NORTHERN ARIZONA UNIVERSITY

Department of Mechanical Engineering
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ME 486C Section 002

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To: Dr. Armin Eilaghi

CC: Connor Gaudette

From: Flying Squirrel

Date: 8/30/2025

Re: Project Management

1. Reflection

Project Management - Success:

The team was successful in many areas, mainly in client meetings and presentation organization. Some stand out points are included in the following list:

Client Meetings:

- Consistent
- Concept generation
- Prototyping
- Plans moving forward

Presentations:

- Well organized
- Quality information
- Shared input

Project Management - Room for Improvements:

While the team felt the semester was successful, there are areas the team can improve on. The following list highlights these areas of improvement.

- Time management
- Communication
- Assignment contribution
- Exclusive team meetings
- Seeking instructor/TA feedback on assignments

Project Management - Action Items:

The following list addresses the areas of improvements and how to resolve issues in the future.

1. **Time management**
   - Start assignments sooner for all classes to avoid schedule conflicts and ensure high quality work
2. **Communication**
   - Move from previous line of communication to more reliable resource such as teams, which will allow smoother work on online assignments
3. **Assignment contribution**
   - Discuss with team members their role in specific assignments, making the best use of every team member's capabilities
4. **Exclusive team meetings**
   - Create a designated time for the team to meet to discuss assignments, progress, or any other issues
5. **Seeking instructor/TA feedback on assignments**
   - Help improve overall grade on assignments

Remaining Design Efforts:

- Motor testing: Ensure motors can spin at the required RPM while producing the required torque.
- Learning Teensy: In our last client meeting, our client recommended using Teensy instead of Arduino as the chosen motors use CANBUS communication and Teensy functions better for that.
- Learn how to use 3D printers.
- Test each iteration and make corrections as needed.

2. Gantt Chart

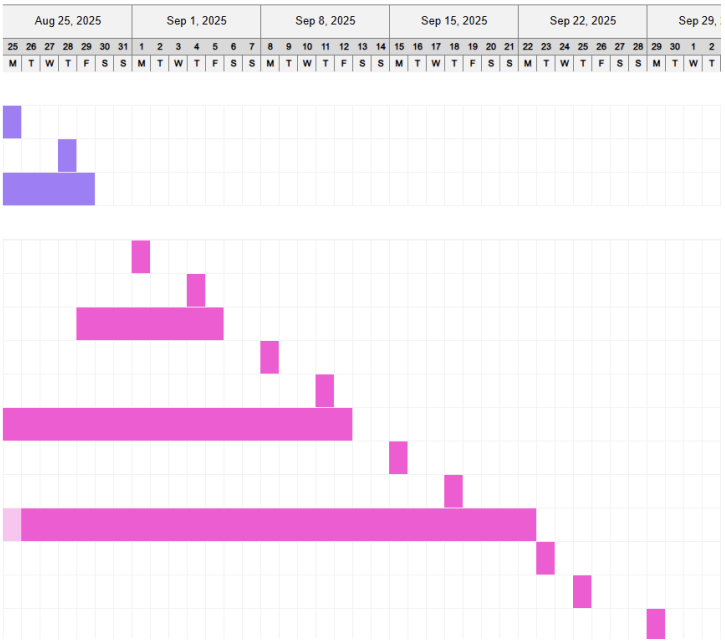
Flying Squirrel

Project start: Mon, 8/25/2025

Display week: 1

SIMPLE GANTT CHART by Vertex42.com
https://www.vertex42.com/ExcelTemplates/simple-gantt-chart.html

TASK	ASSIGNED TO	PROGRESS	START	END
August				
Kickoff Meeting	All	0%	8/25/25	8/25/25
Client Meeting	All	0%	8/28/25	8/28/25
Project Management	All	0%	8/25/25	8/29/25
September				
Staff Meeting	All	0%	9/1/25	9/1/25
Client Meeting	All	0%	9/4/25	9/4/25
Engineering Model Summa	All	0%	8/29/25	9/5/25
Staff Meeting	All	0%	9/8/25	9/8/25
Client Meeting	All	0%	9/11/25	9/11/25
Individual Research/Analys	Individual	0%	8/25/25	9/12/25
Staff Meeting	All	0%	9/15/25	9/15/25
Client Meeting	All	0%	9/18/25	9/18/25
Hardware Status Update (3	All	5%	8/25/25	9/22/25
Peer Eval 1	Individual	0%	9/23/25	9/23/25
Client Meeting	All	0%	9/25/25	9/25/25
Staff Meeting	All	0%	9/29/25	9/29/25



This chart breaks down the normal weekly tasks for our project as well as the deliverables required to keep on track. Our first major milestone will be the hardware check, which will be preceded by other smaller tasks. Working backwards, these steps will look something like this:

- Present first hardware status update (33%)
- Confirm updates with client and review feedback
- Assemble hardware
- Print or fabricate needed custom parts
- Order third party components
- Plan hardware demonstration
- Plan hardware/parts assembling progression with client
- Review final CAD model and drawings
- Finalize choices for outside components

