

PRODUCT TEARDOWN: BLACK + DECKER LIGHTWEIGHT 5-SPEED HAND MIXER



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User Centered Design

Memo: The target audience for the product seems to care about efficient accessibility as an indoor kitchen product. The priorities of the mixer are ease, versatility, and power ability, especially with the added “turbo mode”. The minimal color, low cost, and ejectable whisks all point to focus on ease of use for the product.



User Info ~

- User Demographic
 - Simple interface
 - Low cost
 - For the average home baker - not professional
 - Lightweight and compact
- Product Concerns:
 - Questionable quality
 - Speed can be too fast
- Use environment:
 - Kitchen (For household use only)
 - Existing support
 - Kitchen supplies
 - Electricity

Links ~

- [Product page](#)
- [Amazon](#)
- [User and care manual](#)
- [Chemical disclosure statement](#)

First Use Documentation

Packaging: simple and straightforward

In the box: mixer, two beaters, instruction manual (simple use, user doesn't need previous experience)

Assembly: obvious without instructions, only three parts

- Noticed there is a left and right beater, one has a larger ring that only fits on one side
- Safety zip tie on the plug-scissor symbol to indicate cutting
- Exploratory interface - good learnability
- Everything clicked into place (sound), no extra pieces.
- Whisks click into a specific orientation in each hole
- Beaters spin in opposite directions, toward the center. Audible clicks (feedback)
- Design of turning on notch
- Ejection only works when it stops
- No difference between right and left-hand

Expected components:

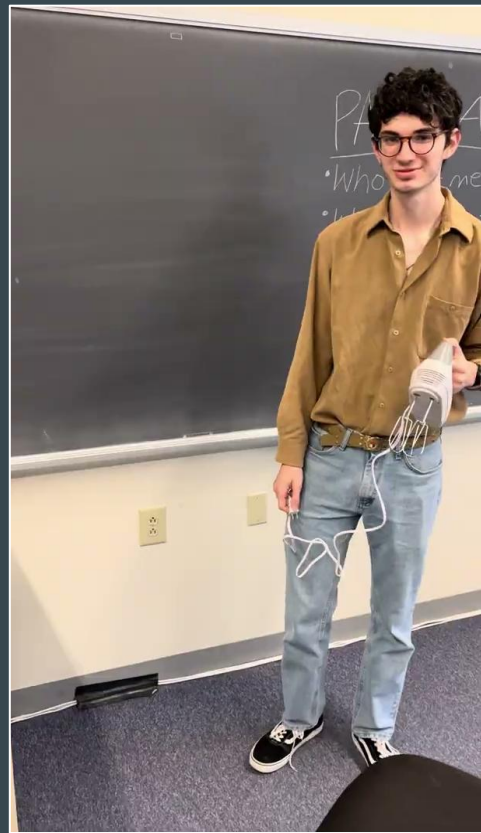
- Motor
- Gears
- Fan
- Switches (control)
- Power supply converter

Timing:

- 5 min - to prepare mixer and start using device
- 3 min - to finish using device and to eject and clean beaters

Issues:

