MMAE 432
Raging Ducks
Project

AGENDA

Empty text

01 Functional Requirement

02 Design Process

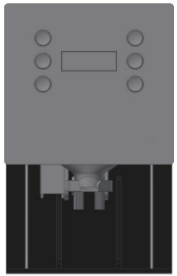
03 Design Analysis

04 Conclusion

FUNCTIONAL REQUIREMENTS

FEATURE 1 : SPEED

dispense less than 10 seconds



FEATURE 2 : ACCURACY

±5% weight tolerance

FEATURE 3 : VARIETY OF VOLUME MEASUREMENT

three kinds of volume

FEATURE 4 : VARIETY OF INGREDIENT CHOICE

three kinds of ingredients

FUNCTIONAL REQUIREMENTS

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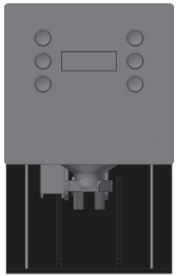


FEATURE 3 : VARIETY OF VOLUME MEASUREMENT

three kinds of volume

FEATURE 4 : VARIETY OF INGREDIENT CHOICE

three kinds of ingredients

Design Process

1 Sketch Model

Manual Operation

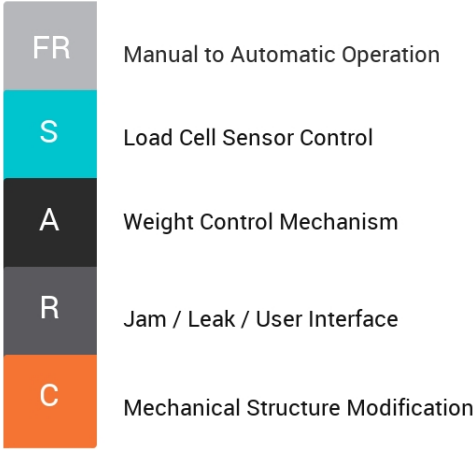
2 Functional Prototype

Automatic Operation

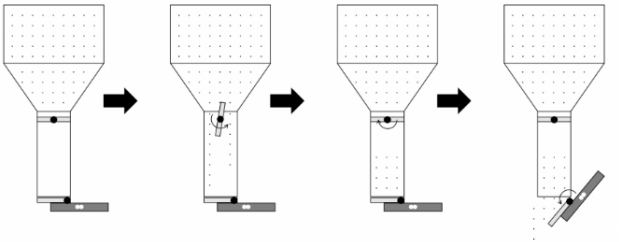
3 Alpha Prototype

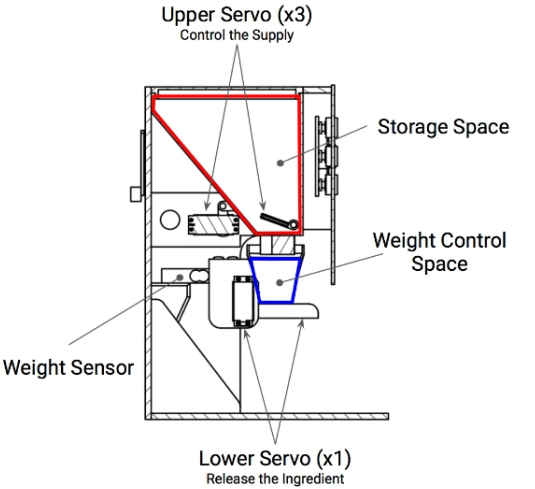
User Interface

FRSARC at Functional Prototype



Analysis
Weight Control Mechanism





Analysis
Risks at Function Prototype

Jam

Ingredients stuck when the door repeat opening and closing

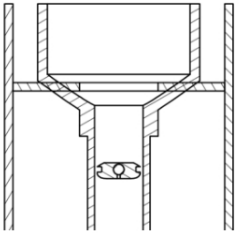
Leak

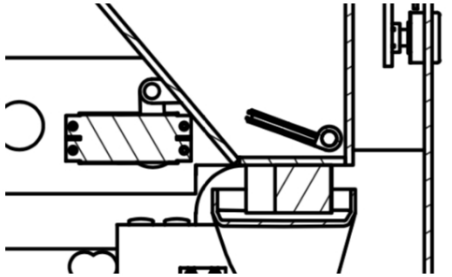
Ingredients leak betwen the outlet and dispencing cup

