Project Deliverable E: Project Schedule and Cost

Wade Stanley, Jacob Thom, Samuel Cadotte, Ethan Zhang, Ramya Patel

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University of Ottawa

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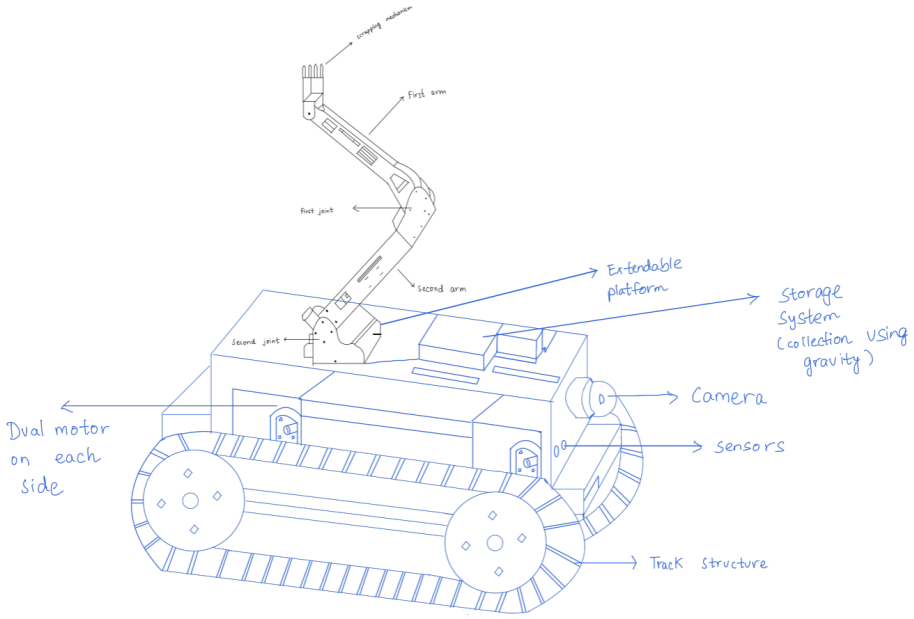
1. Introduction

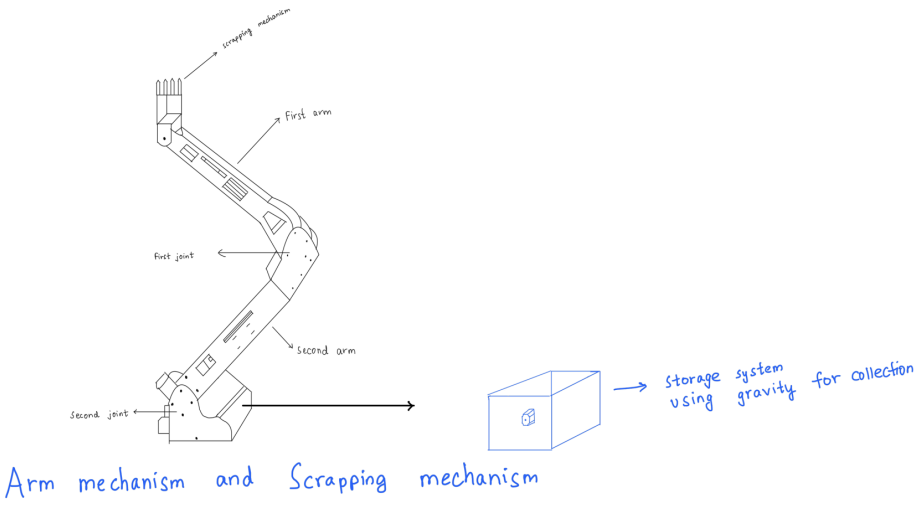
This report presents a refined design that summarizes our chosen concept built on the information presented in the last deliverable. We have created a schedule for prototyping and testing our solution, which includes a list of tasks to be completed, as well as risks and contingency plans to mitigate these risks. Additionally, we have listed important equipment as well as an estimated cost of all materials and components required. Finally, we have included a prototyping test plan to help us prepare to build the first prototype of our design.