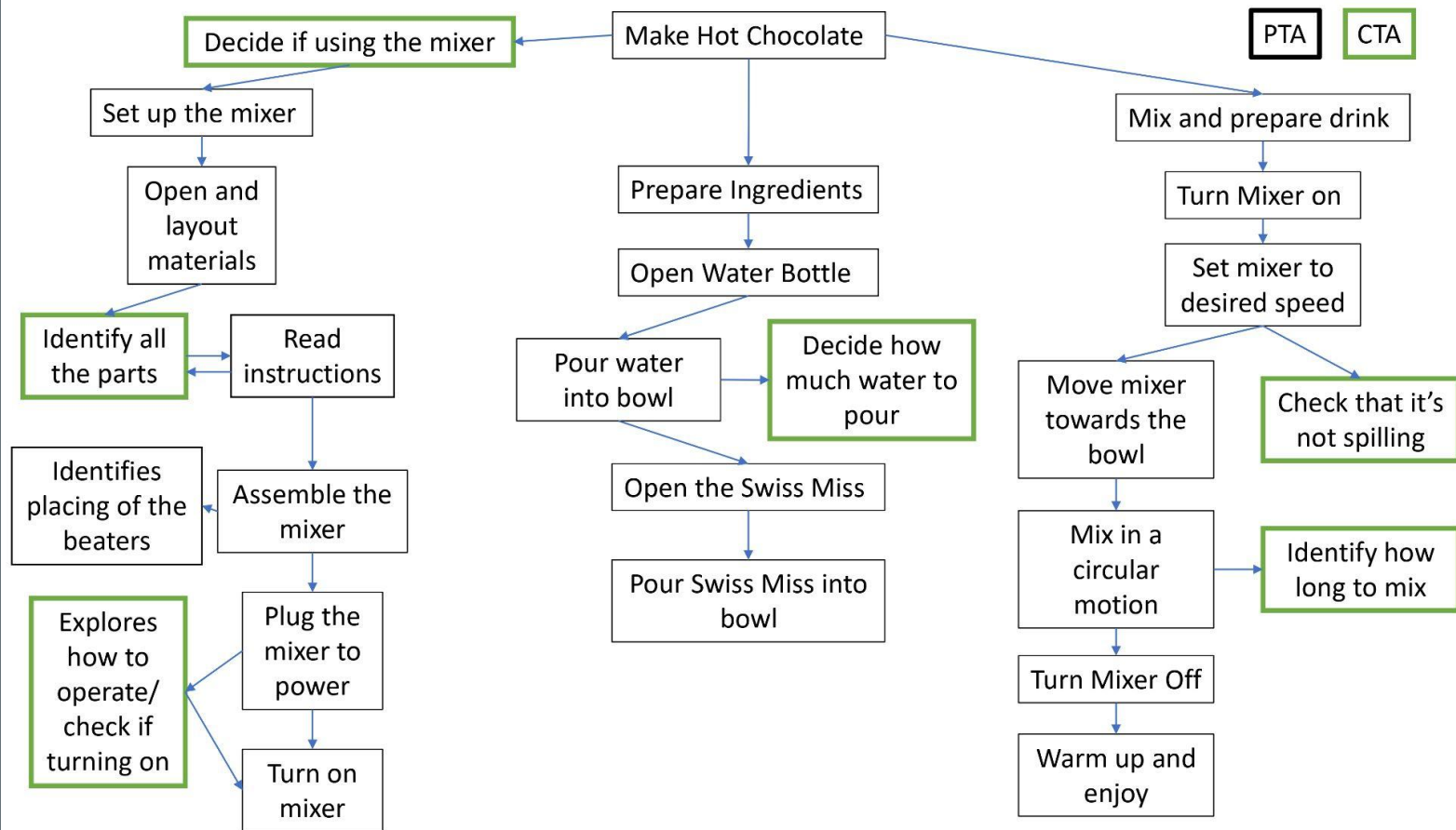
- Eject - function (though signaled) is not always clear to take out beaters
- Safety - the device high speed is slightly uncontrolled especially if attempting to eject while device is running



A close-up photograph of a person's hand holding a custom-built micro-robot. The robot is a complex assembly of metal, plastic, and electronic components. It features a central motor with copper windings, a gear train, and a small yellow gear at the top. A screwdriver is being used to adjust a component on the right side of the robot. The background shows a white surface with various small parts and blue sticky notes, one of which has the text "COAP 3" and "mower & locks" written on it.

[illegible]

