

Meeting 5/28:

Manufacturing Capabilities:

Ours: Hand tools, soldering iron

Outsource: 3D Printing, Machine Shop

Ideas:

Spider Robot: <https://www.instructables.com/Spider-Tank-Robot/>

Mars Rover: <https://www.instructables.com/FRED-Friendly-Rover-Exploration-Device/>

Problems to solve:

Exploration

-Rescue Robot

Parts On Hand: Arduino, MG90s servo, push button, L293D Motor driver IC, Ultrasonic Sensor, capacitors and resistors, Micro USB breakout board, DPDT Switch 6x6x6 mm, jumper wires, breadboard, rotation sensor, temperature and humidity sensor

Wood

Budget: ~\$300

Plan:

Problem Statement (things we want the robot to do)

- Exploration robot
- Able to travel quickly over flat ground
- Able to navigate through rough terrain/obstacles
- Able to sense its surroundings
- Able to record what's going on (camera?)
 - Able to change viewing angle

Design(s)

- Multimode traverse (driving & climbing)

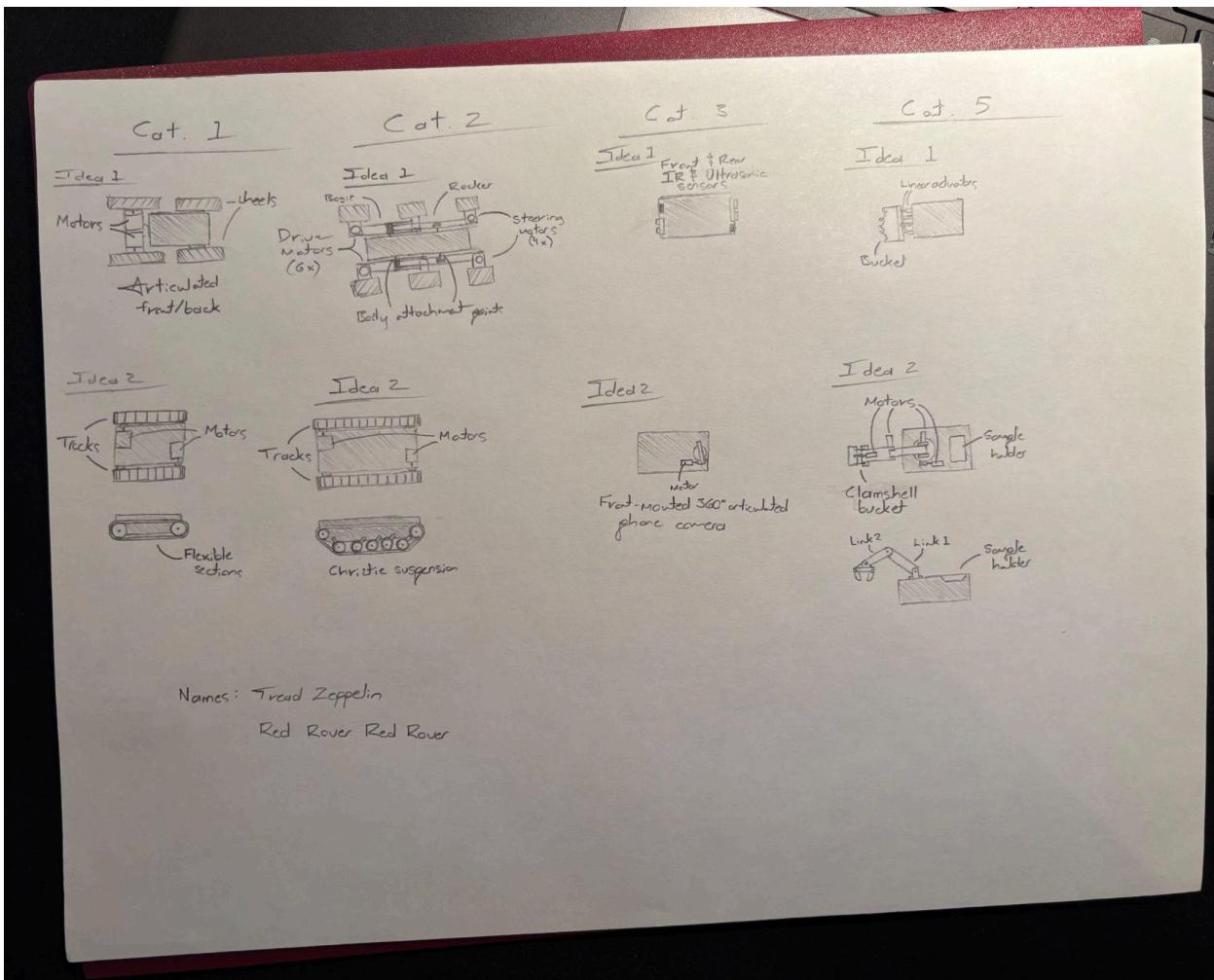
Modeling
Manufacturing
Testing
Iterating?

