CONCEPTUAL DESIGN

GNG1103, Section # F, Team # F3

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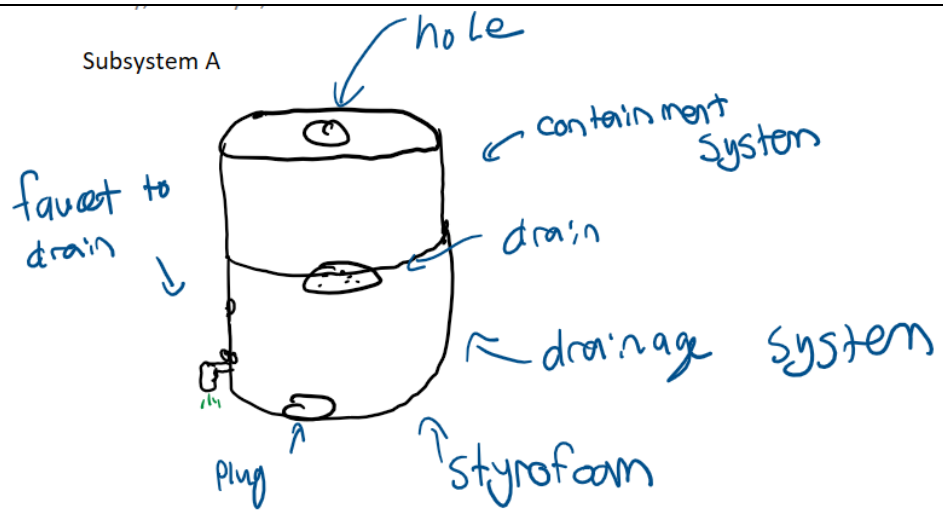
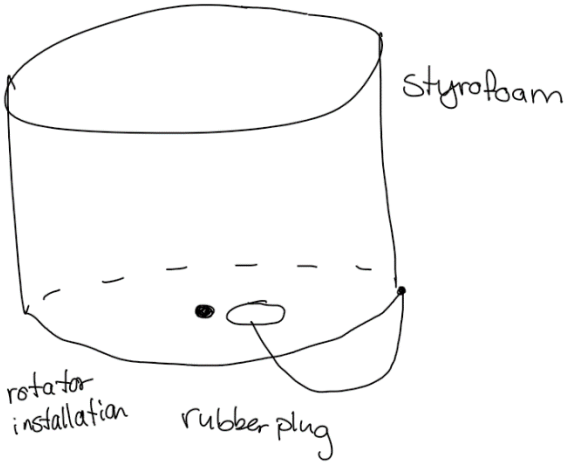
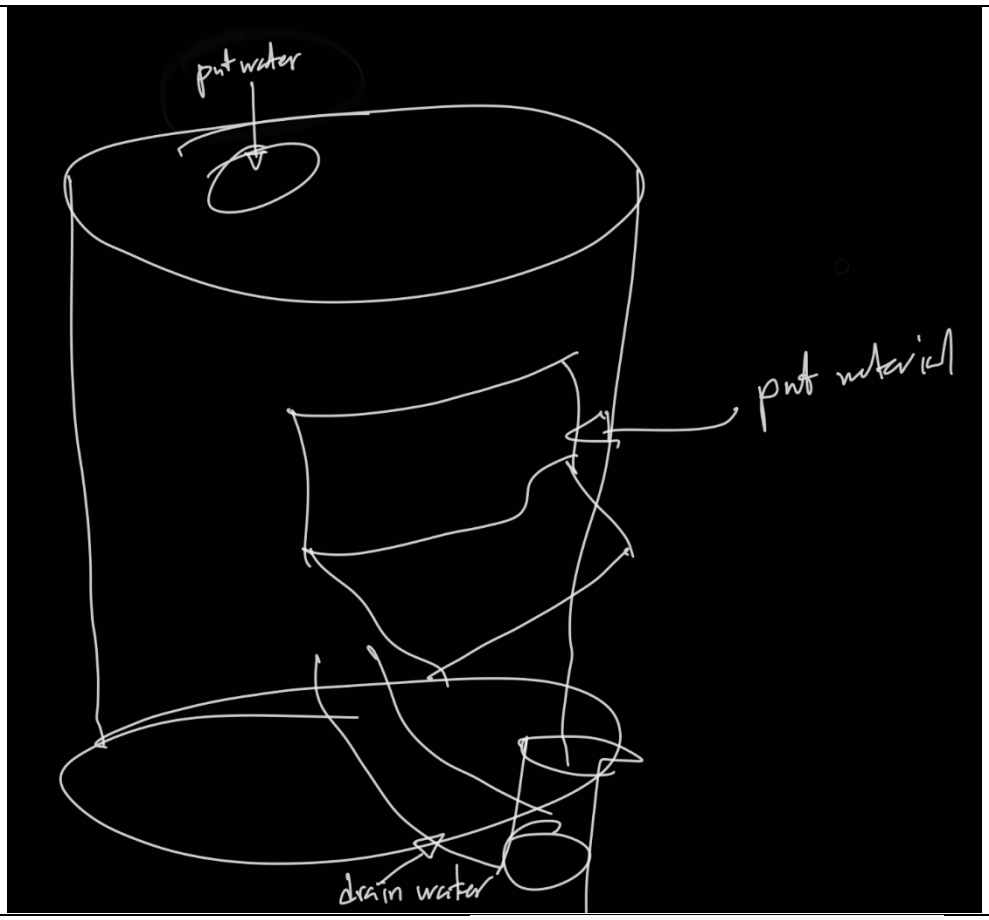
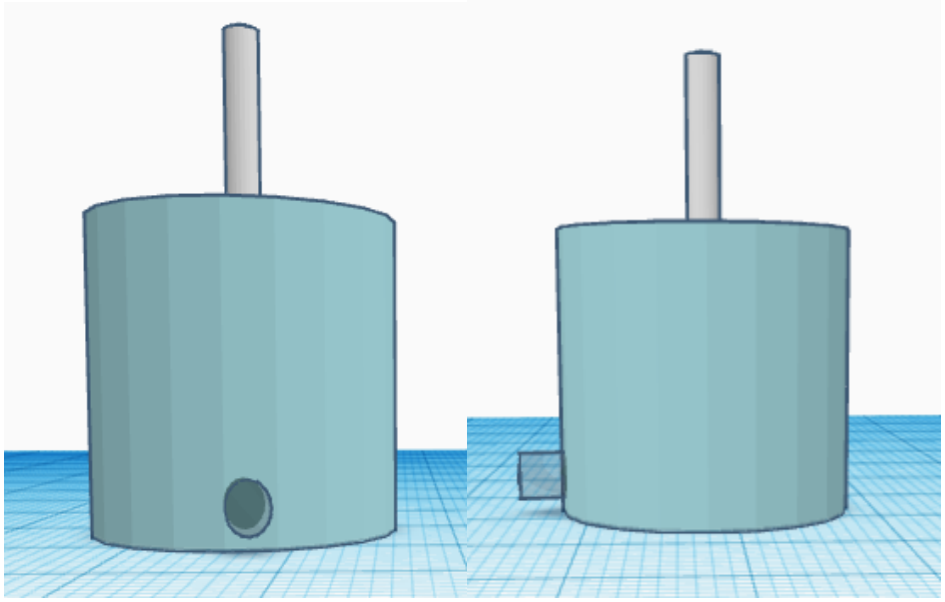
1.0 List of Subsystems