Task Analysis: Making Hot Chocolate



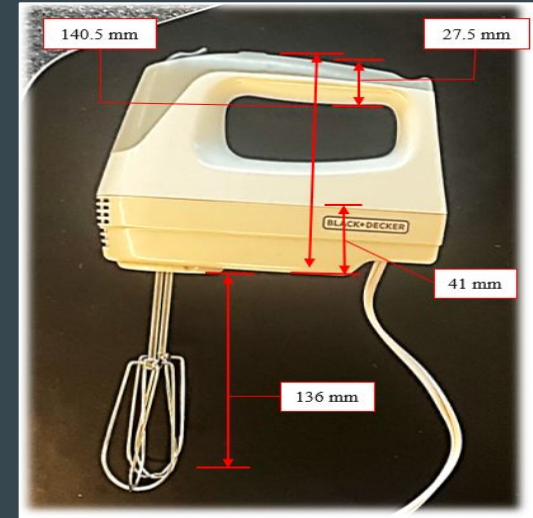
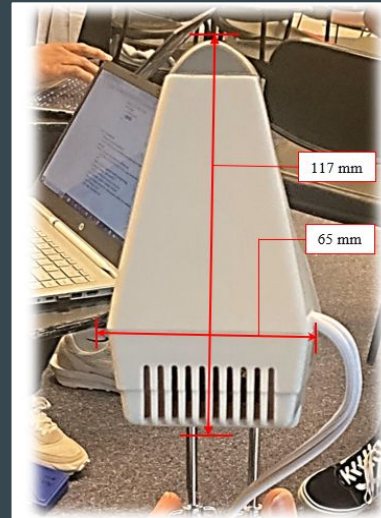
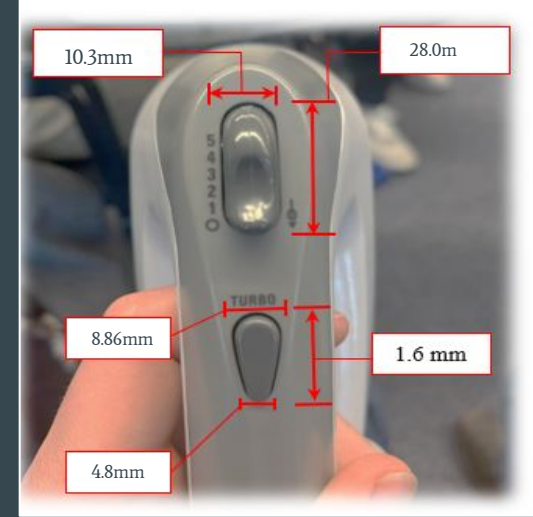
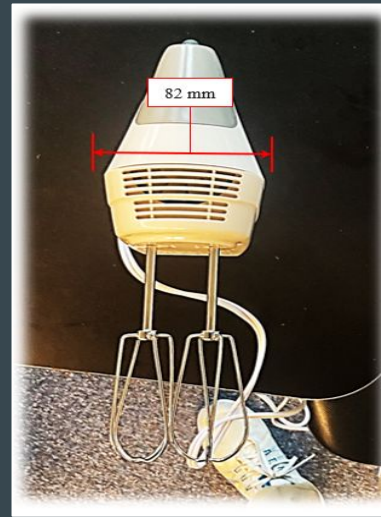
External Overview

Affordances:

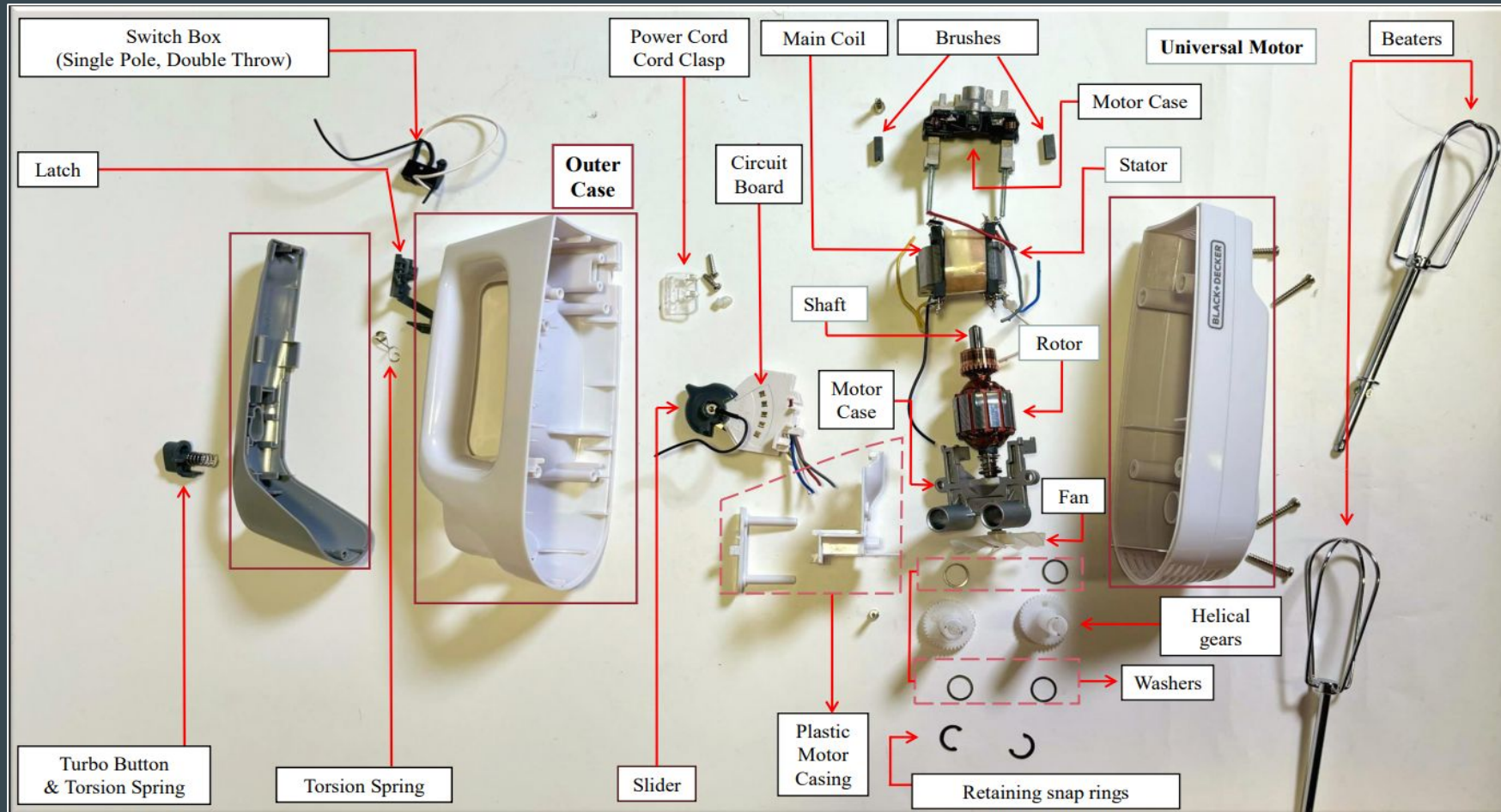
- Sliding switch - Shaped to easily be pushed forward causing device to turn on. Back end is also pointed to be easily pointed down to turn device off.
- Handle - Ergonomic universal hand design.. Fit cues user to correctly hold mixer with beaters down.
- Bottom Shape - Lifted back as a bowl rest and maintaining mixing height.
- Turbo Button - Thumb-shaped button used to indicate potential danger and require active pressing to utilize.

Signals:

- Slider - Different numbers to indicate speed on the left side of the switch. A symbol indicating beaters ejection on right. "TURBO" to indicate mode.
- Beater Insertion - each hole as a line drawing of distinct beater structure to cue which beater goes in which hole.

