



# THE MOMENT GROUP 15

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Tao

# INTRODUCTION



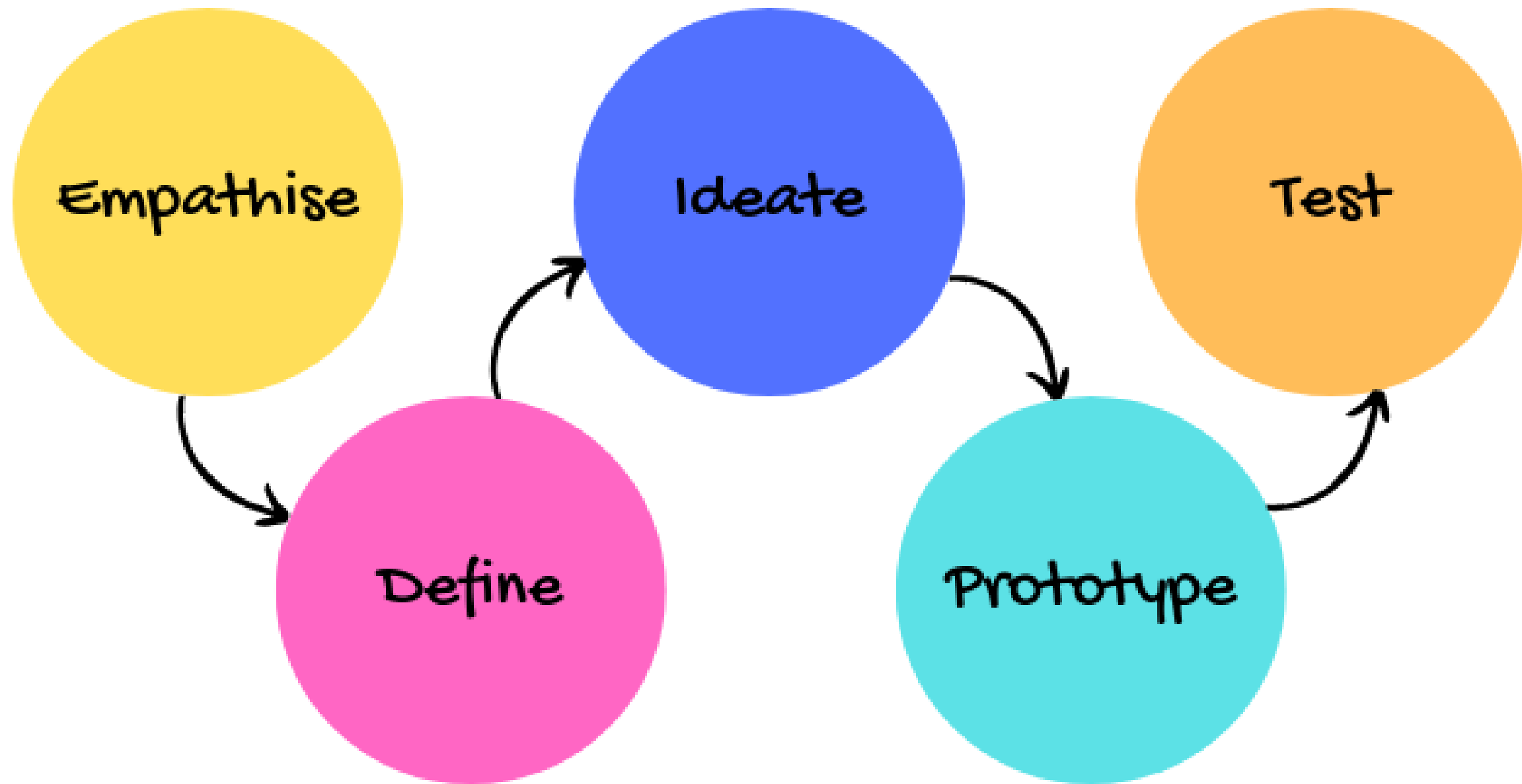
AYMERIC SIN TAO



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# EMPATHIZE PROCESS

- Determine needs from client presentation and rank them
- Gather ideas based on client needs
- Getting feedback from client
- The importance of getting a sample that is 30 to 80 milligrams
- Efficient yet simple design

Importance	User Need	Justification	Statement
5	Retrieve 30–80 mg of radioactive material from a pipe	This is the main goal of the product, making it the highest priority.	Product can efficiently retrieve radioactive material from a tube.
5	Function safely to avoid contamination	Safety is critical. Without it, retrieving radioactive material cannot happen safely or effectively.	Product will include safety measures to prevent contamination.
5	Be portable	The product must be easy to transport, reducing time and effort during operations.	Product will be lightweight and portable for efficient transportation.
4	Work in horizontal and vertical orientations	Pipes vary in orientation. The product needs to function regardless of how the pipe is positioned.	Product will operate in both vertical and horizontal tubes.
4	Include a failsafe in case of system failure	Failures happen. A failsafe ensures no harm to the operator and prevents further issues.	Product will include failsafe mechanisms for safety.
3	Provide operator feedback	Feedback helps the operator know what's happening (e.g., entering the pipe, extracting material).	The product will provide operator feedback for better efficiency and safety.
2	Accommodate slight deviations	Pipes won't always be perfect, so the product should handle small irregularities.	Product will adapt to slight deviations in pipe structure.
1	Be battery-powered or man-powered	The product needs reliable power. While battery power is	Product will primarily use batteries but can also be man powered.