https://docs.google.com/spreadsheets/d/1yYNA3DHrZXKpDBs_nJ3L70hhGrD67DS7tCSIt4M4SZU/edit?usp=sharing

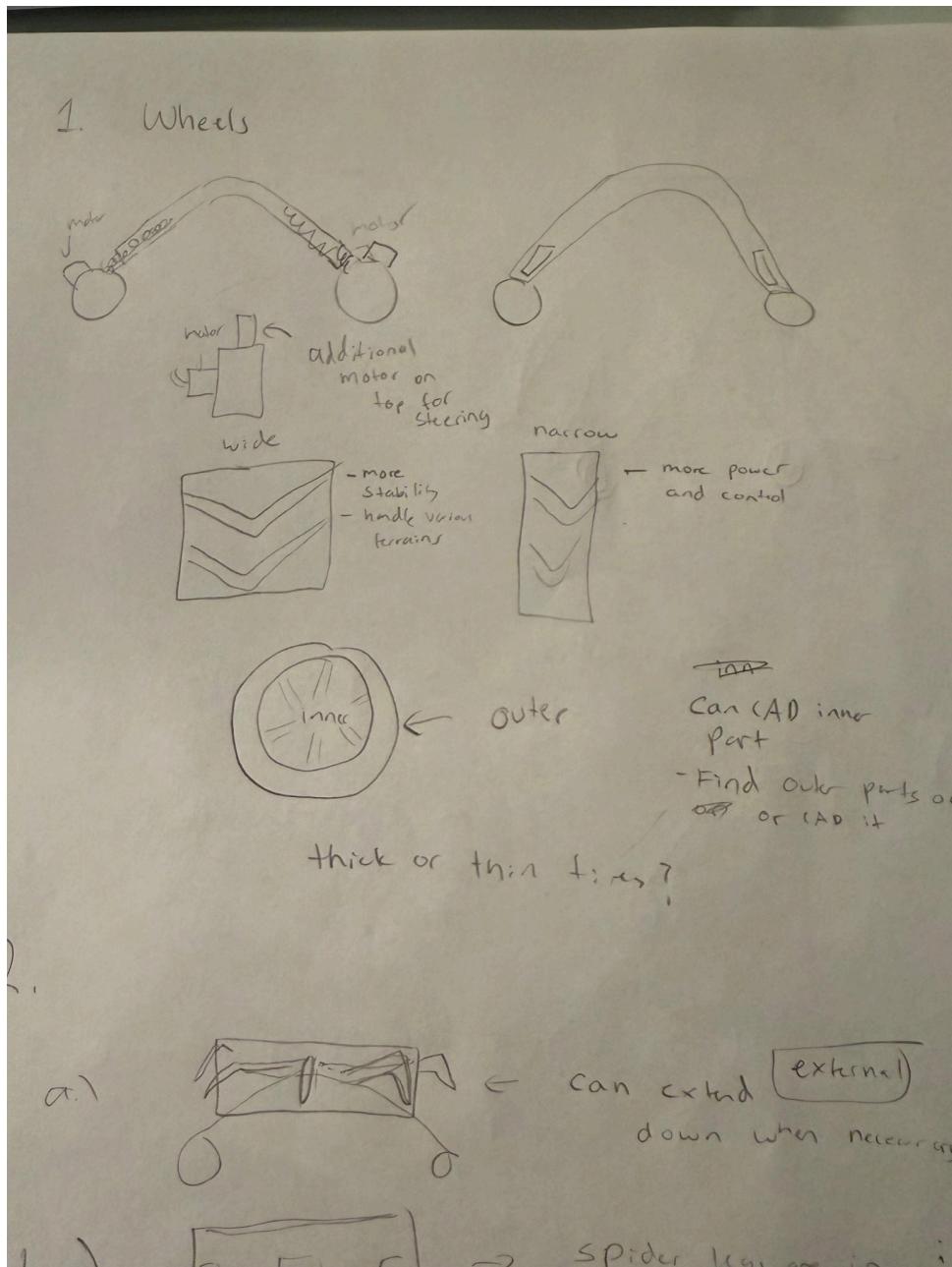
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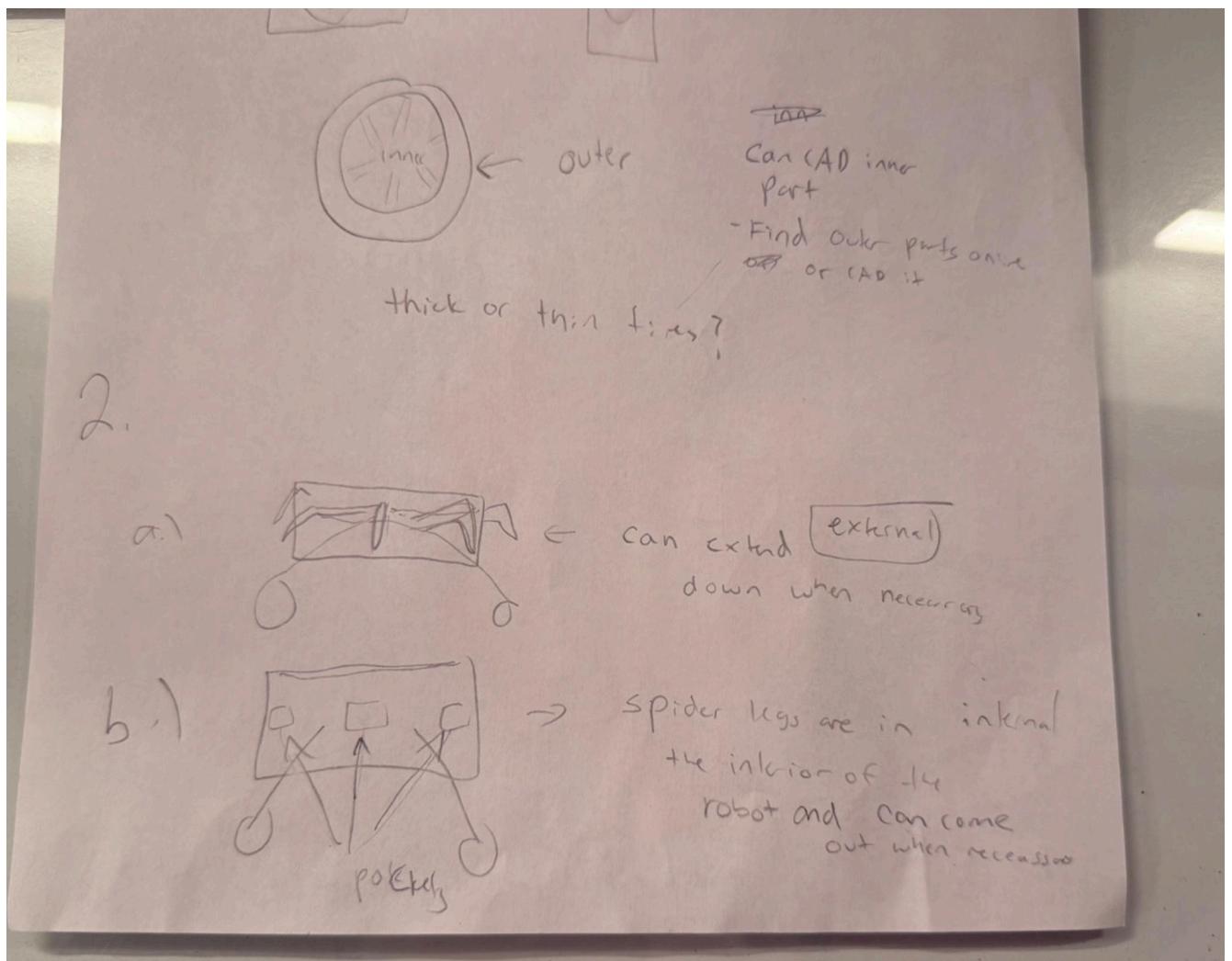
PLAN BEFORE NEXT MEETING:

Generate three ideas per problem category & sketch
Generate two names
Come back together Friday around 10 (Stay in contact)



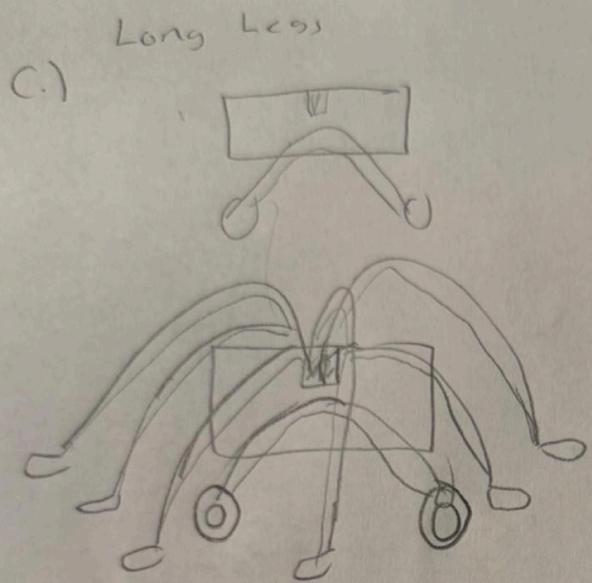
Emma:





Emma:

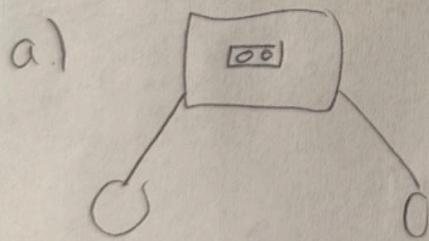
- 1: Hudson1 and Emma suspension]
- 2: Hudson 1 and Emma 1] Best is Hudson 2 1
- 3: Hudson1/Emma2] Sensors front and back
- 4: Emma 2 and Emma 3] Emma 3
- 5: Emma2/Hudson2] Arm



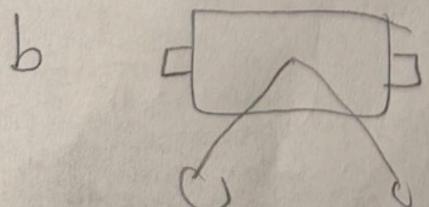
Spiders legs
fast in the interior

Come out of center
like Dr Octopus or
long legged spider
when necessary
(series of robotic
arms with rubber
bottoms)

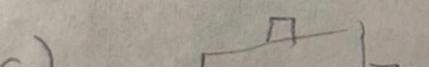
3. Sense Surroundings - Ultrasonic sensors



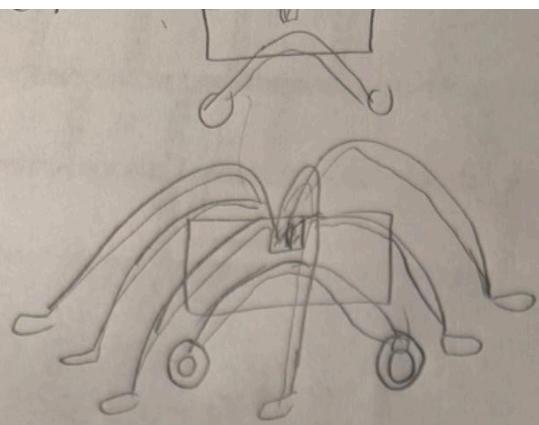
single sensor on front



sensor on front and back



sensor on each side of

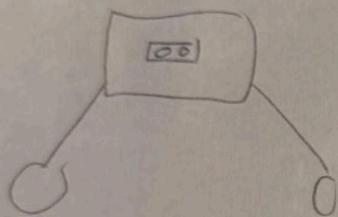


~~fast~~ in the interior

Come out of center
like Dr Octopus or
long legged spider
when necessary
(series of robotic
with rubber ^{arms}
bottoms)

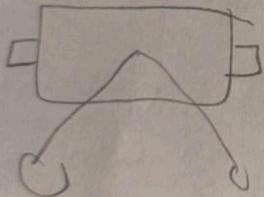
3. Sense Surroundings - Ultrasonic sensors

a)



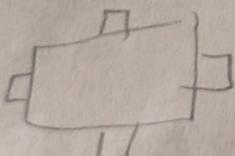
single sensor on front

b



Sensor on front and back

c)

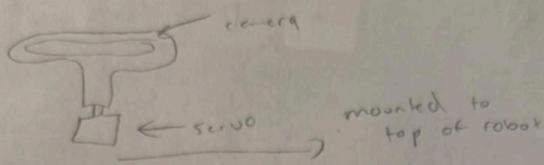


sensor on each side of
robot body

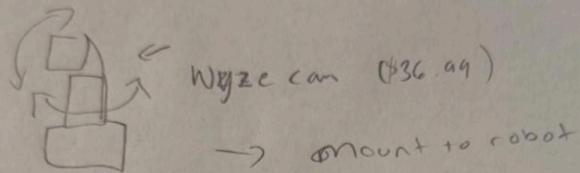
* also have a temp and humidity sensor as well

4. Recording

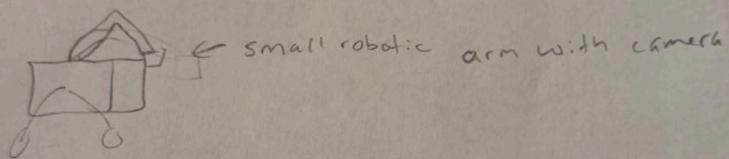
a.)



b.)

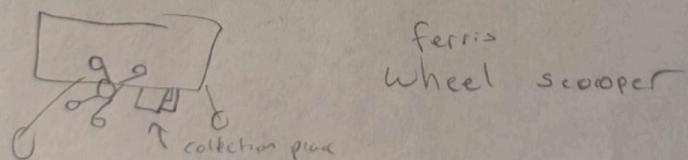


c.)