3. Top Level Finances

Incomes		
Item	Amount	Status
Project Budget	$3,750	Acquired
CONBOLA Suction Cups-Heavy Duty-2 Pack	$11.99	Acquired
BOJACK 16-pin Stepper Motor Driver Controllers- 10 Pack	$8.99	Acquired
LUXEBELL Digital Luggage Scale	$9.99	Acquired
Husky 2in C-Clamp	$3.78	Acquired
BESSEY Clutch Clamp 6in x 2-1/2 in	$14.97	Acquired
Cane's Fundraiser	$120	Acquired
Estimated Total: $3919.72		
Current Total: $3919.72		

Expenses		
Item	Amount	Status
3 Axis force sensor	$320.57	Acquired
Raspberry Pi 5 8GB	$80	Acquired
Arduino UNO R4	$27.50	Acquired
Breadboard	$9.99	Acquired
DC Power Supply	$33.94	Acquired
Motor Set	$267	Acquired
Remaining BOM Items	$1,205.46	Not Acquired
Estimated Total: $1944.46		
Current Total: $739		

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4. Purchasing Plan

	Raw Materials, Parts or Components	($) Unit Cost	make/buy	Primary vender	Manufacturer	lead time	Part Status	QTY	($) Total cost
1	3 Axis force sensor	320.57	buy	zhimin	zhimin	Arrived	on hand	1	320.57
2	ODrive S1	59.00	buy	Odriverrobotics	Odriverrobotics	2 week	on order	4	236
3	16384 CPR Absolute RS485 Encoder with Cable for ODrive Pro or S1	149	buy	Odriverrobotics	Odriverrobotics	2 week	on order	4	596
4	Dual Shaft Motor - D5312s 330KV	59.00	buy	Odriverrobotics	Odriverrobotics	2 week	on order	4	236
5	PLA (1Kg)	20.73	buy	Amazon	creality	2 days	on hand	1	20.73
6	Trapazoidal Lead Screws,10 x 2, RH steel 20 inches	29.06	buy	Roton	Roton	1.5 weeks	8/28/2025	2	58.12
9	Trapazoidal Lead nut,10 x 2, RH Bronze	25.79	buy	Roton	Roton	1.5 weeks	8/28/2025	2	51.58
10	2x OVONIC 3S Lipo Battery 15000 mAh 130C 11.1V LIPO battery with EC5 plug for 1/8 RC truck	126	buy	ovonic	ovonic	1 week	8/28/2025	1	126
11	Raspberry Pi 5 8GB	80	buy	electromaker	raspberrypi	Arrived	on hand	1	80
12	Arduino UNO R4	27.5	buy	Amazon	ELEGOO	Arrived	on hand	1	27.5
13	Strap	8.99	buy	industrialsafety	industrialsafety	1 week	10/16/2025	1	8.99
14	6.5x3 touch LED screen	0	buy	waveshare	waveshare	2 weeks	Donated	1	0
15	Ball bearings	2	buy	harborfreight	harborfreight	3 days	8/28/2025	3	6
16	DC power supply	33.94	buy	Amazon	Nice-Power	3days	Purchased	1	33.94
17	Suction cup	12	buy	Amazon	Airhead	3 days	10/16/2025	3	36
18	Fishing line	25	buy	Amazon	Beyond Braid Braided	3 days	10/16/2025	1	25

19	C-Clamp	5	buy	Home depot	Amerella	3 days	10/16/2025	3	15
20	screws	5	buy	Home depot	Amerella	3 days	8/28/2025	1	5
21	linear ball bearings	5.83	buy	misumi	misumi	1 week	10/16/2025	1	5.83
22	Uxcell 10mm OD 8mm Inner Dia 400mm Length 6063 Aluminum Tube	6.22	manufactured	harfington	harfington	1 week	8/28/2025	1	6.22
23	Breadboard	9.99	buy	Amazon	amazon	Arrived	on hand	1	9.99
24	mounts	10	buy	jameco	jameco	1 week	8/28/2025	3	30

We have bought one motor set with us and is undergoing testing before we purchase three more sets of the motors. We have also received a donated screen from Professor Reza.

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5. Manufacturing Plan

Following the bill of materials and purchasing plan above, the remaining items planned for the project will need to be manufactured by the team or outsourced locally. Below is a table listing these parts, who will be manufacturing them, and the predicted turnaround time. The parts are also listed in order of importance and will be manufactured in that order. The aluminum components will be a priority to be manufactured early in the semester, or before the semester, if possible, so testing and adjustments can be completed. The shell will be the last item produced, as it is planned to only be added once the final product is completed.

Part	Material	Manufacturing Location	Manufacturer	Estimated Time
Bottom Mounting Plate/Skeleton	Aluminum	NAU Machine Shop	Shop Managers	≤ 1 Week
Top Mounting Plate/Skeleton	Aluminum	NAU Machine Shop	Shop Managers	≤ 1 Week
Rear Support Rod	Aluminum	NAU Machine Shop	Joey Mathews	≤ 3 Hours
Robot Shell	PLA	Ryan Donnellan's House (3D Printer)	Ryan Donnellan	≤ 1 Week

The team is currently planning on starting assembly of the robot starting on the week of September 1st, with the motor components, to begin testing. The plan is to assemble the bottom of the robot so the motor systems can be thoroughly tested for all movement. Following this, the lift mechanism will be assembled to ensure the system is working as intended. This is planned to be completed early in the semester as well. The top section of the robot will be the last to be assembled soon after that, and the entire robot and all of its sub-systems will be assembled as soon as the top portion is completed. This plan ensures that the robot will be completed with enough time for proper testing and modifications.