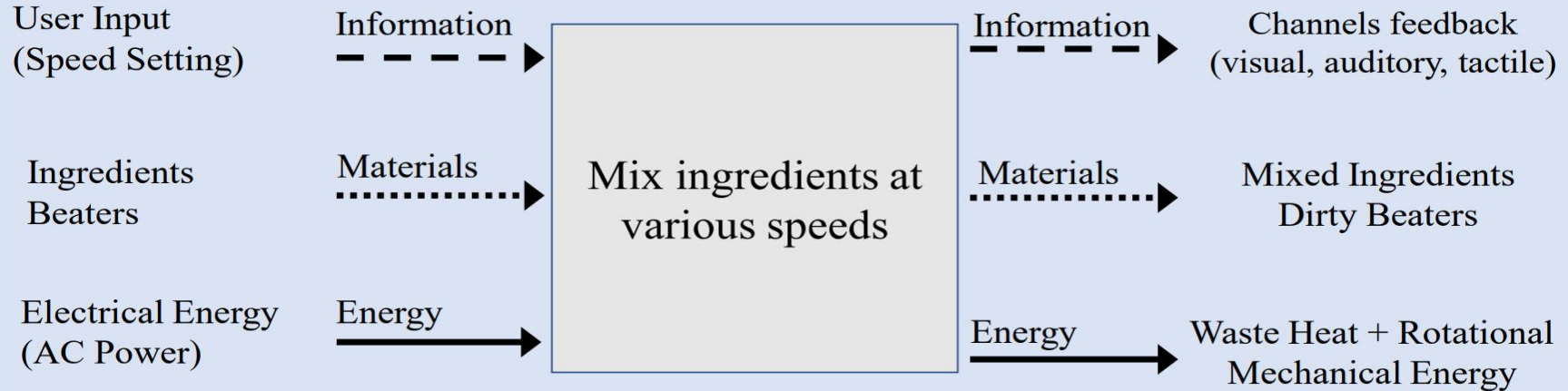


Exploded View

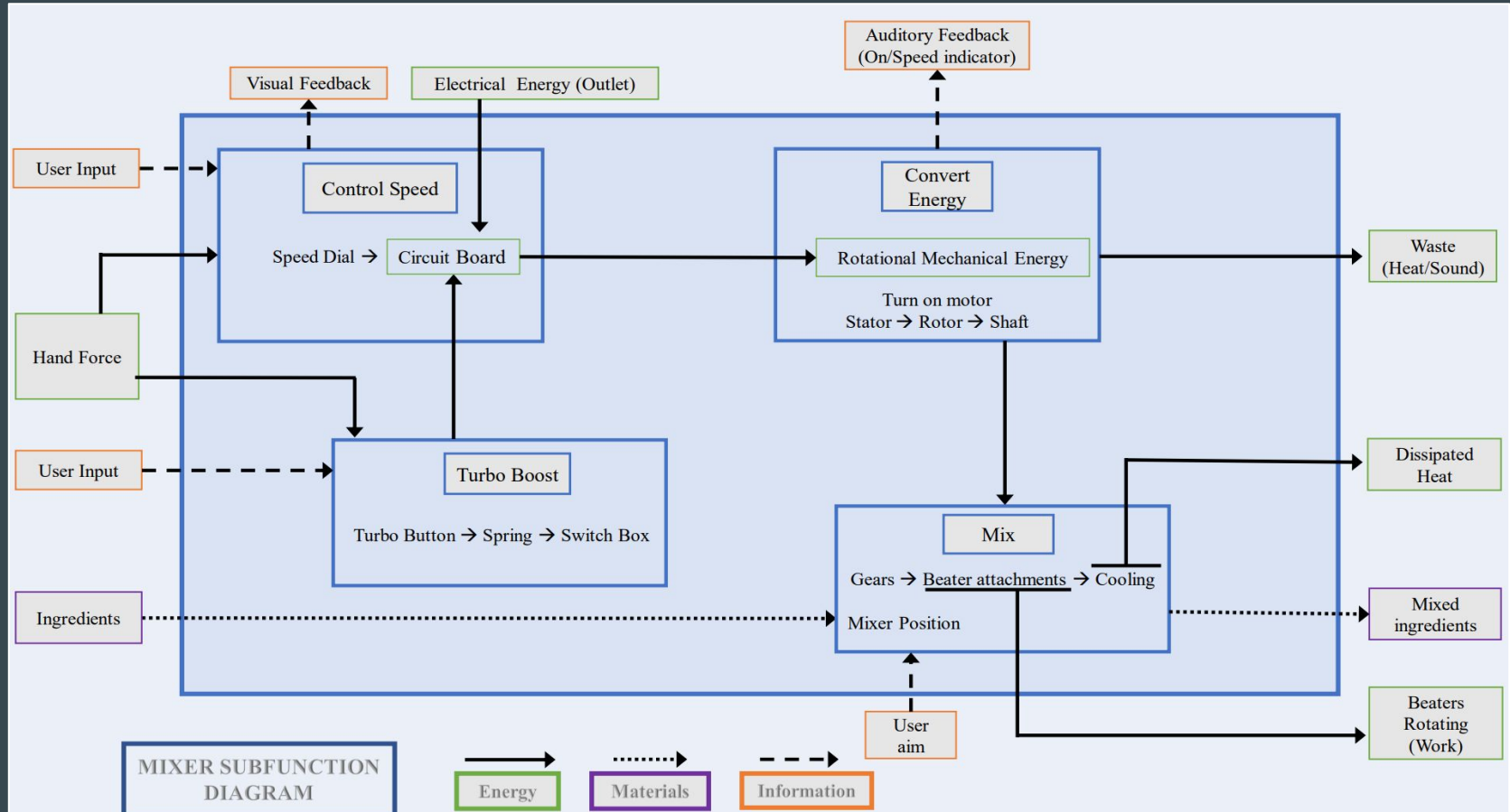


System Model

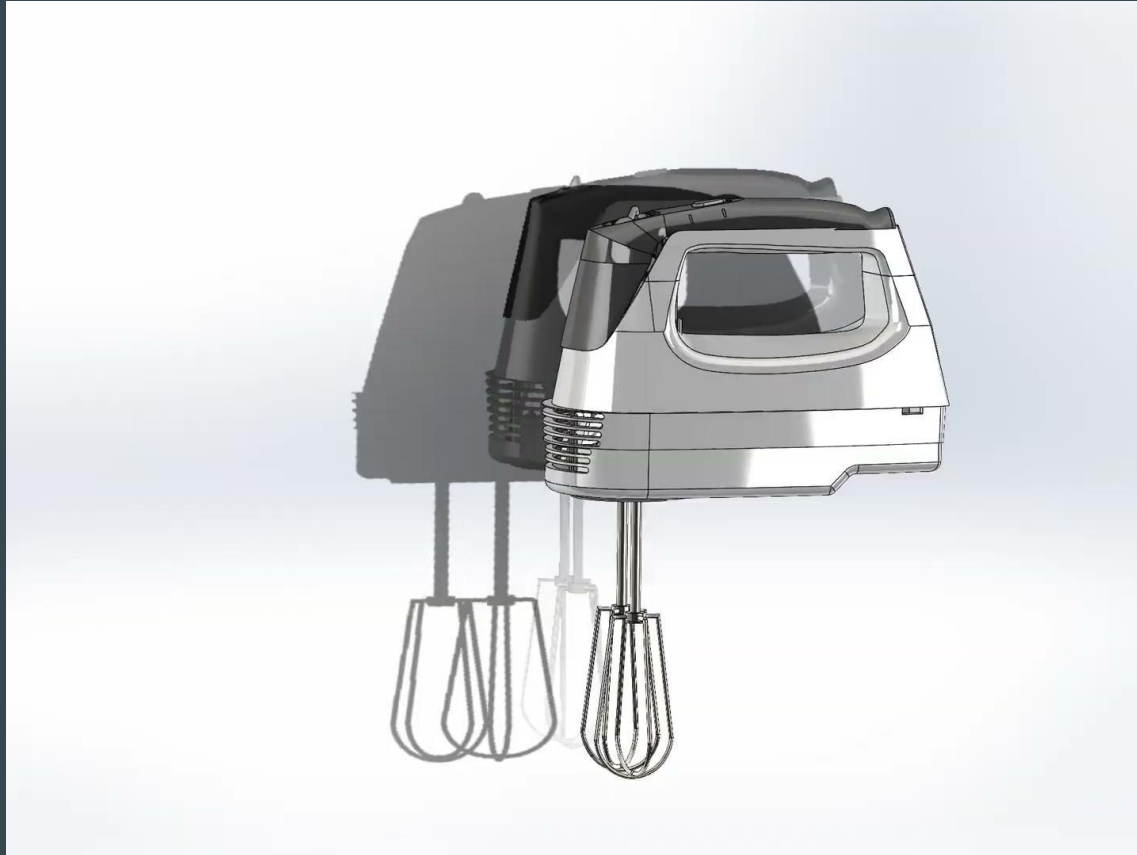
