

SHTTL

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Too Many Spice Bottles, No Good Solution

SHTTL Simplifies...

- *Organization*
- *Clean-up*
- *Measurements*
- *Ease-of-use*
- *Portability*



› Kitchen › Kitchen & Dining › Kitchen Utensils & Gadgets › Seasoning & Spice Tools



KitchenArt



SHTTL Has A Wide Set of Uses/ Applications / Areas

Cooking



Baking



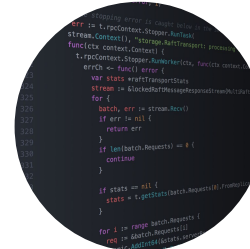
Clutter Management



Hardware



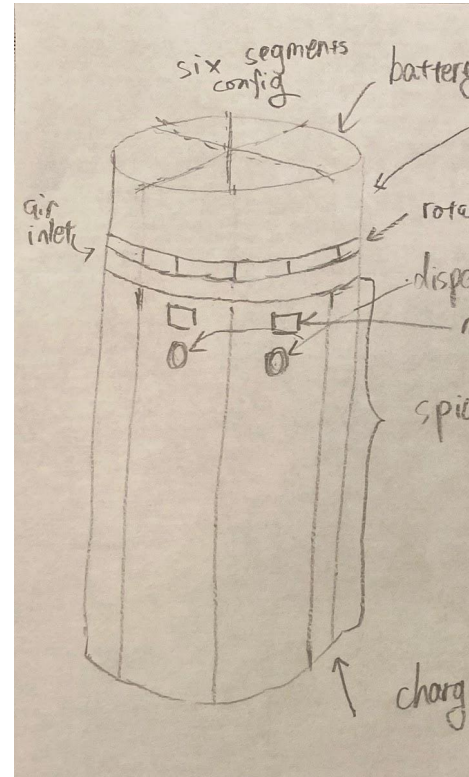
Software



Requirements

Dispensing

- Dispense Accuracy: +/- 10% of target volume
- Max Dispense Speed: 1 tsp/s
- Spray radius distance ratio:
 - 6" diameter when 6" from target
 - Min 2", Max 12" (linear in-between)
- Jamming Rate: Once per month



Requirements

Use

- Weight: <500g
- Charging Speed:
- Noise Level: < 60dB (coffee grinder is 80-90)
- Size: 4x4x8.75 in
- Battery Life: 2 days of nominal use.
- Storage Capacity: 5-6 compartments, functional for 1-2 for MVP

Technical Challenges

Powder, Solid Dispense Technology

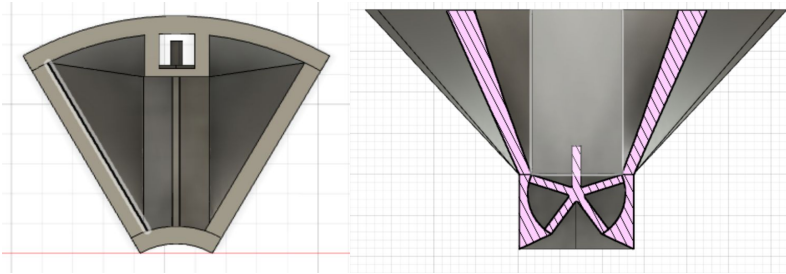
Integration: Very limited space, interface between components, connections

Reasonable consumer-use performance for weight/speed/accuracy/etc.

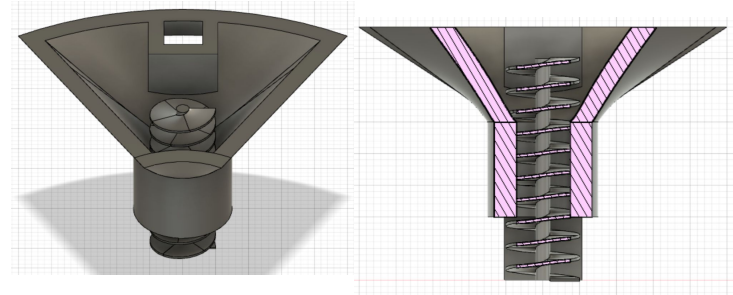
Spice storage capacity that functions while meeting requirements



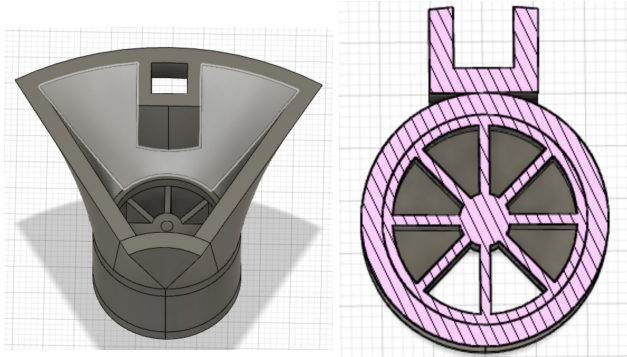
Powder dispense options(3D printed)



Gum-ball Wheel (Option 1)

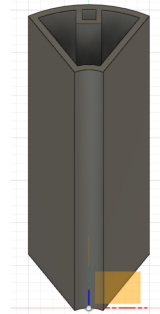


Vertical Auger (Option 2)