A. Containment & drainage
B. Debris analysis
C. Physical components of rotator mechanism
D. Rotator control
E. Installation of sample
F. Physical components of heating system
G. Control of heating system

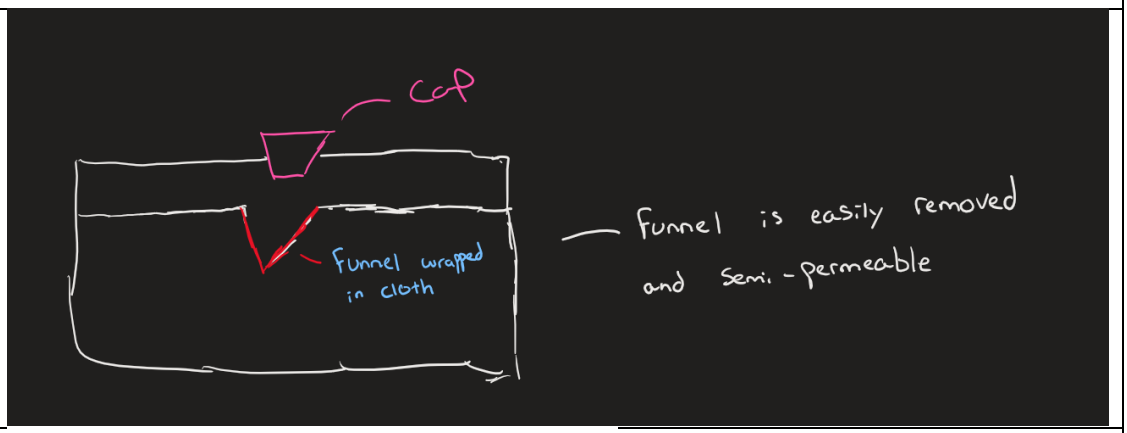
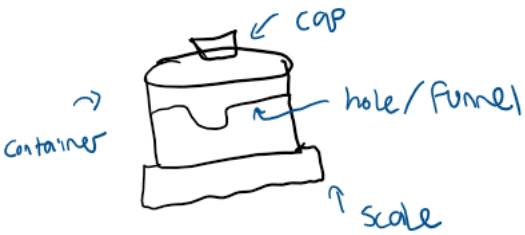
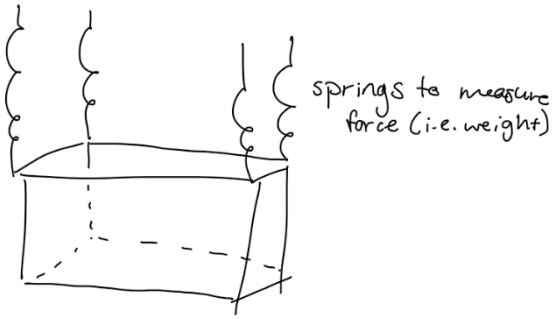
1.1 Subsystem A

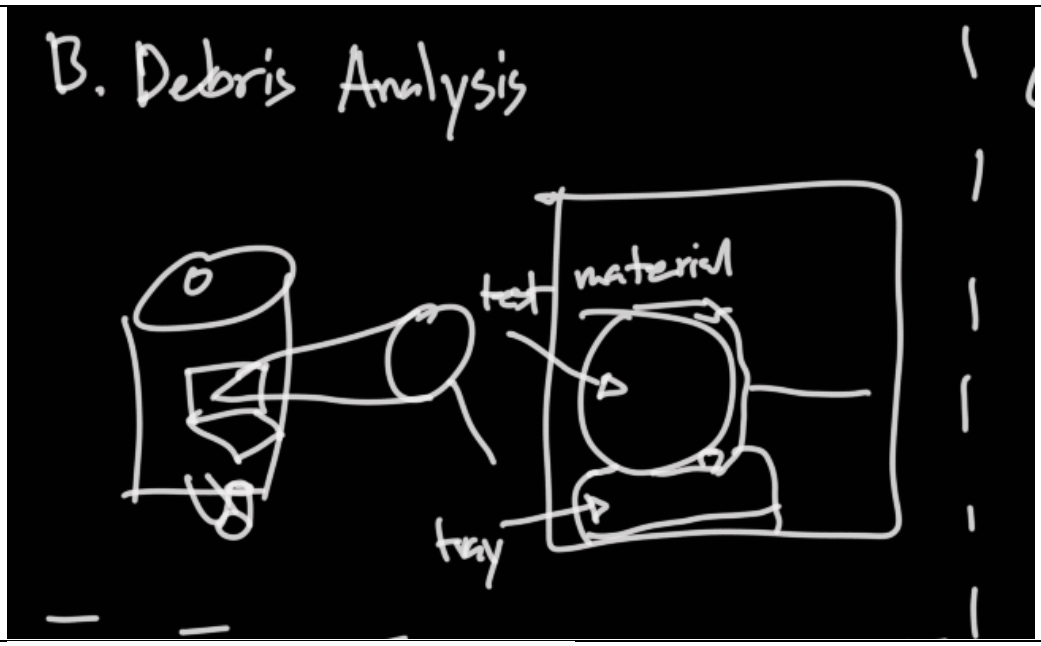
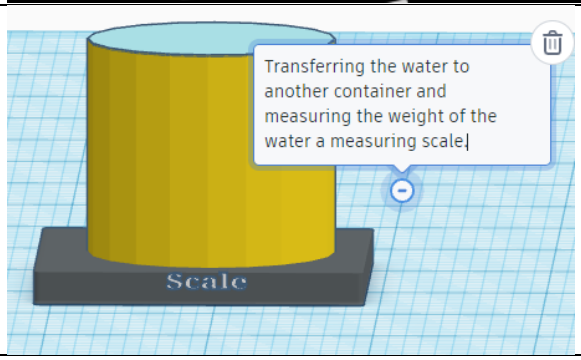
Name	Solution
Ahmad	