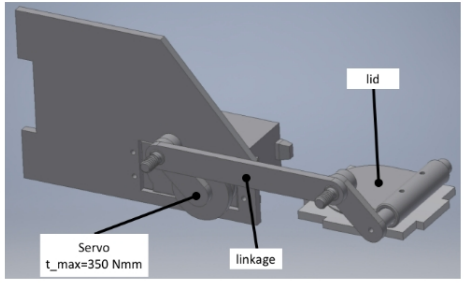
User Interface

Everyone uses the machine instinctively

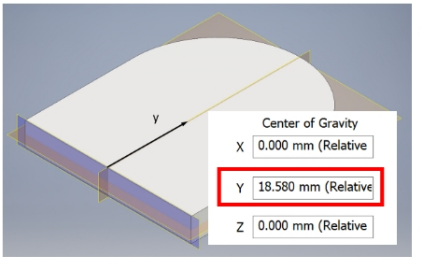
Counter Measures
Jam

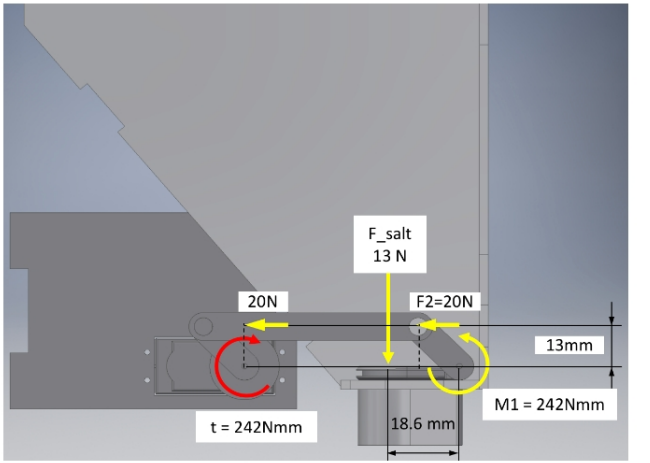






Counter Measures Jam





Counter Measures Jam

Torque Analysis 2

Step 1: Find the center of gravity

Y1 = 18.60 mm: the distance from the axis to the center of gravity

Step 2: Find the moment at the axis

F1 = (1.32 kg)(9.8 m/s^2) = 13 N
M1 = (13 N)(18.6 mm) = 242 Nmm

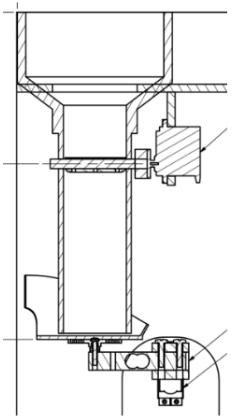
Step 3: Find the force at the linkage

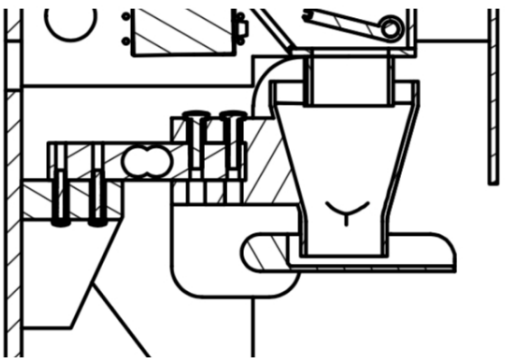
242 Nmm = (F2)(13)
F2 = 18.6 N

Step 4: Find the moment at the servo

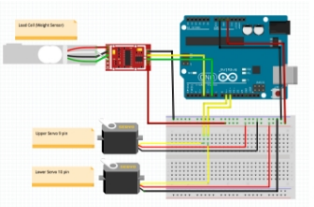
t = M2 = (18.6 N)(13 mm) = 242 Nmm < 350 N mm
n = 350 / 242 = 1.45

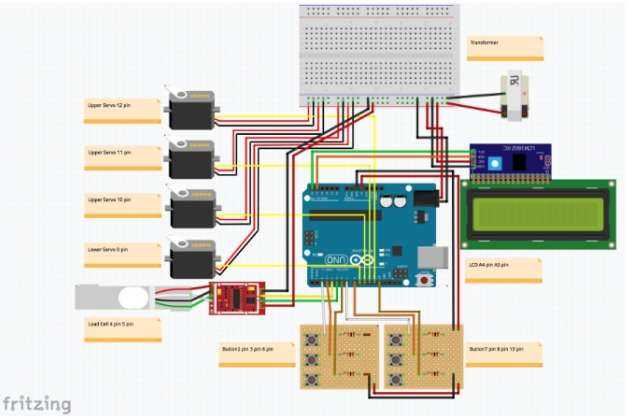
Counter Measures
Ingredients Leak





Counter Measures
User Interface





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