2. Detailed Design Drawing

a. Drawing 1:



b. Drawing 2:



3. Project Plan and Schedule

Task	Estimated Duration	Responsible Team Member(s)	Risks	Contingency Plans
Prototyping movement mechanism	2-4 hours	Designer, Engineer, Quality Controller,	Device is unable to reach desired depths or move efficiently	Make adjustments to mechanism and parts
Prototyping sample collection mechanism	2-4 hours	Designer, Engineer, Quality Controller	Collection mechanism is unable to collect consistent samples	Modify components of collection mechanism
Prototyping user feedback system	2-4 hours	Designer, Engineer, Quality Controller	User feedback fails to provide updates	Modify sensors or data transfer system
Prototyping complete design	2-4 hours	Designer, Engineer, Quality Controller	Device does not fit in environment or components do not work together	Adjust size of device or modify layout

Implementing adjustments and improvements	3-6 hours	Designer, Engineer, Quality Controller	Changes bring new, unforeseen issues	Modify one part at a time and determine effects of changes
Assembling working device	4-6 hours	Designer, Engineer, Quality Controller	Problems with assembling parts	Follow assembly
Testing final design	2-4 hours	Designer, Engineer, Quality Controller,	Device does not perform to client's standards	Make appropriate adjustments and conduct tests
Implementing small adjustments to final design	2-6 hours	Designer, Engineer, Quality Controller	Small fixes bring new, unforeseen issues	Assess the problem, avoid unnecessary changes and conduct multiple tests

4. Cost Estimations and Bill of Materials

a. Initial Budget: We are provided with 100$ over the course of the project which we need to efficiently plan out or make our revised designs able to reuse components from the previous ones to cut down on overall cost.

b. Equipment List and Use Case:

Equipment	Use Case	Associated Cost
Dual Motors	Movement and Mobility Control	$20 ($10 each)
Robotic Arm	Metal Sample Scraping	$20
Sensors	Assist in Navigation and Obstacle Detection	$10
Storage System	Collects and Hold Metal Samples	$5

c. Bill of Materials:

Item	Use Case	Cost

Servo Motors	Controls movement of robotic arms	$15 ($5 each)
Camera Module	Captures real-time visuals	$10
Collection Bin	Hold metal samples after extraction	$5
Tracks	Ensures traction on different materials	$15

5. Prototyping

a. Prototype 1: Current design as shown in the drawings before. It uses treads and a robotic arm as its main components complemented with a camera and various other sensors to provide feedback to the user. The robot arm collects material and deposits it into a container which closes after collection to seal the sample.

b. Prototype 2: Since our initial prototype is to determine whether the movement and arm based collection of samples is viable, our second prototype will either be a new design that incorporates some more complex mechanisms to better cover the requirements we had set previously.

c. Prototype 3: The third prototype will be when we finalize most of the major components of the design. We can still make some minor changes such as adjusting some parameters of various parts so that they better perform.

6. Testing and Procedures for Prototype 1 (Subject to change based on results and design updates)

a. Design Specifications:

Design Specification	Units	Value	Verification Method
Movement mechanism reliability	Percentage	95%	95% reliability of system without fail
Movement distance	Feet	50	See if the prototype can travel 50 feet
Container storage	Mg	30-80	Test scrape in pipe
Scraping mechanism reliability	Percentage	95%	95% reliability of scraping the appropriate amount

b. Validation Plan:

Design Specification	Test method and materials needed	Method of Recording Results	Estimated Test Duration
Movement mechanism reliability	Shorter length of 4 inch diameter tube. Testing by running the prototype through the tube at least 20 times	How many successful attempts are achieved	20/20
Movement distance	A 50 ft measured track	If the prototype can reach 50 feet or not	20/20
Container storage	Prototype container and prototype pipe	If the container can successfully gather an appropriate sample of size from the prototype pipe	10/20 (May require more work to make this successful as it will be a hard aspect of the prototype to achieve successfully.
Scraping mechanism	Prototype scraper and prototype pipe	If the scraper is reliable and scrapes the valid amount of pipe.	15/20 (may be tricky to design)

7. Conclusion

Now that we have a refined design, we have established a solid structure for prototyping and testing our designs. By outlining key tasks and identifying risks, we have taken strong steps towards ensuring a simple and smooth development process. We have also added a detailed equipment and cost estimation list to provide a clear understanding of the materials and components needed for construction. The prototyping test plan will serve as a great tool in creating and evaluating our initial design builds. All of these processes and tables above will help bring us to a more usable and viable solution.