Gurshaan	
Lauren	

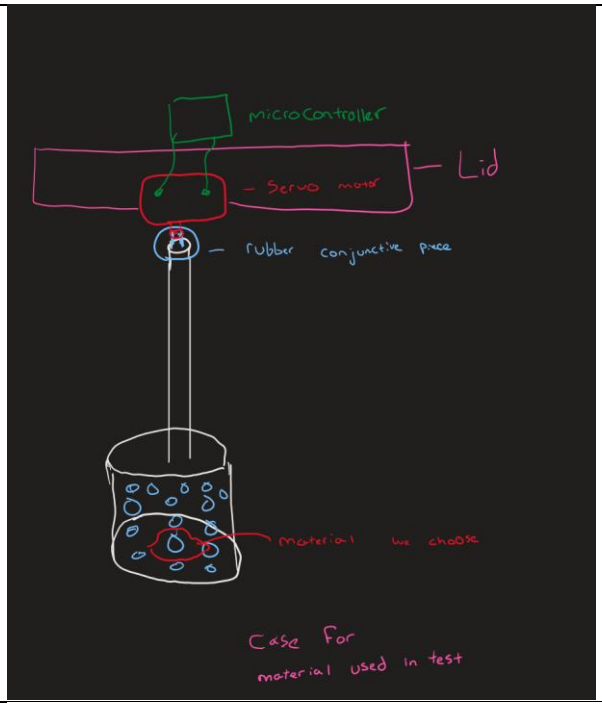
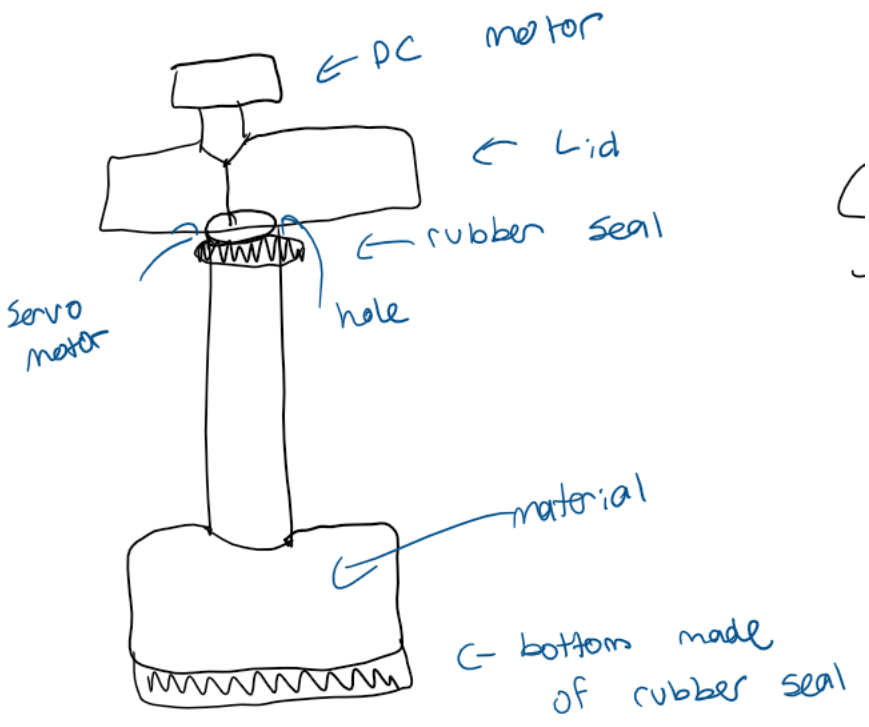
Sendwe	
Yusra	 Just has a spout coming out of it. The cylinder is plastic, and it's see-through.

