

# SMARTSERVO

## RECIPE TURNER KIT



# SMART SERVO PROJECT

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**Hardware Requirement:** This guide requires **Smart Servo devices** to complete the projects and activities described. Smart Servos are available through the Smart Servo Store and authorized distributors.

### About the Smart Servo Project

The Smart Servo Project empowers inclusive innovation by providing accessible tools for creating assistive technologies and engaging STEM education. Our mission is to bridge technology and compassion through community-driven maker education.

Support our mission by purchasing Smart Servos and sharing our resources with your educational community.

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Smart Servo Store: [WagnerLabs..Store](http://WagnerLabs..Store)

**Client:** Margaret "Maggie" Chen, Age 72

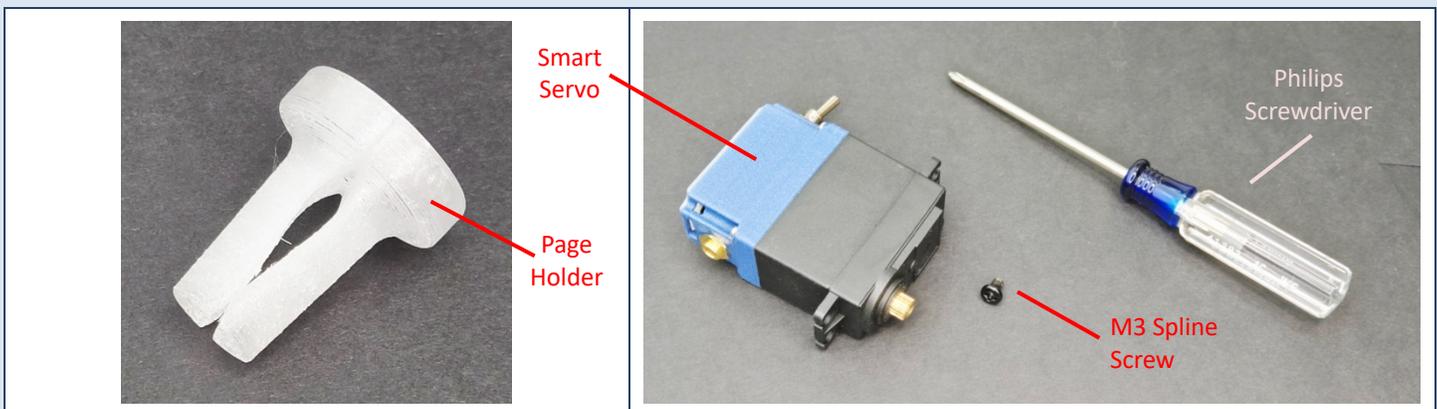
**About Me:** I'm a grandmother who loves cooking traditional family recipes for my children and grandchildren. I have limited mobility in my fingers due to arthritis, and I also have early-stage Parkinson's disease, which affects my fine motor control.

**My Challenge:** I keep my favorite recipes on index cards, but I can't easily pick them up from the counter to flip them over when I need to see the other side. My hands sometimes shake, and when they're wet or messy from cooking, I risk damaging the cards.

