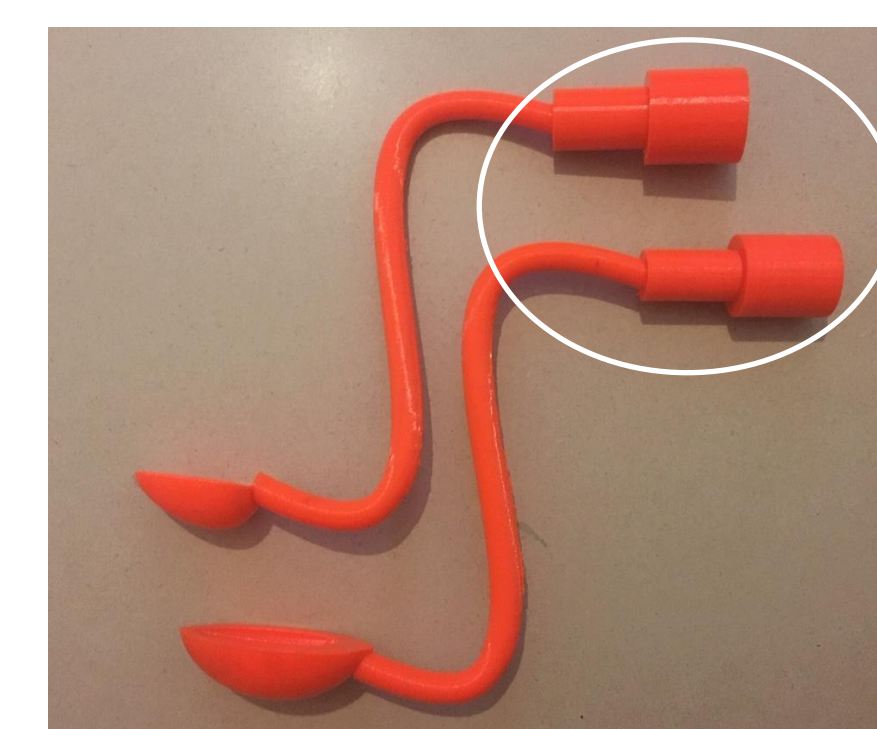


Figure 5: 2 spoons with different cylinder diameters

## Design Study 3: Neck Length



Figure 6: A comparison of the two lengths of the spoon neck that were tested

- Two neck lengths were tested for the effectiveness against tremors
- Weight was added to the short spoon, but not enough to reduce the tremors like the long-necked spoon
- The longer neck was more stable

## Design Study 4: Bowl Turn

- The bowl of the spoon was turned 90 degrees (Figure 7 bottom) and tested to see how it compared to the straight spoon (Figure 7 top)
- It was less stable due to uneven weight distribution, but it made eating easier.



Figure 7: A comparison of the direction the bowl of the spoon is facing

## Final Design

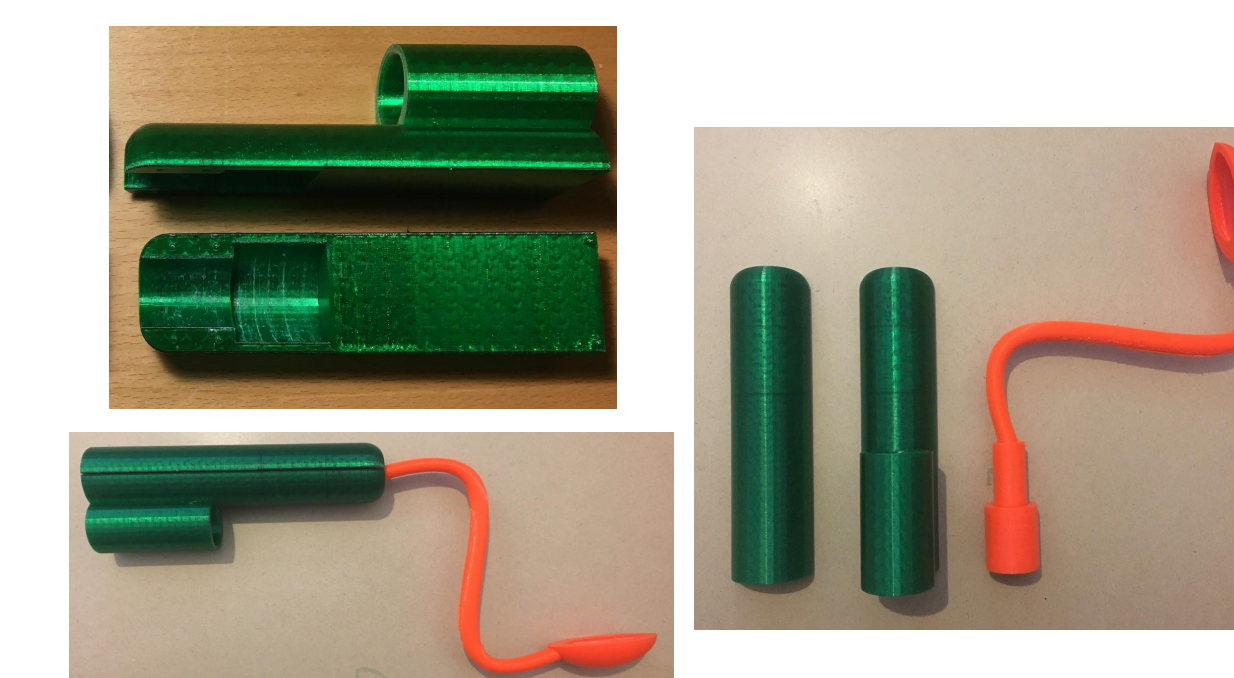


Figure 8: Images of the final design. The spoon, the grip, and them put together

- Changeable grip (can be with or without a caretaker hole)
- Thick grip
- Long neck
- Swinging spoon bowl

## Construction of Device

- The spoon and grip needs to be 3D printed
  - All supports must be completely removed for the spoon to swing properly
  - Must be printed with a food grade printing filament
- The whole thing can be sealed with epoxy coating
  - Smooths out the spoon by covering hole left in the filament

## Conclusions and Future Extensions

- The spoon is suitable for all types of tremors and can keep most food within the bowl, but scooping is still difficult and will be improved in the future
- The grip can be changed so that when an individual becomes dependent, they can use the caretaker hole and still be a part of the eating process. it can also be made to have less slipping by changing the cylindrical shape
- The user would have to lift the spoon high up for the bowl of the spoon to reach their face due to the long neck. Weights can be added and length changed

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