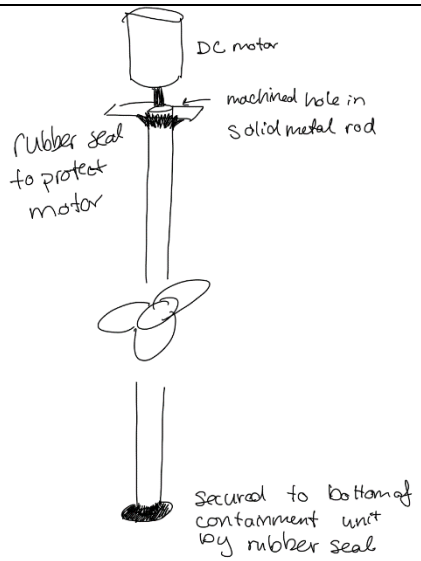
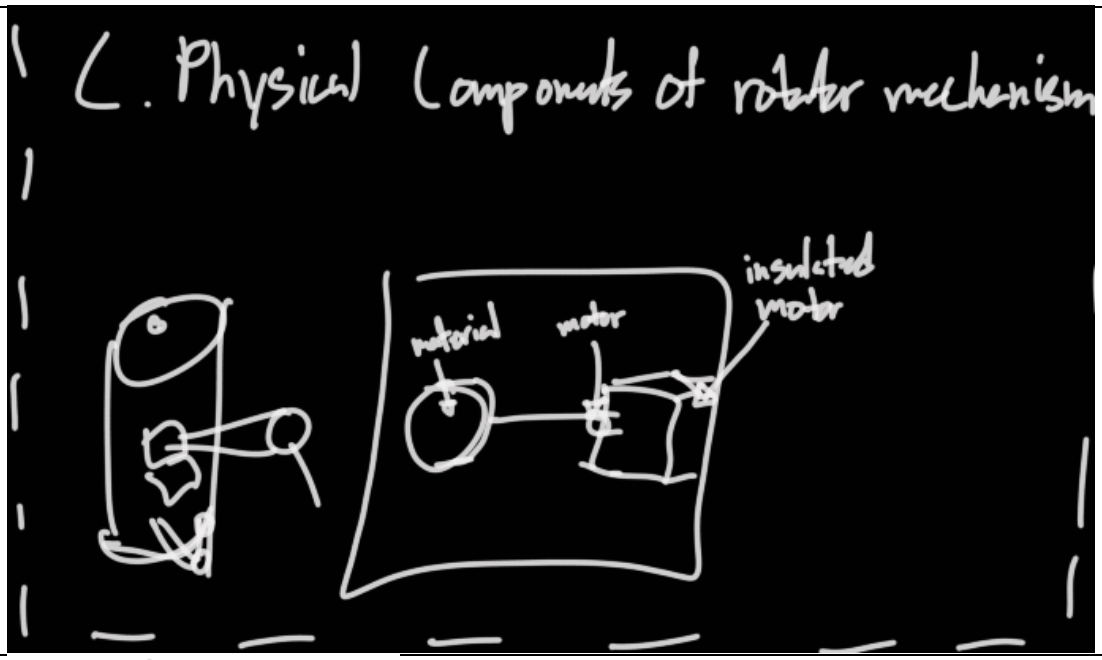
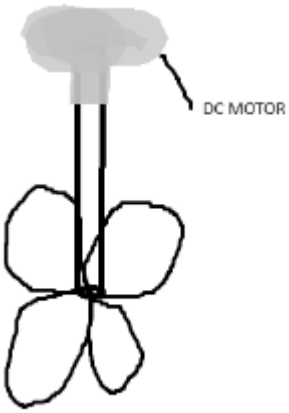
1.2 Subsystem B

Name	Solution
A	
G	
L	 or a cylinder with three springs

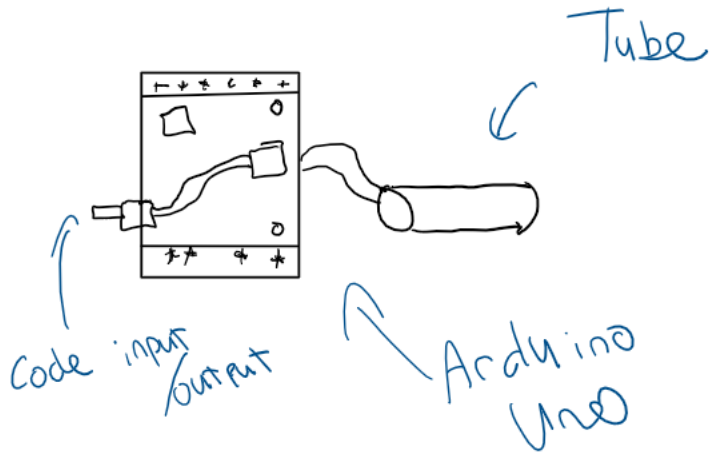
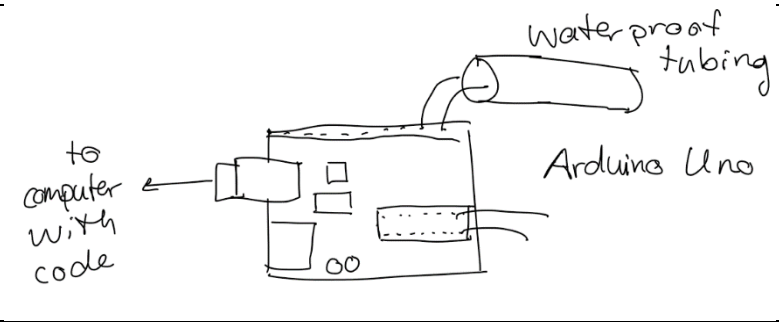
S	 B. Debris Analysis material test tray
Y	 Transferring the water to another container and measuring the weight of the water a measuring scale Scale