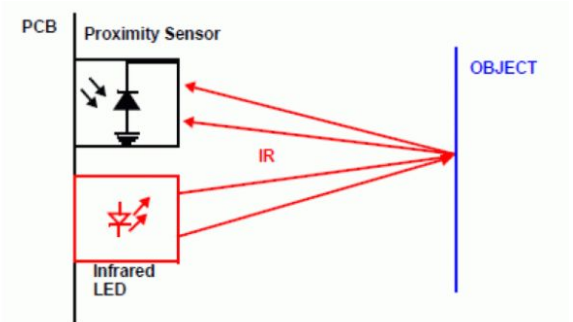
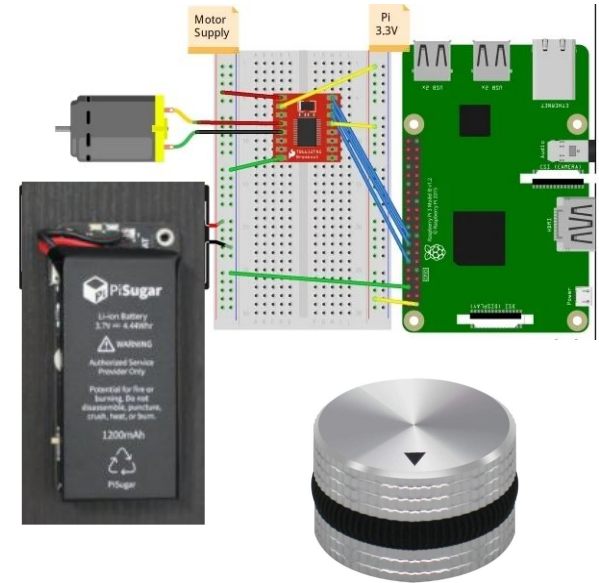
Rotary Cup (Option 3)

- Compatible with same storage unit
- Driven by M10 motor (10*10*20)
- Other ideas include: Horizontal Auger, Reciprocal Cup Filler.
- Consideration/benchmarks: durability, accuracy, speed, reliability, production difficulty



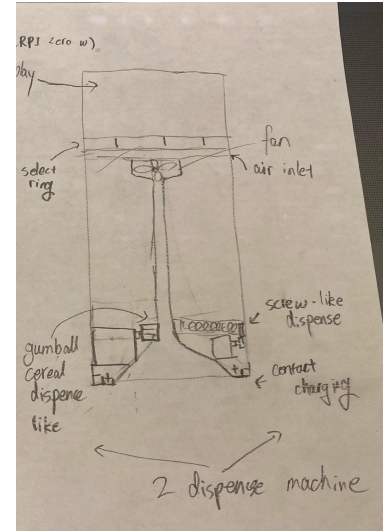
Electronics & Control

- Pi zero W: built-in bluetooth, small footprint
- Using raspberry Pi Sugar2 for all power: I2C for monitoring, easy integration with Zero W
- Use close ranged IR distance sensors to measure the remaining volume of spice: small footprint, lack of alternative
- Buttons and select ring as user input to control the device
- Use gpio/I2C to control 7 DC motors
 - 6 motors for spice dispensing
 - 1 motor for fan
- Design PCB to connect sensors/actuators
- Using 3V Micro Planetary Reducer Motor High Torque DC Motor



Integration

- 3D printed shell, UV Resin, Water resistant
- Modular Assembly Design
 - Electronics compartment all lives on the top
 - Lower assembly (servos) is water-proof.
 - Twist-on connection, physical contact pins
 - Dispense options have same connection and interchangeable
- User Interface
 - Buttons: 1 for each spice, intuitive to use, press and dispense
 - E-ink screen: Flexible, variable size, E-ink is low energy consumption
 - Selection ring: selecting amount (1g, 2g, half tsp, 1 tsp...). Also acts



Testing/ Verification/ Metrics

Dispensing

- Dispense Accuracy: Weigh spices before and after dispense using scale
- Max Dispense Speed: Timed user testing
- Spray radius distance ratio: Dispense onto white paper and measure distance
- Jamming Rate: Keep track of any jamming in weeks of testing

Use

- Weight: Scale
- Charging Speed: Full drain charging tests
- Noise Level: Measure decibels
- Size: Tape Measure
- Battery Life: Keep track via nominal testing use
- Storage Capacity: 5-6 spices

Division of Labor

(Manny) Motor Controller, Motor Interface, PCB, Software Design & Implementation

(Xander) Mechanical Design & Implementation, Component Interfaces, iOS Software Design & Implementation

(Joanna) User Input, Component Integration Design, Charging Base, Testing, PCB

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Weekly Meetings, Status Reports

Proposal Presentation

Order Parts

Initial Designs

Electronic Design

Power Analysis

3 Operation Dispense Mechanisms

PCB Design

Initial Testing

Print Initial Dispense Mechanisms

Dispense Integration with Motors

Compatibility

CAD support for upper assembly

Sensor Integration

IOS Bluetooth Testing

Minimal IOS UI

Upper/ Lower Connection Design

Volume Control

UI Integration

Upper/ Lower Connection

Terminal Base

Upper Assembly Integration

Iteration & Testing

final presentation

Legend:

All

Joanna

Xander

Manny

Xander/Manny

Joanna/Manny

Xander/Joanna