# DEFINE STAGE

Design specification:	Relation (=, <, >, =)	Value	Units	Verification method
<b>Functional Requirements</b>				
Scrapping	> , <	30, 80	mg	Testing
Storage	>/=	80	mg	Measuring
Portable	=	12 x 12 x 12 (turned off)	in	Measuring
Weight	>	5	lbs	Measuring
<u>Self Supporting</u>	=	Yes	N/A	Design
Vertical and horizontal	=	Yes	N/A	Design, Testing
Easily Retrievable	=	Yes	N/A	Testing, Design
Accommodate deviation	=	1	cm	Testing, measuring
Power Input	=	<u>Self Supporting</u>	N/A	Design
<b>Constraints</b>				
Budget	<	100	\$CAD	Calculation
Crawler size	<	4	In diameter	Measuring
Crawler range	>=	15	in	Measuring, Testing
<b>Non Functional Requirements</b>				
Installation	=	Simple	N/A	Testing
Looks	=	Full and safe	N/A	Design

- Creating polished design criteria
- Constraints
- Technical benchmarking to determine products similar
- Researching potential tools that may be used for scapping and collection

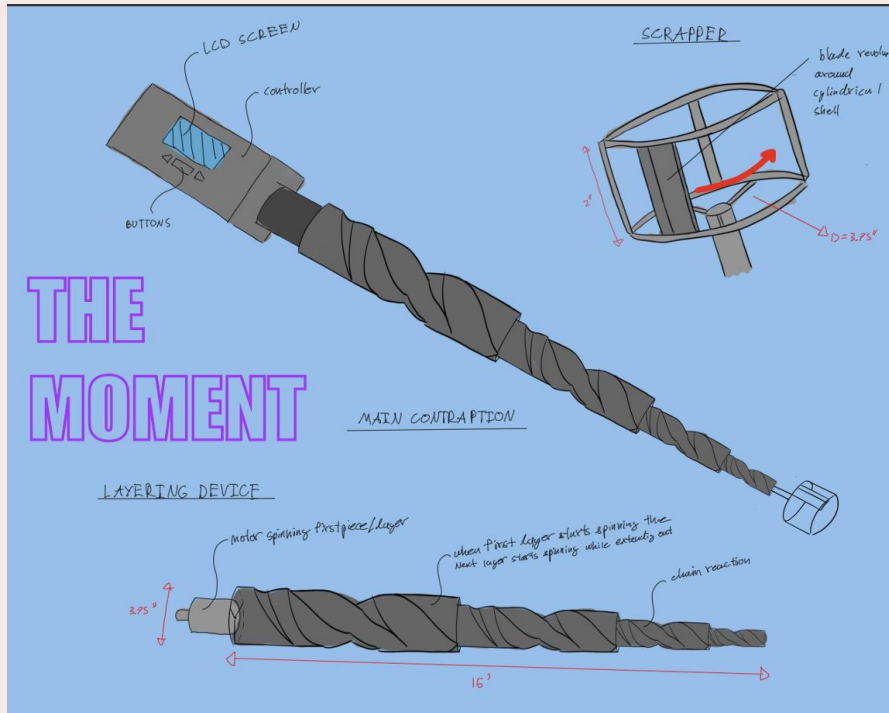


Scrapping tools

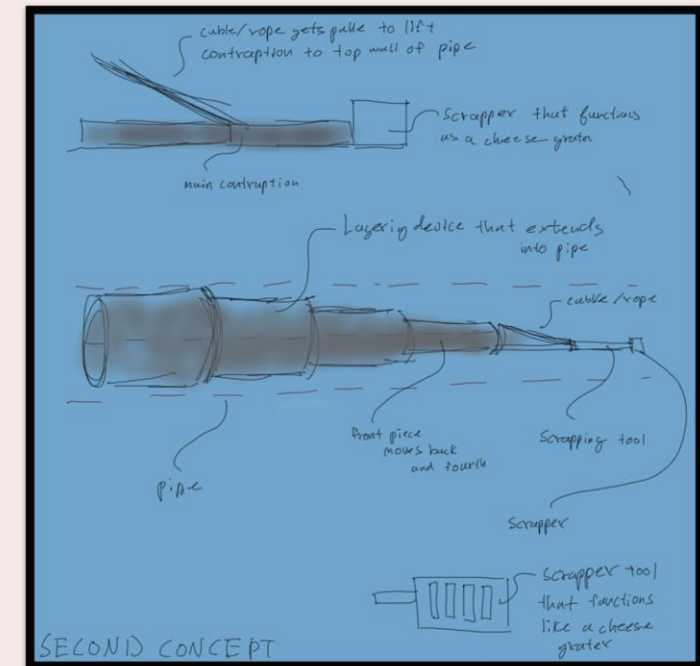
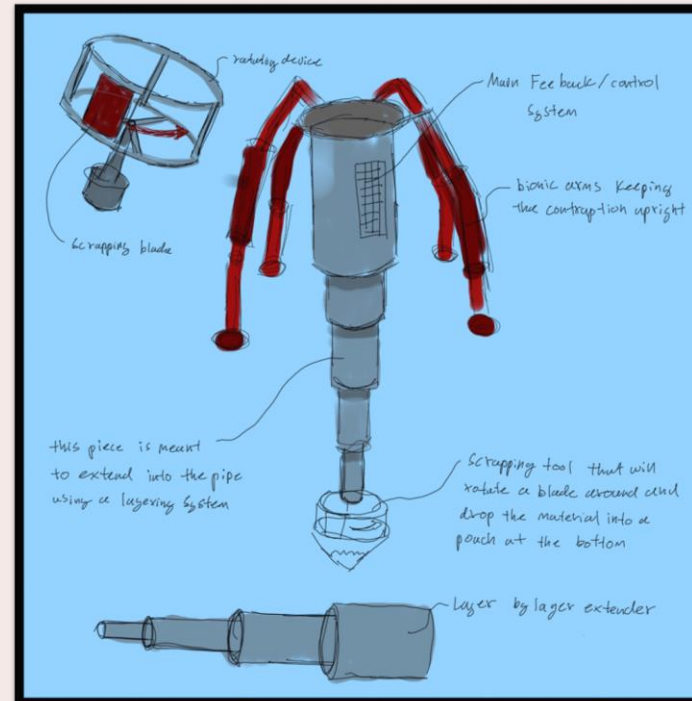
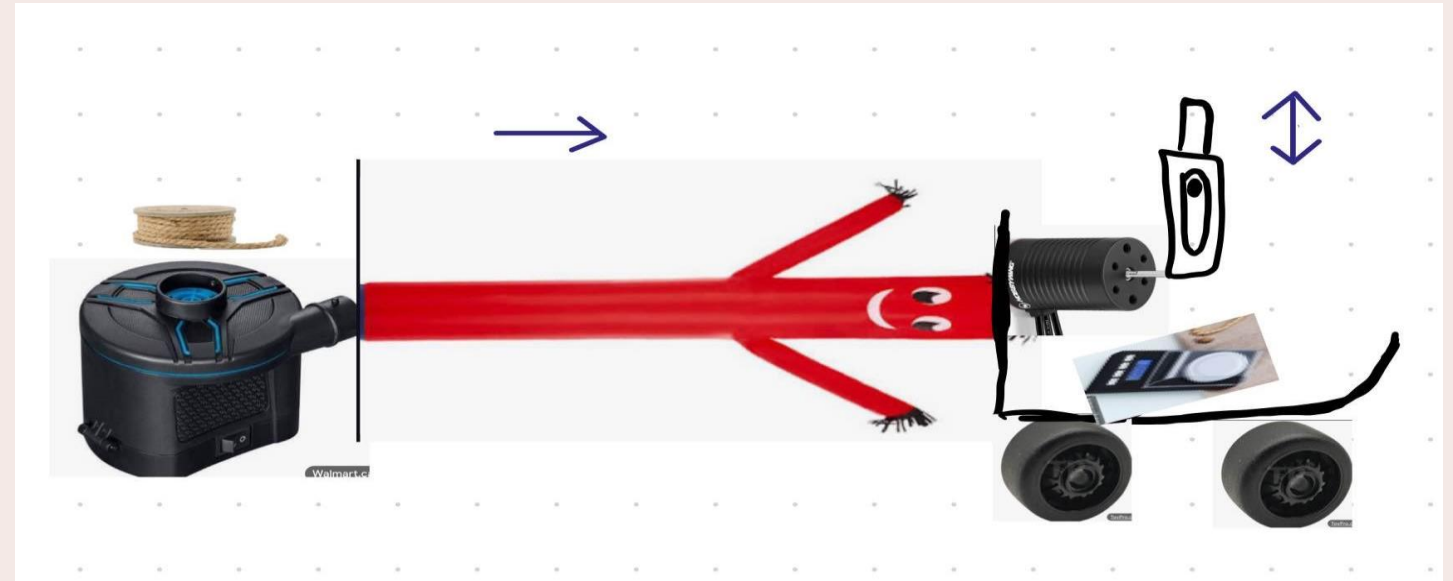
Extending tool