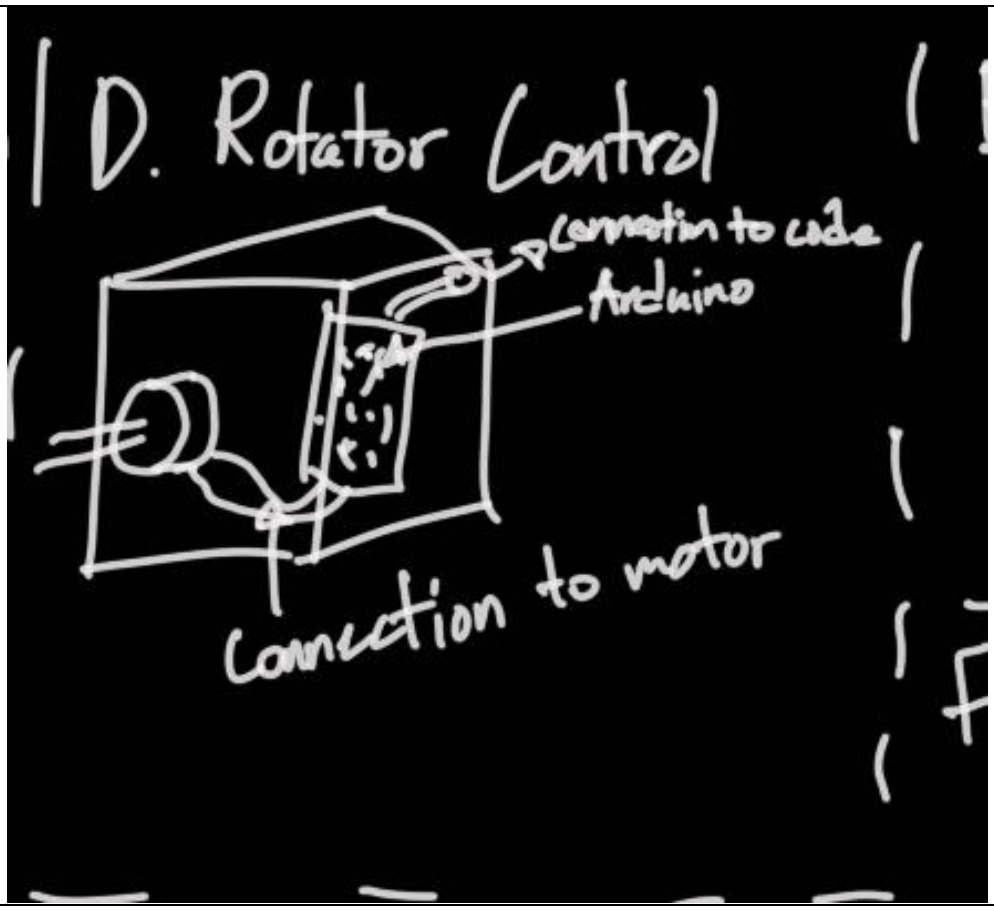
1.3 Subsystem C

Name	Solution
A	
G	

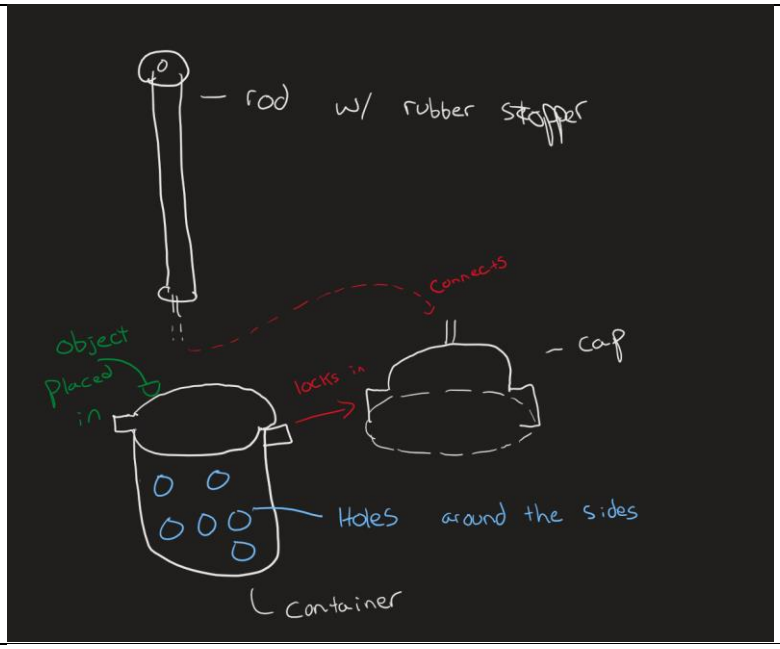
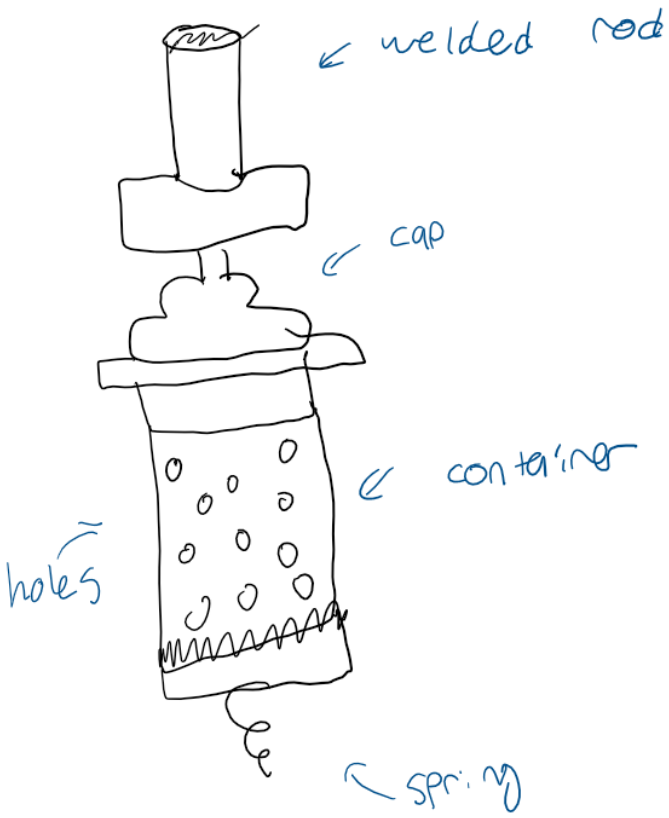
L	 DC motor machined hole in solid metal rod rubber seal to protect motor secured to bottom of containment unit by rubber seal
S	 C. Physical Components of rotator mechanism material motor insulated motor
Y	 DC MOTOR