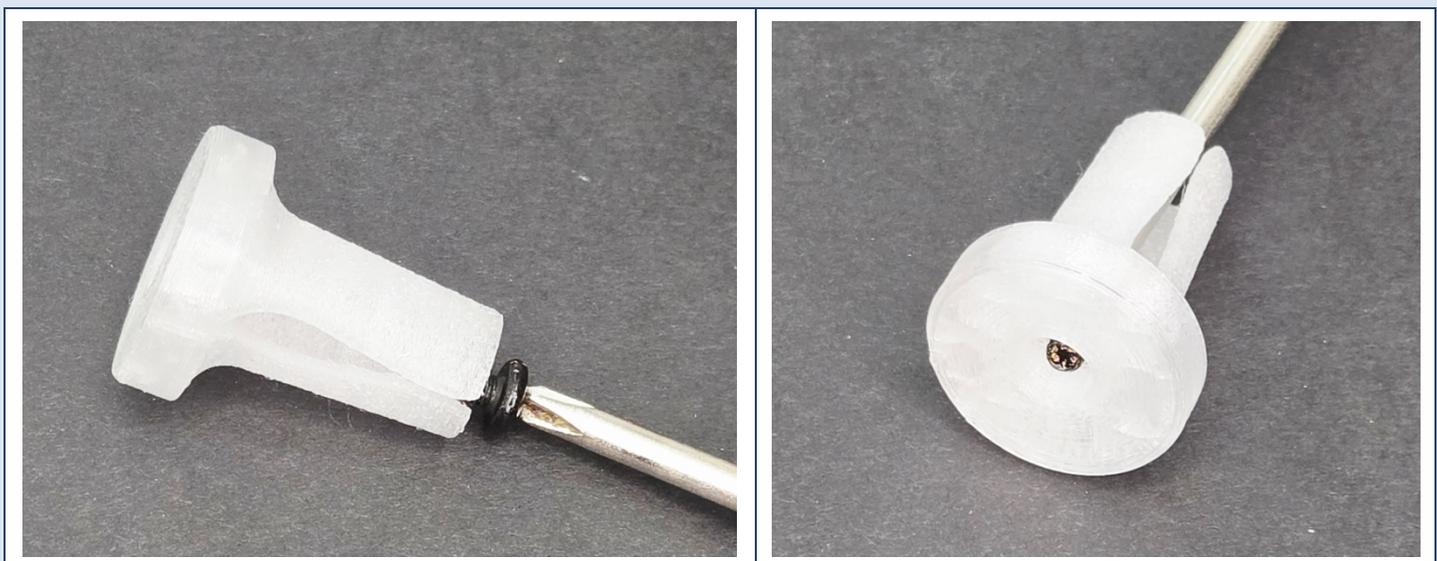
**Technical Need:** A device that can flip recipe cards or small instruction sheets, activated by a large, accessible button that I can press with my hip, elbow, or foot while my hands are busy cooking.

Let's now look into our kit and see if we can get started on something that can assist Maggie.

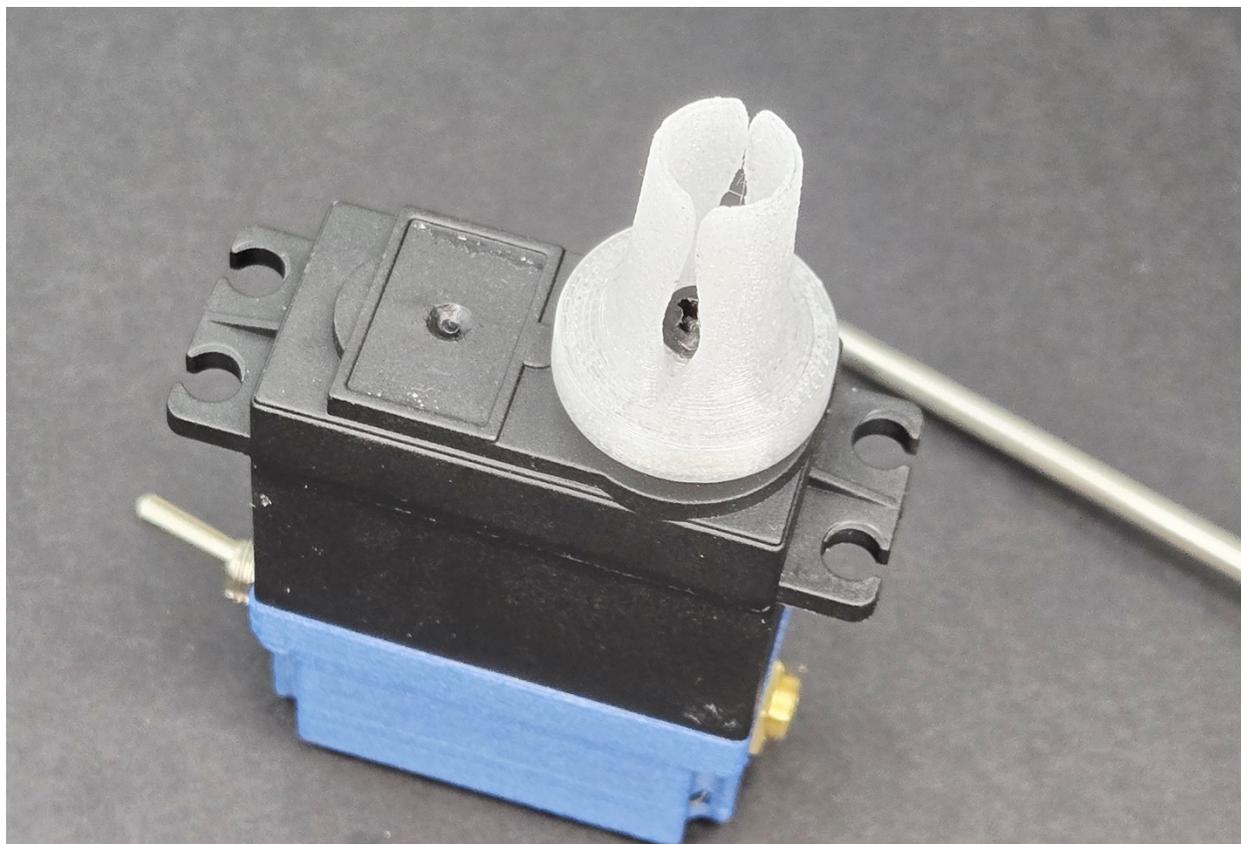
**STEP 1:** Lay out all the components that are new in this kit as well as some parts from previous kits.