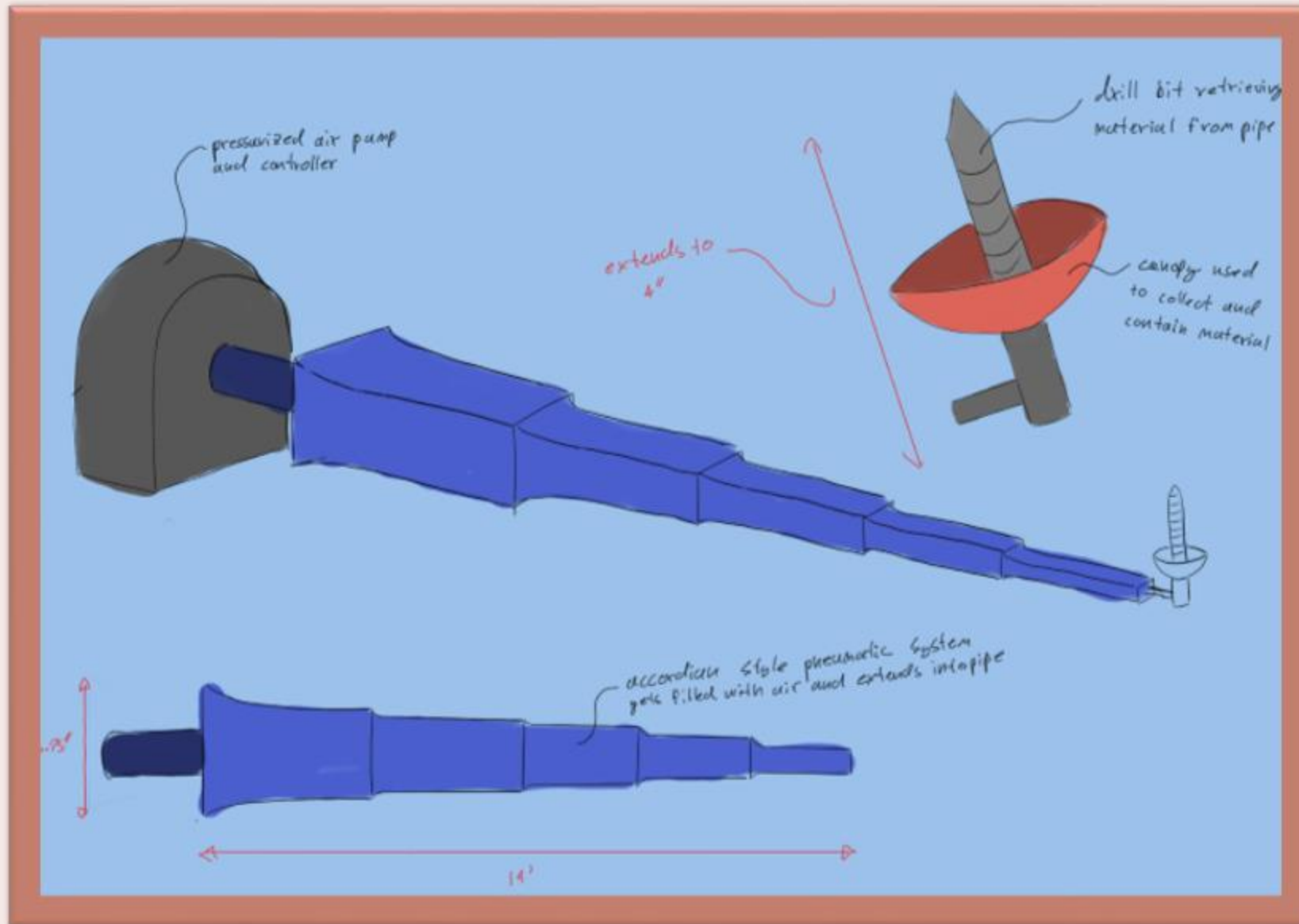
# IDEATE STAGE



- Initial prototype 1 sketch (Left)
  - Early concept (Top Right)
  - Early concepts (Bottom Right)
- Telescoping rod may not be very viable option
  - Extending pneumatic
  - Simple feedback system
- A rotating scrapper may not collect the sample properly