Mixer Function Structure Diagram



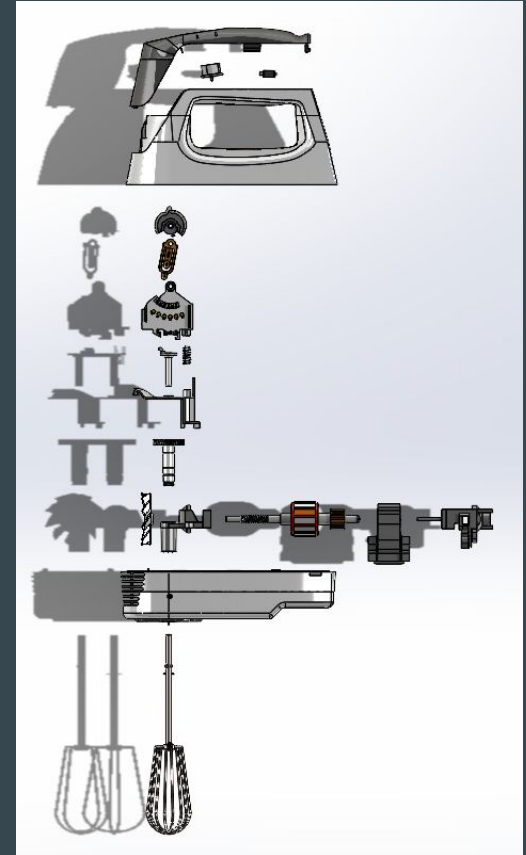
System Model



CAD Model

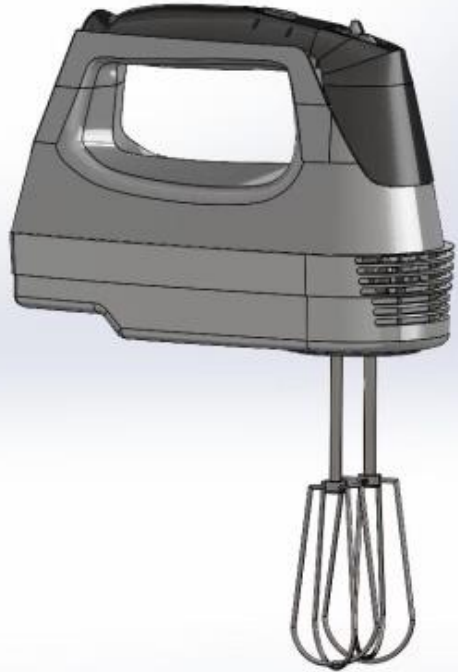


Exploded Animation