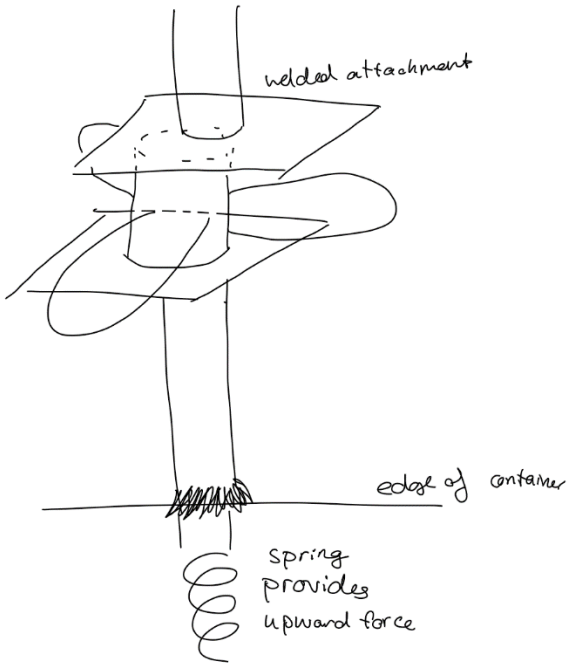
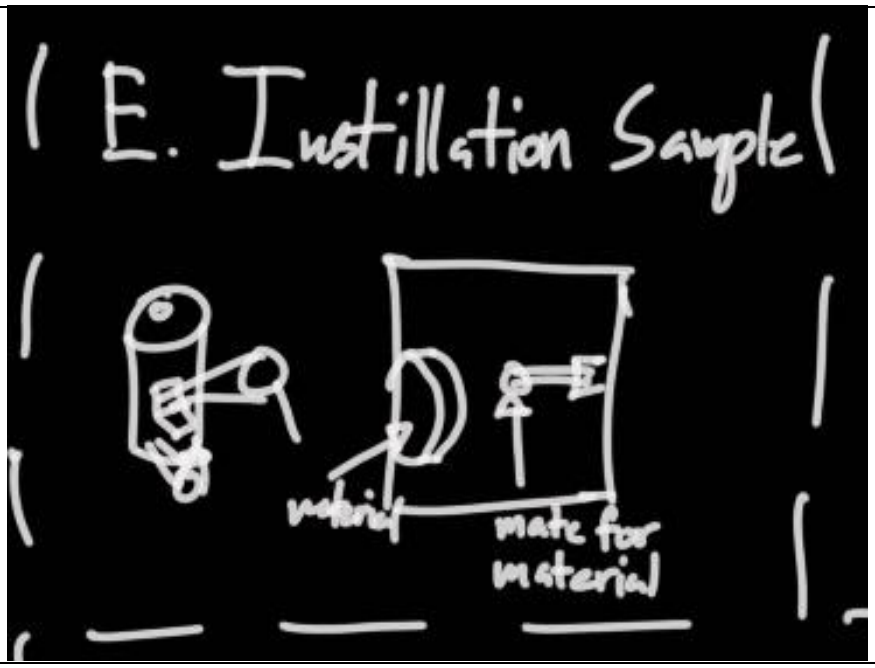
1.4 Subsystem D

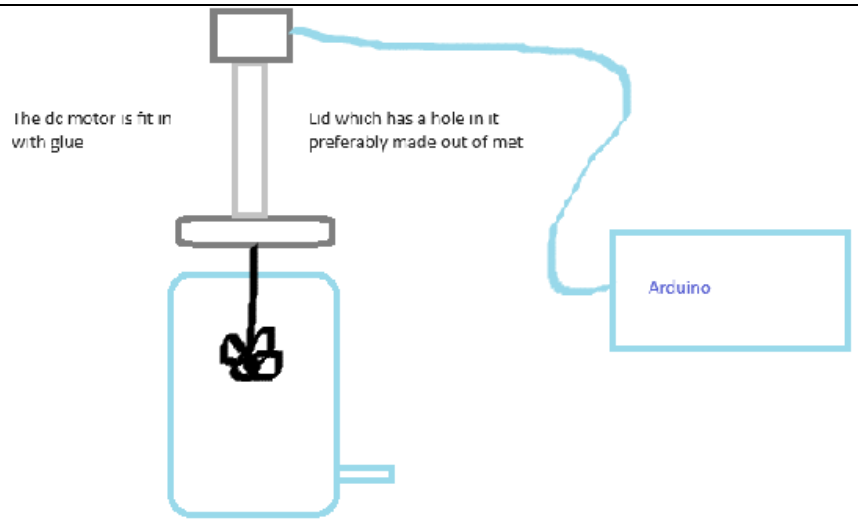
Name	Solution
A	Same as Lauren's design
G	
L	