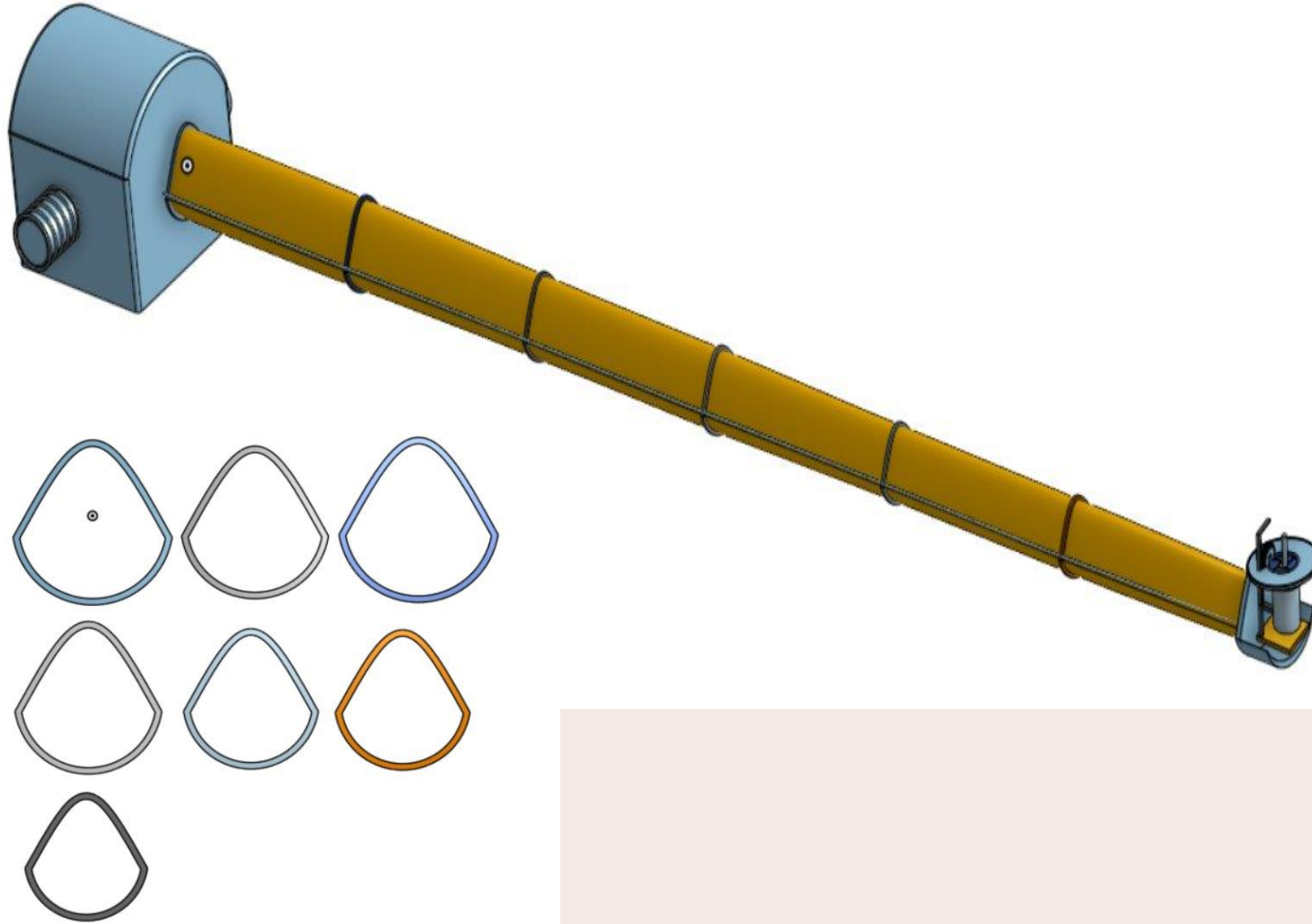


# FINAL SKETCH



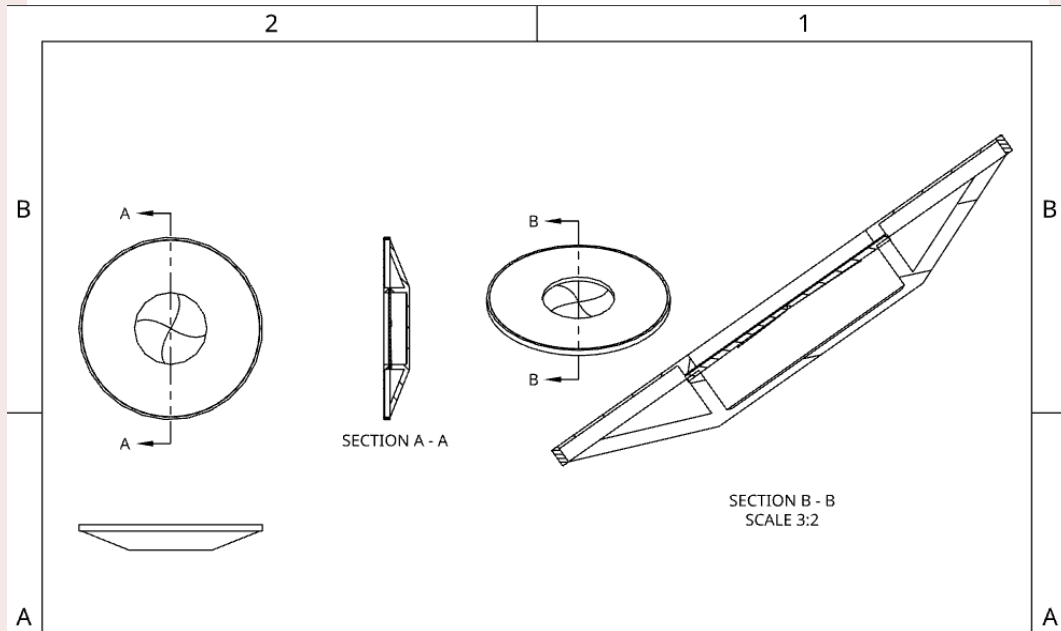