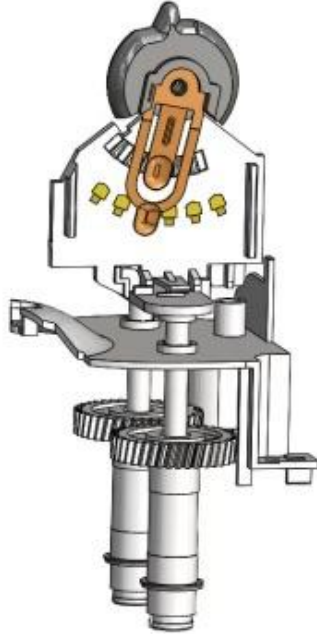


Exploded View

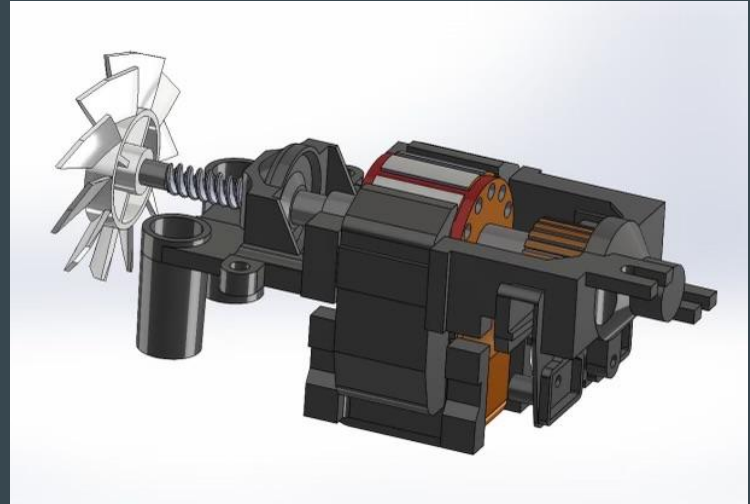
CAD Model



Full Assembly



Speed Control & Gears



Motor Subassembly