S	
Y	Same as Lauren and Gurshaaan's design

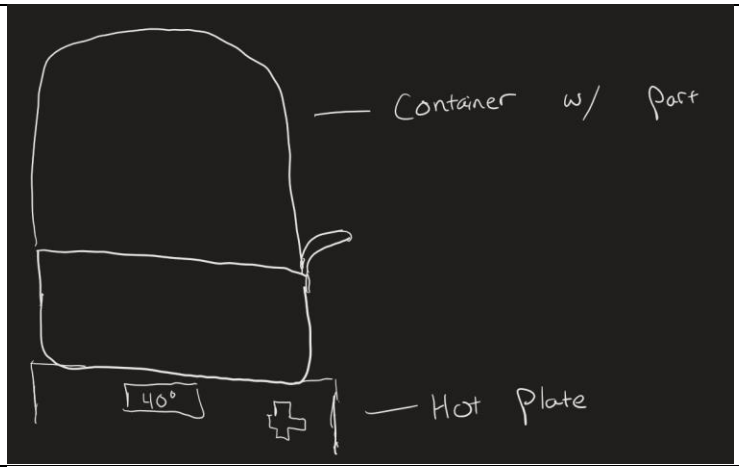
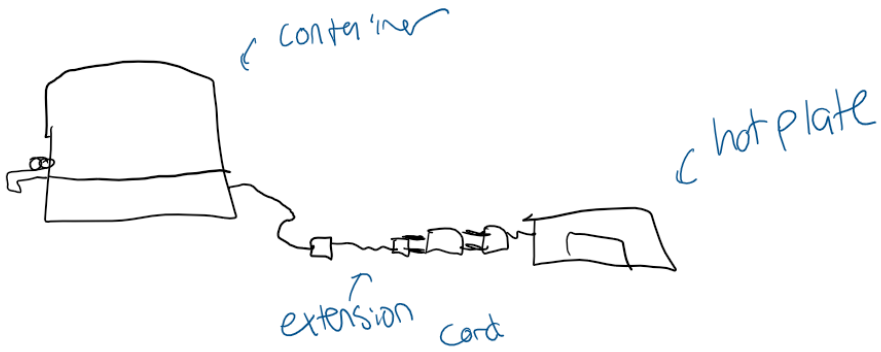
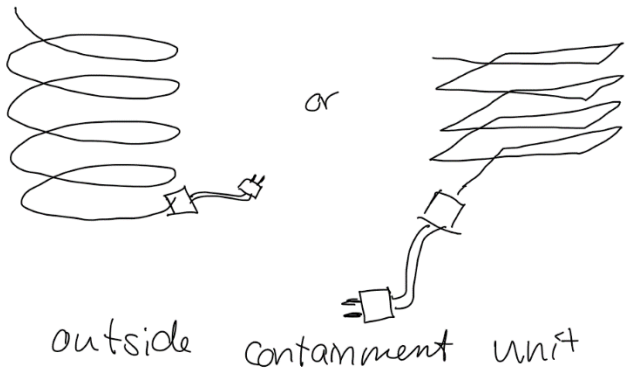
1.5 Subsystem E

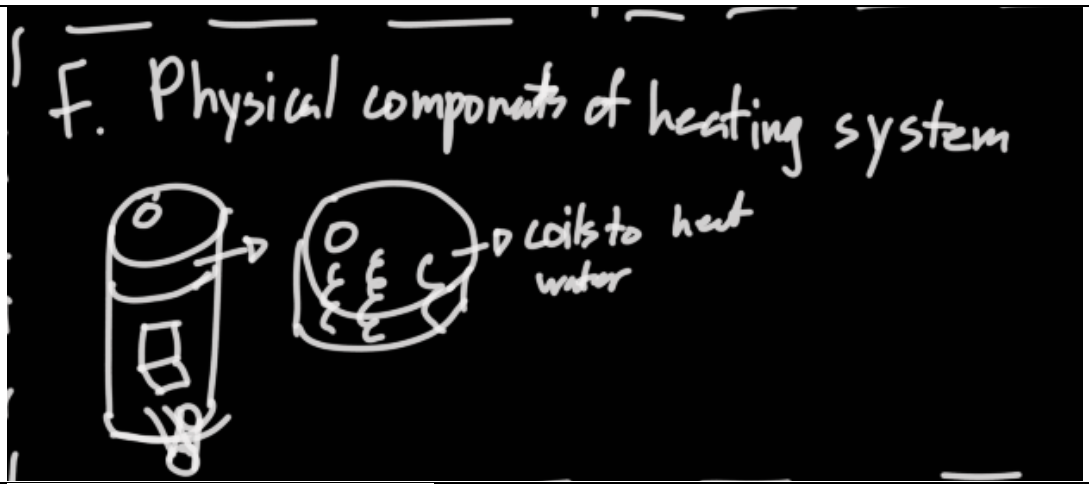
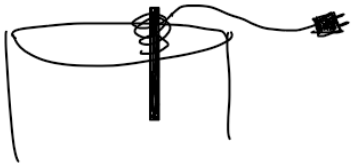
Name	Solution
A	
G	

L	 welded attachment edge of container spring provides upward force
S	 E. Instillation Sample material mate for material

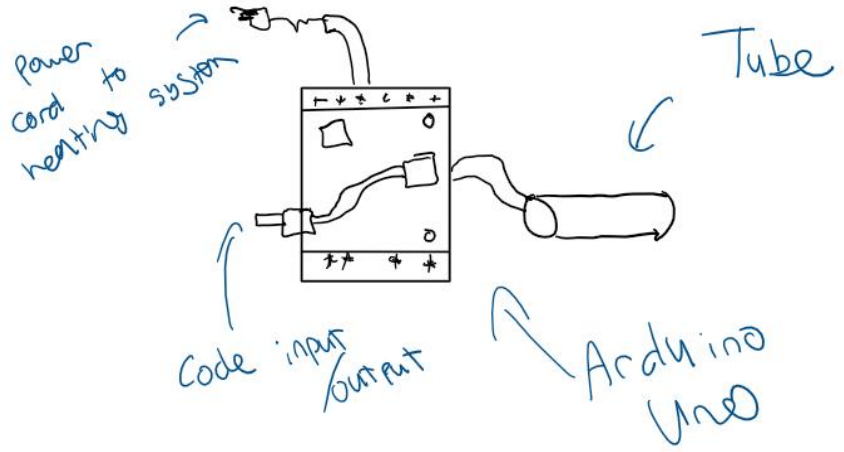
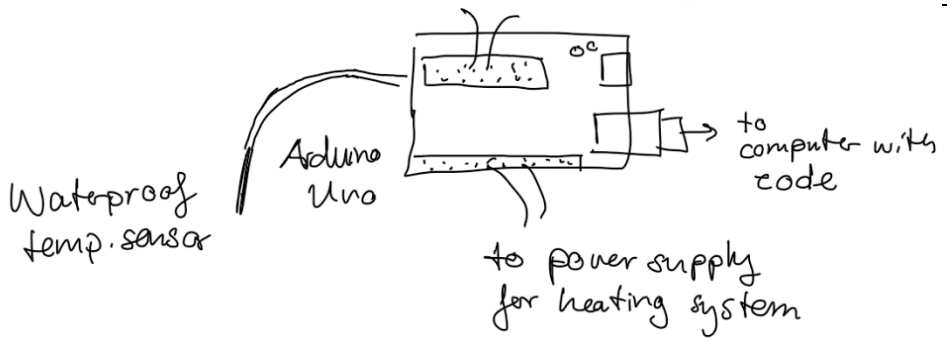
Y	 The rod is attached to the motor by super glue. Then a wire is attached to the blade, the wire is then put through the rod and attached to the DC motor. Finally, the metal lid is used to close the container.