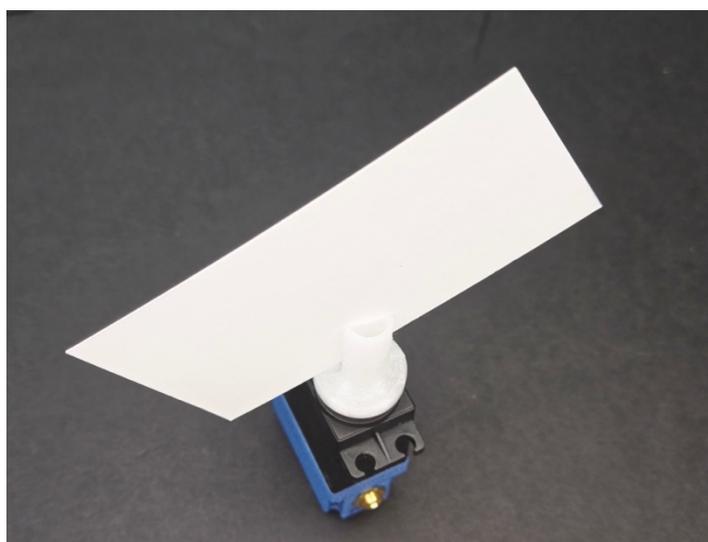
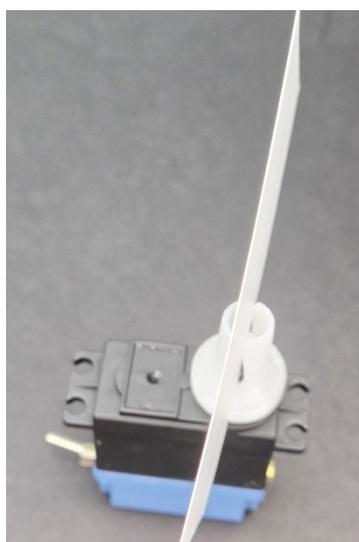
**STEP 2:** Use your Phillips Screwdriver to guide the M3 Spline Screw.



**STEP 3:** Align the spline shape on the Page Holder with the spline on the Smart Servo. With the M3 screw also aligned, screw it down. This process should pull the Page holder tightly onto the spline.



**STEP 4:** Slide a note card, cardstock, or a recipe through the slit on the Page Holder. Keep in mind that you can pry the two sides apart to up to a millimeter without breaking it.



**STEP 5:** We now can connect out test button and power cables to the Smart Servo to see what happens to the card. We'll still want to consider what needs to be done next to better assist someone like Maggie. Read her profile again and see if she would appreciate something like this turner as is. As you reflect on what follow up questions you would ask her or what else she would need to use it, consider the following questions:

- **What type of mounting system would she want and would something from a previous kit work in her situation?**
- **Is the current code on the Smart Servo going to work for Maggie? If not, is there a snippet that would work better or that can be used as a starting point for a customized code?**

### THE ABLENET JELLY BEAN ASSISTIVE BUTTON

This kit includes an assistive button that is the industry standard for adapted equipment. This button will be available for you to use in all devices you create going forward including this project. It essentially can be used to replace the test button we've used up to this point. Here are some of the main features of the Jelly Bean Button:

Here are some of its key physical features of the Jelly Bean Button:

- **Activation Surface:** Features a 2.5-inch (6.4-cm) diameter activation surface that can be pressed anywhere.
- **Interchangeable Switch Tops:** Comes with removable and replaceable switch tops in a choice of Red, Blue, Yellow, or Green, allowing for customization based on user preference or visual needs.
- **Clear Snap Cap:** Includes a clear snap cap that allows for the use of symbols or pictures on the switch.
- **Durable Construction:** Made of durable high-impact ABS plastic, designed to withstand regular use.
- **Wired Connection:** Equipped with a 6-foot (183 cm) cord for a wired connection.
- **Standard Plug:** Uses a standard 1/8-inch (3.5-mm) mono plug for easy compatibility with various assistive technology devices.
- **Mounting Plate:** Includes a Quick Ready Mounting Plate for Assistive Technology for versatile mounting options.
- **Compact Design:** Has product dimensions of 3.3 inches L x 3.3 inches W x 1.05 inches H (8.4 cm L x 8.4 cm W x 2.7 cm H).
- **Low Activating Force:** Requires a low activation force of 2.5 ounces (71 grams).
- **Auditory and Tactile Feedback:** Provides both an auditory click and tactile feedback upon activation.

### CONGRATULATIONS!

You just built an automated recipe turner with accessible controls. Next, we'll want to consider what needs to be done next to better assist Maggie. Read her profile again and see if she would appreciate something like this device. If so, reflect on what follow-up questions you would ask her and what else she would need to use it in her kitchen.



#### REMINDER ABOUT CODING SNIPS

If you want to return your code to the original “factory setting”, just copy and paste from here: [tinyurl.com/SmartServoSnpis](https://tinyurl.com/SmartServoSnpis)



#### 3D PRINTING FILES

If you're able to 3D Print, download the 3D parts used in this project here: [tinyurl.com/SS-STL-RECIPE](https://tinyurl.com/SS-STL-RECIPE)





## THE BIGGER PICTURE

### DESIGNING FOR REAL-WORLD CONSTRAINTS IN YOUR RECIPE TURNER

#### Beyond Accessibility: Understanding Situational Constraints

When you built the recipe turner with its large, easy-to-press button, you created something far more universal than you might realize. Maggie needs this device because arthritis and Parkinson's make picking up cards difficult. But consider: a surgeon needs to view procedure steps without contaminating sterile gloves. A baker with flour-covered hands wants to advance to the next recipe step. A factory worker with greasy hands needs to check assembly instructions.

These aren't all people with disabilities - they're experiencing what designers call "situational constraints." Good engineering recognizes that designing for permanent constraints creates solutions benefiting everyone facing temporary or situational limitations.

#### Designing Input Methods for the Environment

Your recipe turner uses a large button activated with different body parts - hand, hip, elbow, or foot. This is sophisticated interface design recognizing real-world conditions. In kitchens, hands might be wet, holding hot pans, or covered in dough. In factories, they're greasy, wearing thick gloves, or holding tools. In medical settings, they must remain sterile.

Engineers call this "designing for degrees of freedom in interaction." Instead of demanding one specific input method, you've created multiple pathways to the same result. The button's large size doesn't require precise aim. Its low placement works from seated or standing positions. Its simple press-and-release action doesn't require sustained pressure or complex gestures.

#### The Engineering of Reliable Activation

That AbleNet button represents decades of engineering refinement. Good activation mechanisms need enough resistance to prevent accidental triggering, but not so much that limited strength can't activate them. They need clear tactile feedback so users know they've pressed it, even without looking. They must work reliably whether pressed quickly or slowly, at different angles, with different forces.

Professional switch designers test activation forces measured in grams, calibrating exact spring resistance. They consider "throw distance" - how far the button travels before activating. They design for millions of cycles without failure.

#### From Kitchens to Critical Infrastructure

Designing inputs for constrained conditions appears throughout engineering. Emergency stop buttons in factories are large, bright red, and mushroom-shaped so workers can slam them with fist or elbow while focused elsewhere. Foot pedals in cars, dental offices, and industrial machines free hands for other tasks.

These extreme design requirements drove innovations benefiting everyday products - from touchscreens working with gloves to voice assistants operating hands-free. Your recipe turner demonstrates that the best engineering isn't always about sophisticated technology - it's about deeply understanding the problem, user, and context, then designing the simplest solution that actually works in real-world conditions.

