

## Product description:

StabiliWare: An assistive eating device for individuals with Parkinson's disease

Our device is a spoon to aid those with Parkinson's in eating, thus empowering them to not feel shame when eating and overall gain independence.

StabiliWare uses two bowls: an inner and outer bowl. The outer bowl rotates to cover the inner bowl. As such, when the user is eating, they scoop up the food, close the bowls to prevent spillage, bring the spoon to their mouth, and release the spoon to eat. This covering mechanism prevents spillage by preventing the food or liquid from leaving the bowl during tremors.

The mechanism of covering and uncovering is governed by a simple system of gears, shafts, and springs. The gear and shaft placed in the head of the spoon and the handle respectively allow the cover to rotate back and forth. The spring placed between the trigger and the main handle section allows the cover to retract by itself when released.

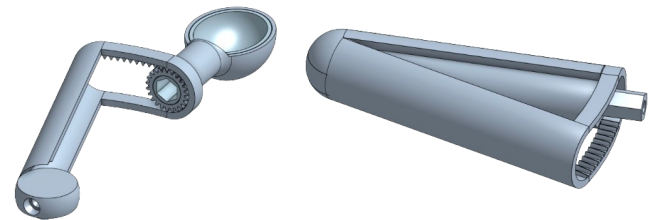


Figure 2. Placement of gears and shaft in spoon

As such, our device mitigates the effects of tremors while eating by preventing spillage.

## Process of building:

There were five main steps to our building process.

1. Initial Sketching and Brainstorming
  - a. Brainstorming for issues we want to solve provided in the logbook through screenshots
  - b. Rough sketches for various prototypes and brainstormed ideas

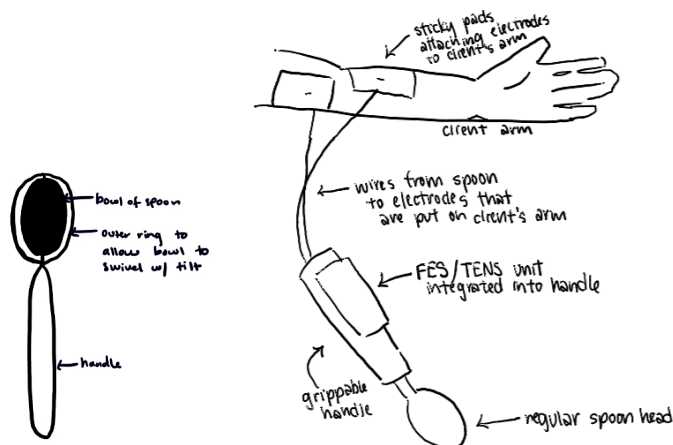
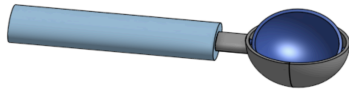


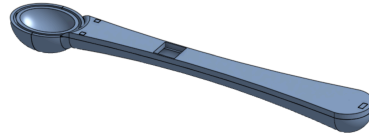
Figure 3. Rough sketch of swivel spoon    Figure 4. Rough sketch of TENS unit integration

## 2. Design in CAD

- a. High-fidelity models of all prototypes in OnShape



**Figure 5.** CAD of swivel spoon



**Figure 6.** CAD of motorized cover spoon

## 3. Prototyping

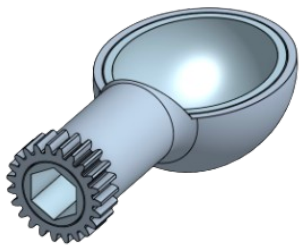
- a. Printing out the prototypes on the 3D printer for further trial and error



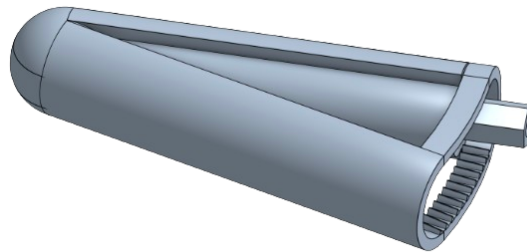
**Figure 7.** Printed prototypes (v1 and v2) of swivel spoon

## 4. Integration of various components

- a. Integration of the components necessary (gears, shafts, and spring) into the spoon



**Figure 8.** Gears used in the spoon



**Figure 9.** Use of shaft in current design

## 5. Testing

- a. Testing of the spoon with a client using water, uncooked rice, uncooked popcorn kernels, and cheerios/beads



**Figure 10.** Pictures of testing process

**Materials used:**

The material used for the actual device is black PLA filament and a 3D printer. PLA filament is food-safe and thus can be used for the purposes of this device. Additionally, a spring less than 0.75 inches is necessary for automatic retraction.

**Requirements met:**

<b>Functional</b>		
1	The device shall allow the user to lift food from their plate to their mouth with minimal spillage.	<b>Pass</b>
2	The device shall allow the user to hold liquid without leaking.	<b>Pass</b>
2	The device shall be dishwasher safe.	<b>Pass</b>
1	The device shall be safe to use.	<b>Pass</b>
2	The device shall be easy for the user to grip.	<b>Pass</b>
3	The device shall be quiet when used.	<b>Pass</b>
<b>Physical</b>		
1	The device shall be made of a food-safe material.	<b>Pass</b>
2	The spoon shall be less than 8 inches in length.	<b>Pass</b>
2	The device shall be able to hold at least 0.5 tablespoon of material.	<b>Pass</b>
1	The device shall be discreet and resemble a normal spoon	<b>Pass</b>
<b>Cost</b>		
2	The utensil set (including but not limited to the basic spoon, fork, and knife) shall cost under \$100.	<b>Pass</b>
<b>User</b>		
1	The user shall have the ability to orally intake food	<b>Pass</b>
1	The user shall be able to hold the device without dropping it.	<b>Pass</b>
<b>Documentation</b>		
1	The device shall include a user manual.	<b>Pass</b>