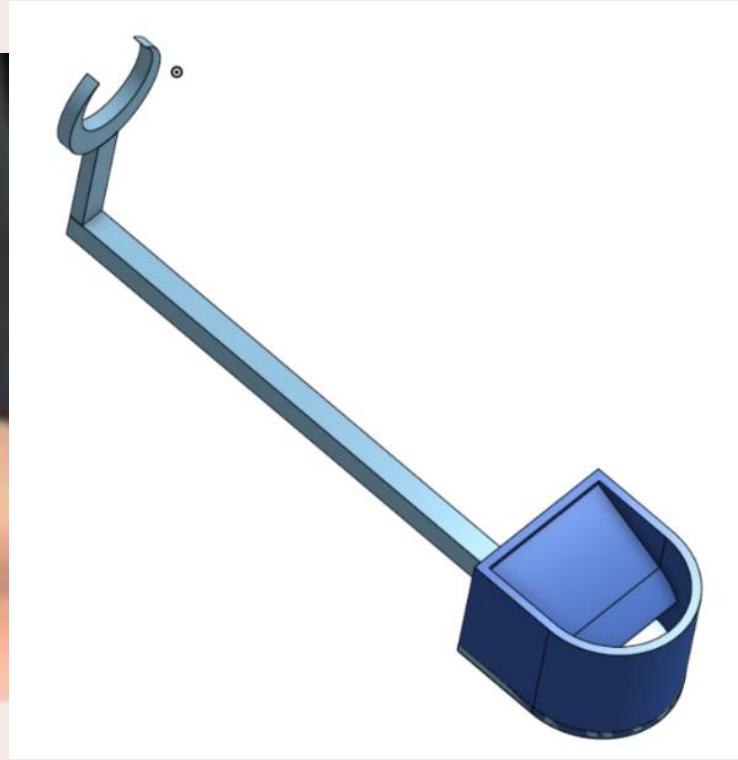
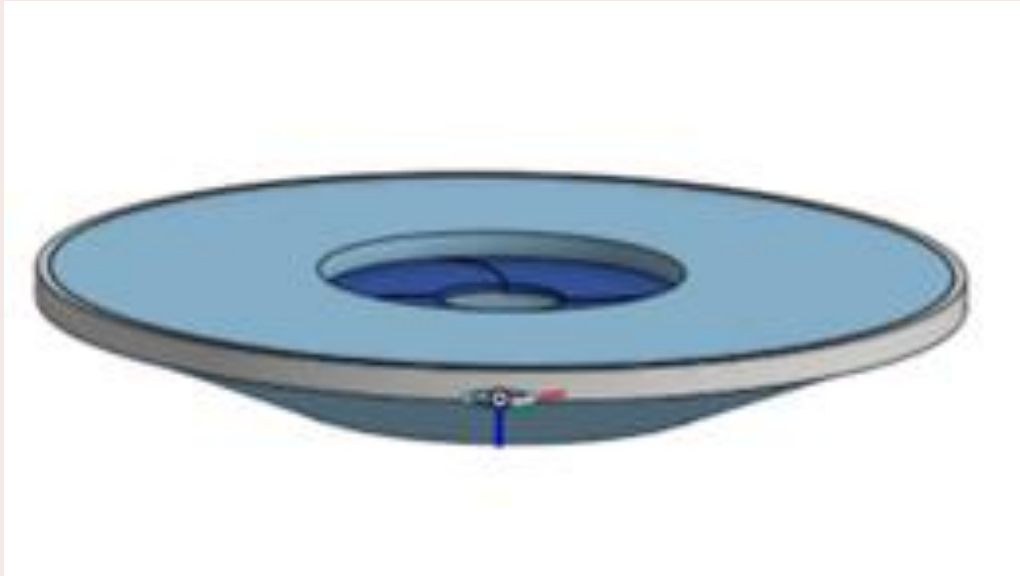