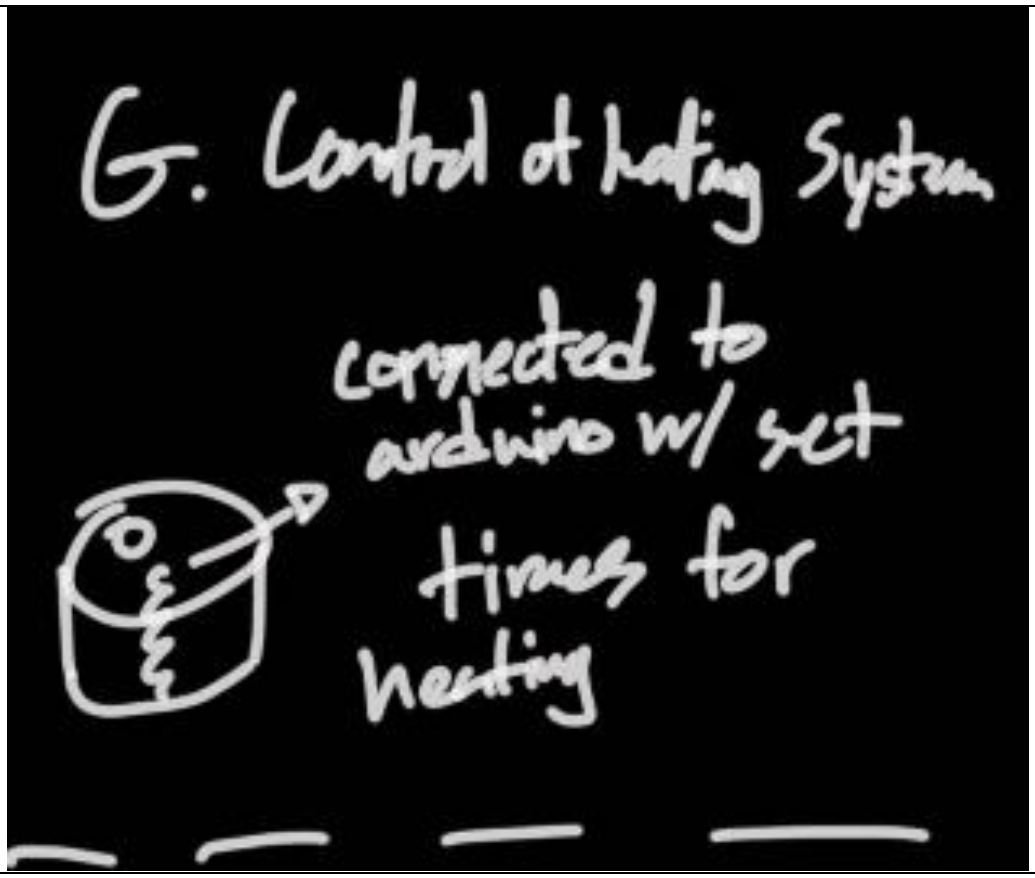
1.6 Subsystem F

Name	Solution
A	
G	
L	

S	 F. Physical components of heating system coils to heat water
Y	

1.7 Subsystem G

Name	Solution
A	Hot plate can have a pre-determined max.
G	
L	 Sensor is placed near the material.

S	
Y	Device can be controlled by hand so no need for Arduino

2.0 Selection of Best Solution

Using a selection matrix, the subsystem will be evaluated based on whether it meets the design criteria (green), partially meets the design criteria (yellow), or does not meet the design criteria (red).

2.1 Combination I

A. A sloped bottom and faucet to drain water, made from plastic on the inside and Styrofoam on the outside as insulation.
B. Draining the water through a filter and out of the container, then weighing the wet filter with debris.
C. DC motor with two (plastic) rods.
D. Arduino Uno with waterproof tubing.
E. Small plastic container with holes, which has a cap to enclose the sample within.
F. Metal rod semi-immersed in water with heating coil around the upper section.
G. Arduino measures & controls power supply to heating system.

Criteria / Subsystem	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A														
B														
C														
D														
E														
F														
G														

2.2 Combination II

A. Two-container system with a faucet to drain the water and a plug as a backup drainage mechanism.
B. Draining the water through a filter and out of the container, then manually removing and weighing the wet filter with debris.
C. DC motor with two metal rods.
D. Arduino Uno with waterproof tubing.
E. Small plastic container with holes, which has a cap to enclose the sample within.
F. Three heating coils immersed in the water.
G. Arduino measures & controls power supply to heating system.

Criteria / Subsystem	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A														
B														
C														
D														
E														
F														
G														

2.3 Combination III

A. A sloped bottom and faucet to drain water, made from plastic on the inside and Styrofoam on the outside as insulation.
B. Draining the water through a filter and out of the container, then manually removing and weighing the wet filter with debris.
C. DC motor with one plastic rod.
D. Arduino Uno with waterproof tubing.
E. Small plastic container with holes, which has a cap to enclose the sample within.
F. Coils embedded in the cover of the container, which heat the water's surface.
G. Thermometer and human turns on and off the power supply.

Criteria / Subsystem	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A														
B														
C														
D														
E														
F														
G														

2.4 Best Solution

Combination I would provide the best solution, since it has the most green sections on the selection matrix, meaning that it meets the greatest number of the design criteria. Combination II meets fewer of the criteria then Combination I. Combination III had one subsystem that was missing a critical element of being able to run for 2 weeks ± 3 hours, and so would not be suitable.