# PROTOTYPE PHASE



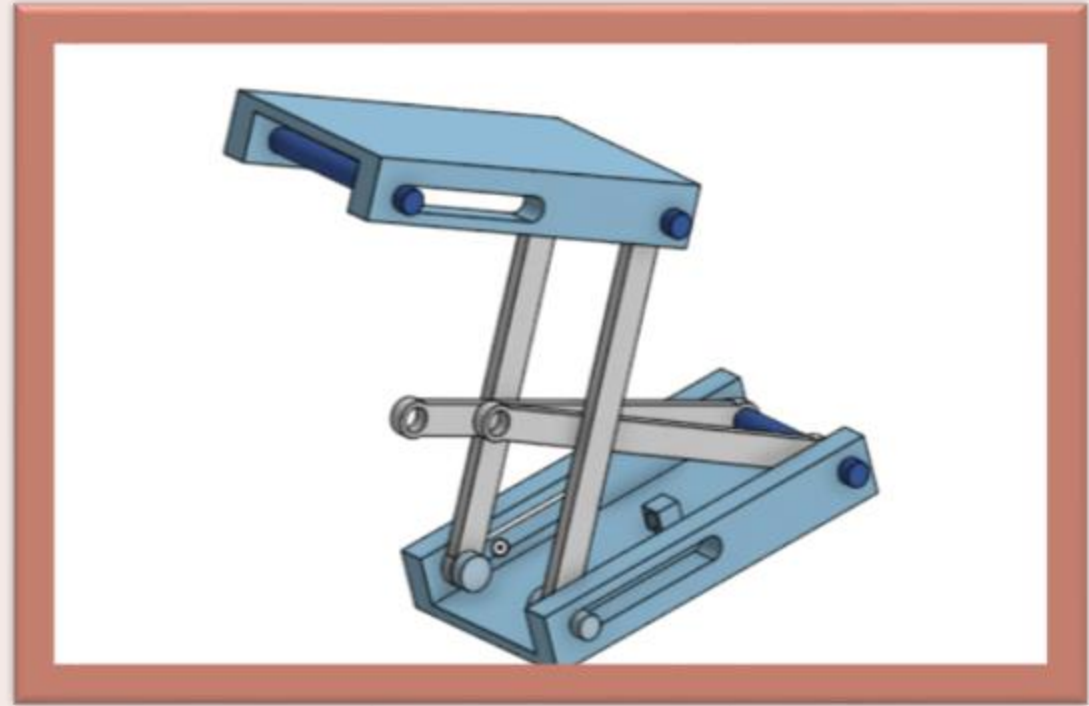
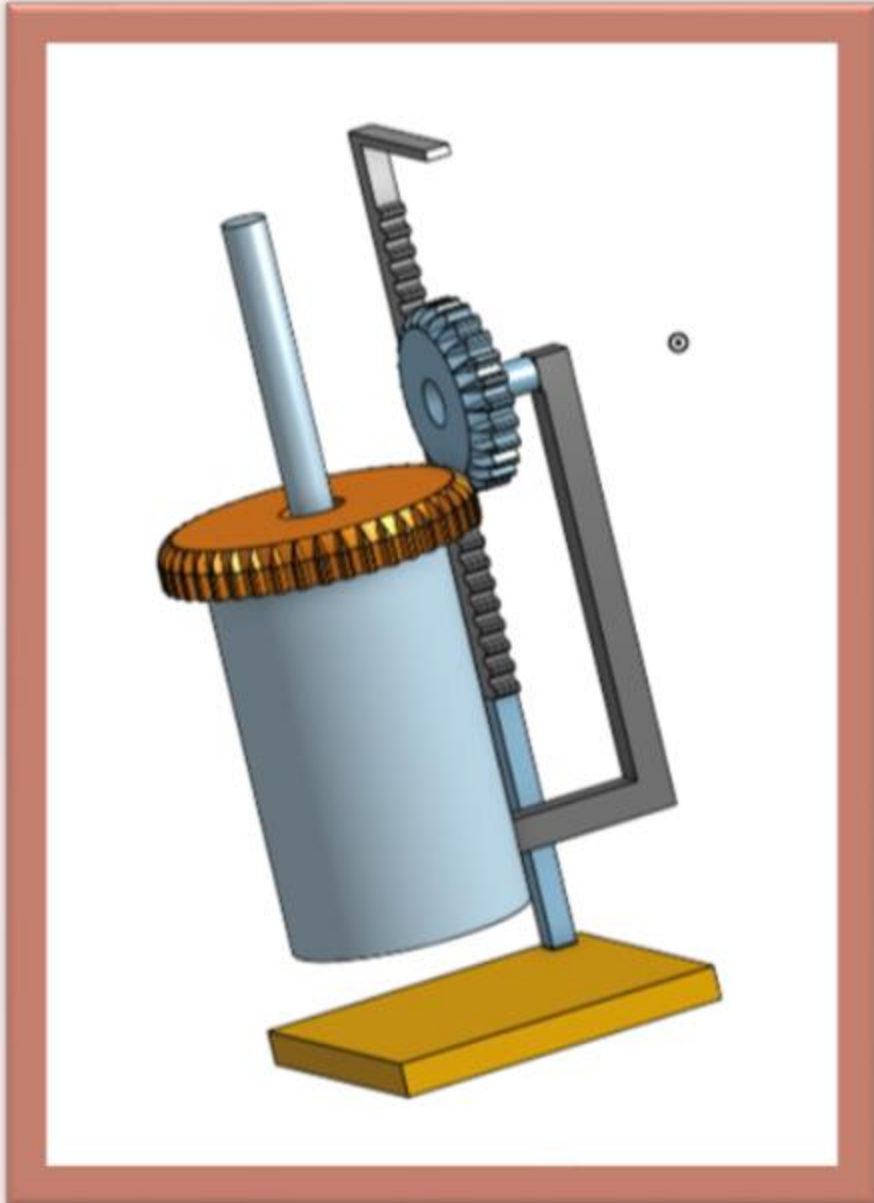
- Final concept
- Telescoping pneumatic system
- Tear drop shape telescoping system
- High pressure air compressor
- Collection device at the end of the layering device

# COLLECTION SYSTEM



- Circular collection system
- As drill component spins the latch opens and collects material
- When drilling stops latch closes
- Attached to top of drill

# RETRIEVAL SYSTEM



- Original system involves rack and pinion runned by motor
- Motor's RPM is very high causing inside damage of tube
- Screw scissor lift solves problem of lifting drill up towards walls of tube slowly.

# TESTING PHASE

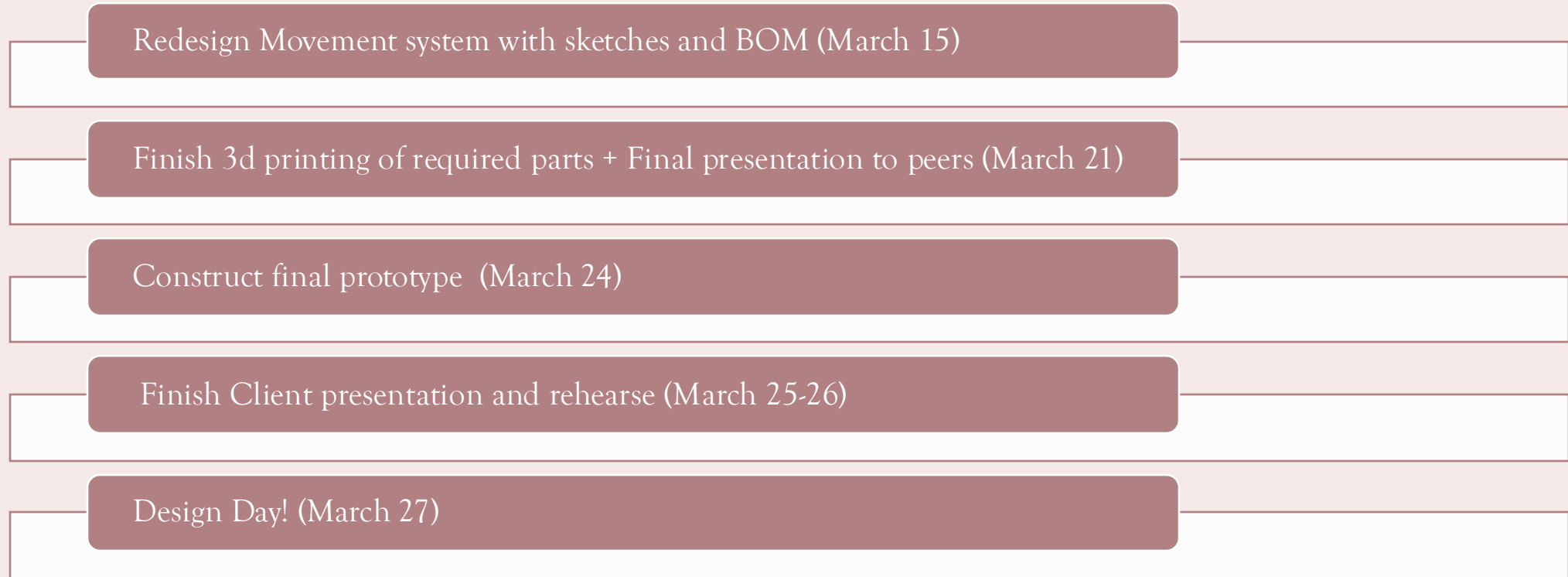
Test Number	Probable Critical Issue	Test Objective (why)	Test description (what)	Stop Criterion
1	Body can move up and down the tube	Testing for performance, Distance Travelled In how much time (feet/sec)	Extending the contraption to 15 feet and contracting it. Seeing how much weight it can push and pull	Body manages to push and pull the weight of the drilling mechanism
2	Controlled Drilling Mechanism	Performance, Management, Distance drilled (inches)	Drill into a material and test to see if device can make holes the same size consistently	Drilled hole sizes are consistent within the past 3 attempts
3	Collection Mechanism	Performance, Management, Amount of material collected (mg)	Drill a consistent hole into a material that will turn into powder, and measure how much the collection system collected in mg	The collected amount is consistent within 7 mg in the past 3 attempts
4	Test functionality of <u>Fail Safe Mechanism</u>	Risk Management	Removing the contraption from a tube utilizing the failsafe mechanism	Failsafe mechanism functions properly, used by multiple different people

5	Testing if entire contraption works when assembled	Performance, Distance travelled (feet) Speed (feet/second) Hole size (inches) Material collected (mg)	Run through an entire material extraction process with the assembled complete prototype	When results equal results from tests 1,2 and 3
6	Feedback system test	Management, Risk management	Run through a material extraction process simulation	There is a <u>clear feedback</u> for when the prototype finishes extending, drilling and retracting

# FINAL STEPS

- Recent events have forced us to reconsider our approach
- Major changes in the design might have to be made
- One of our pivotal team members is no longer in our group
- Our groups resilience and problem solving will be tested

# TIMELINE FOR DESIGN DAY





Thank You For Listening