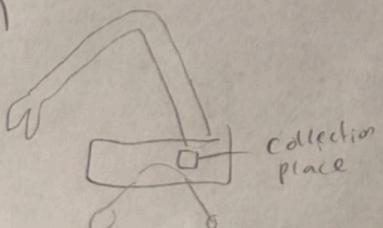
5. Sample Collection

a.)

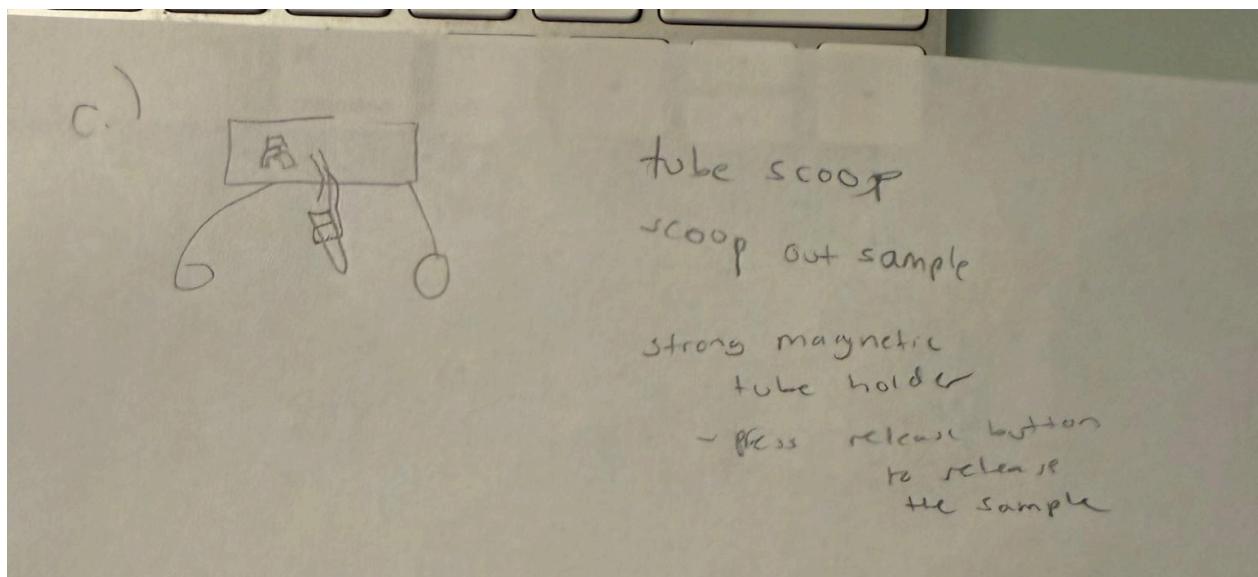


ferris
wheel scoop

b.)



Multipurpose robotic
arm
(could potentially include
a camera as well)



PLAN BEFORE NEXT MEETING:

Come up with more names

Fill out designs and pros and cons in google sheets

Sketch of the final design

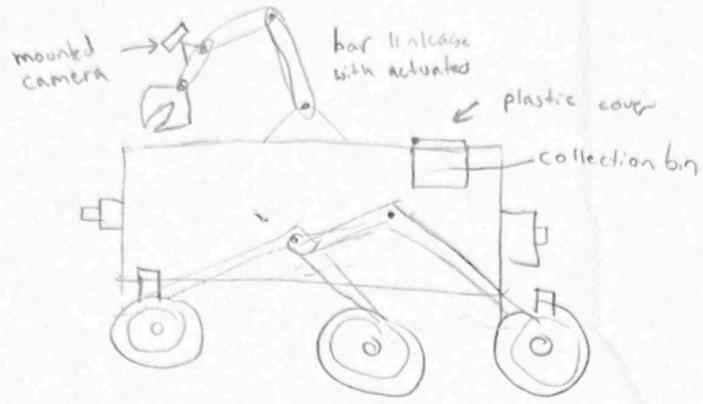
For next time:

Talk about dimensions and begin generating preliminary parts lists

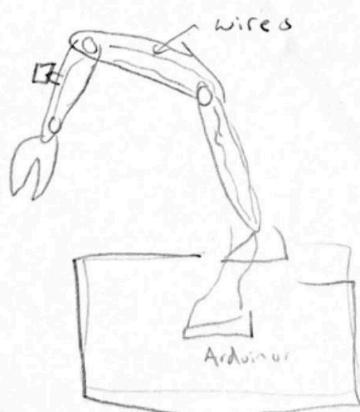
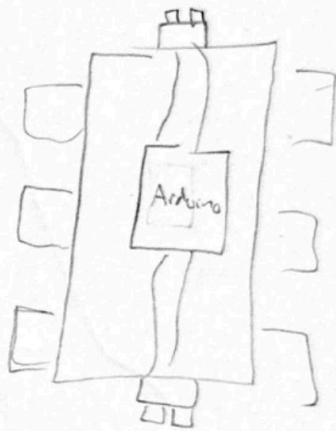
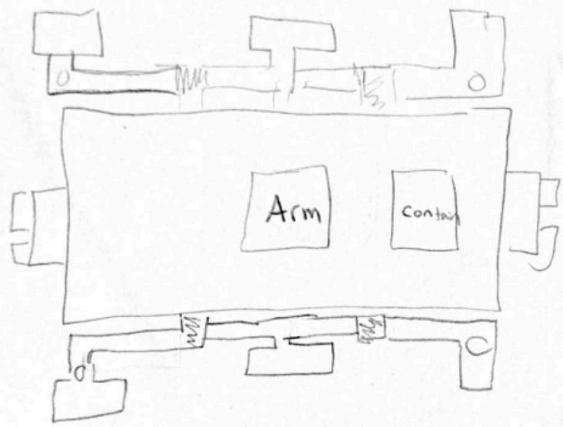
Come back together Monday June 2nd

6/2

Emma Design:



The Fast and
Curious
Net Arm-strong
Nacho Munroe Rover

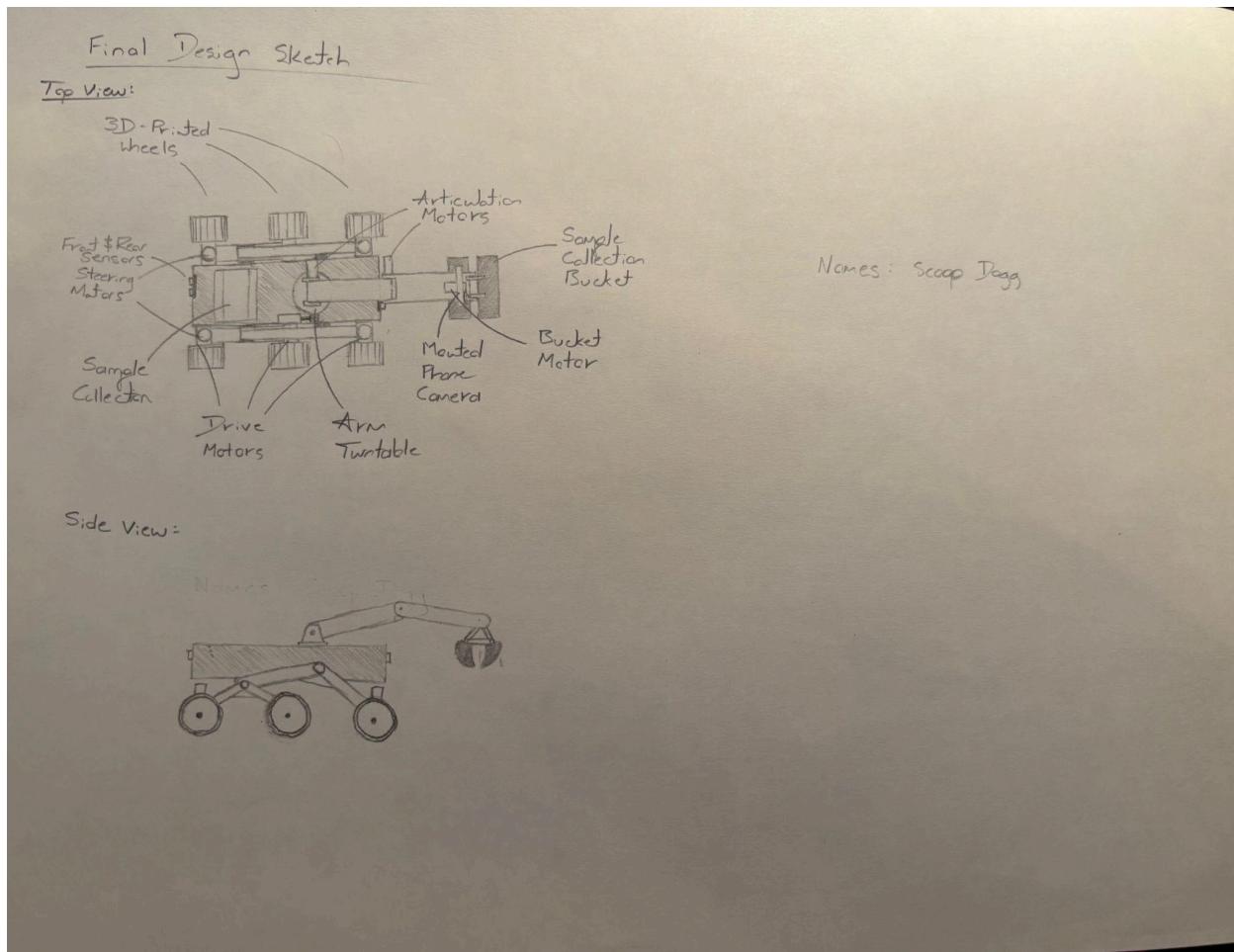


Materials

Steel
Plastic

CAD shovel part
and camera mount
on arm

Hudson Design:



SELECTED NAME: The Fast and the Curious

General baseline dimensions:

Entire rover within a 2ft x 2ft x 2ft box

Can overcome 3 inch vertical wall

Maximum overall weight of 55lbs

Plan before next meeting:

Read through URC requirements and guidelines

Research methods of motor control for multiple motors from single input

Autocad baseline drawing

Update drawings and google sheets

6/5

Solidworks Modeling!

Plan for next time:

Emma - Attach wheels and adjust sizing, brainstorm steering system, research electronics

Hudson- Design Scoop Mechanism & Rotation method & Complete baseline arm mechanism assembly

Meet again on Monday

At the meeting, make an overall timeline

Select motors- Pololu 20 series& general servos

Clamshell mechanism - servo/mechanical

Next steps? - modeling

6/9

Examined suspension subassembly

Examined arm subassembly

TODO before next meeting:

Meeting thursday

Finish subassemblies

Preliminary BOM

Insert completed subassemblies into full assembly

At meeting: finalize overall design

Complete full assembly

6/17

Examined Complete suspension subassembly
Examined completed arm subassembly

TODO: BOM
Model the body
Research 3D printing options - E
Research Machining options - H

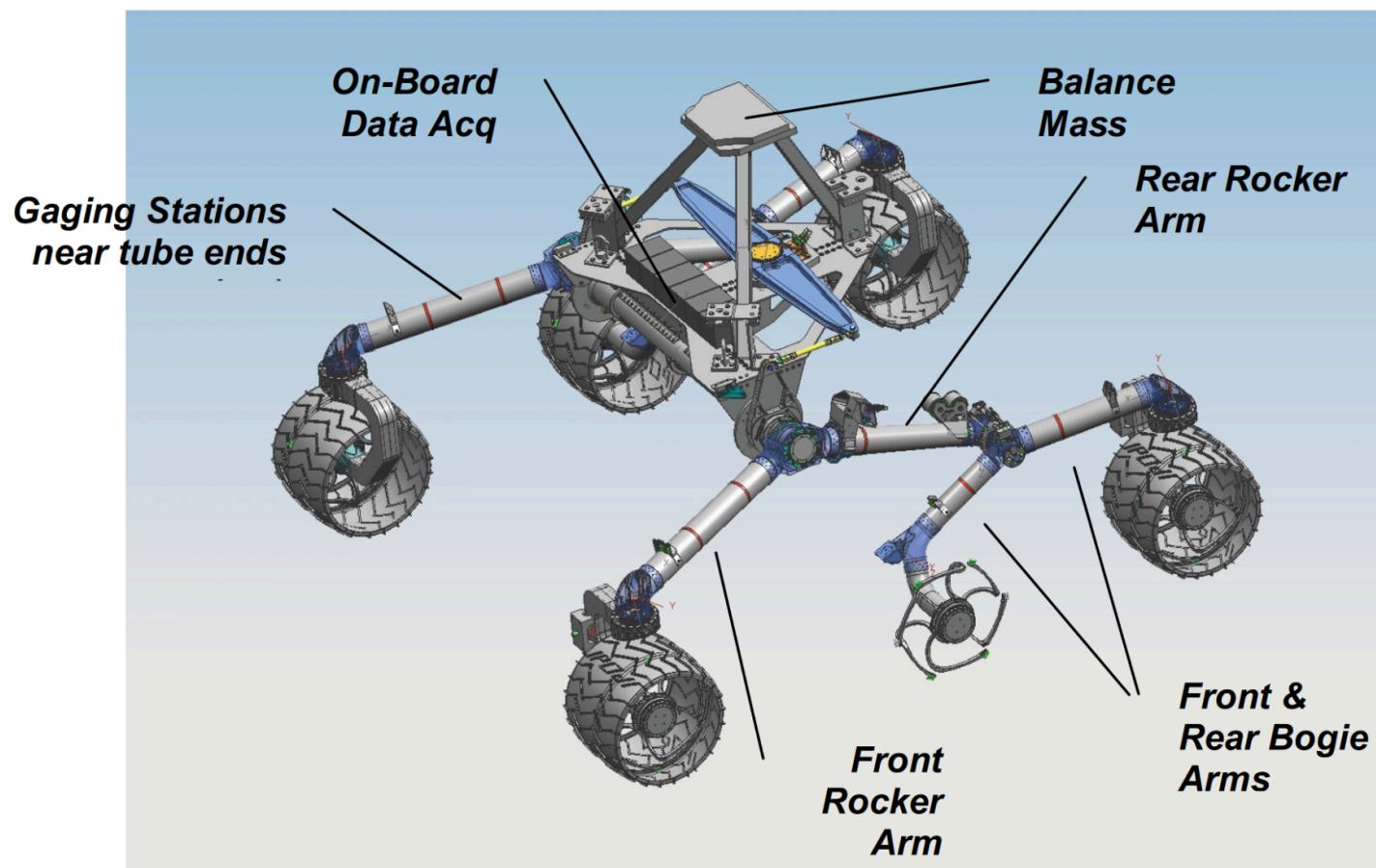
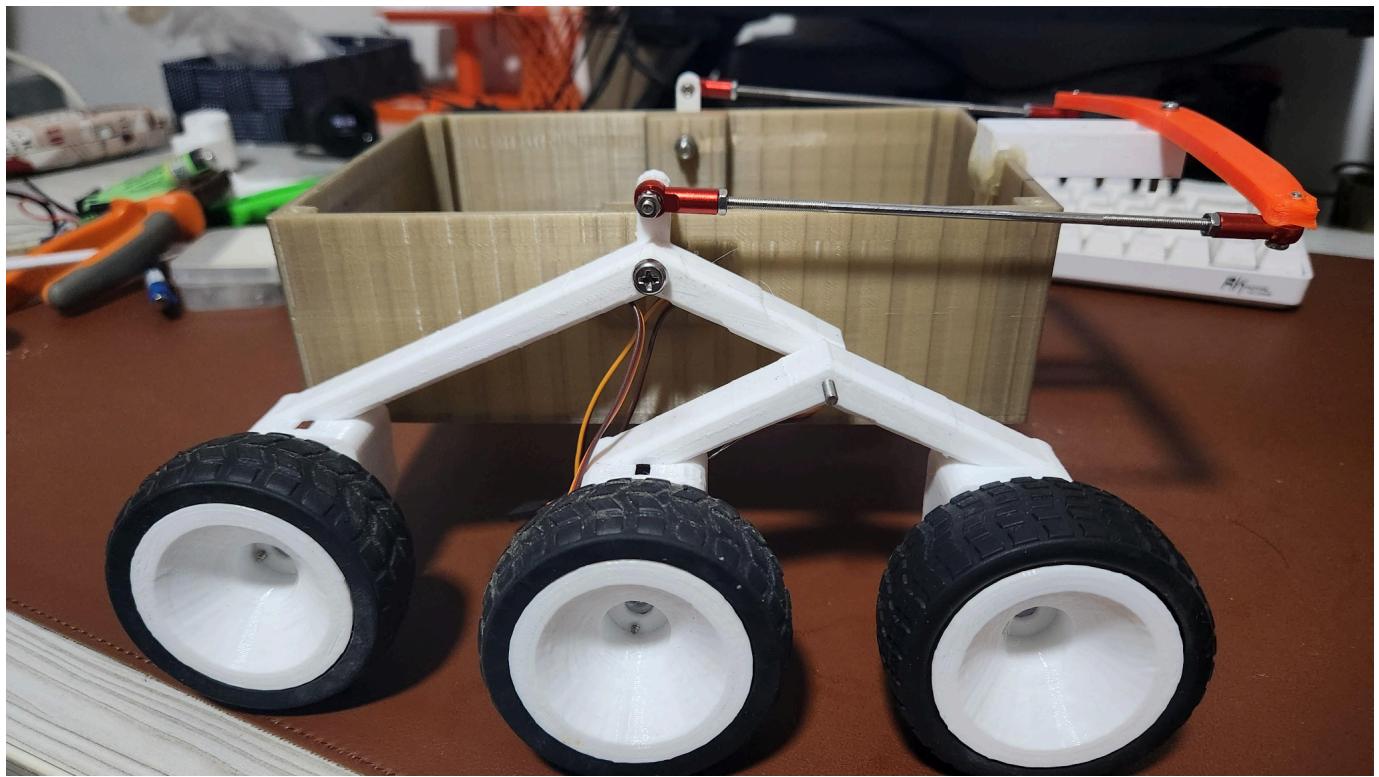
Meeting again on Thursday

For next time: Order parts

TODO:
Complete BOM (electronics and remote controls and stuff)
Finish modeling the body

Next meeting Monday!
At Meeting: Put correct Links into BOM
Make full assembly
Color-code components

6/23
Rocker-Bogie Differential Bar Suspension Examples:



TO DO:

Emma:

- Edit rocker-bogie suspension model
- Edit chassis model accordingly
- Complete BOM electronics
- Ajust BOM chassis materials

Hudson:

- X -Change arm Dshaft size
- X -Add retaining clips
- Create full assembly
- Color code all components
- X -Verify BOM

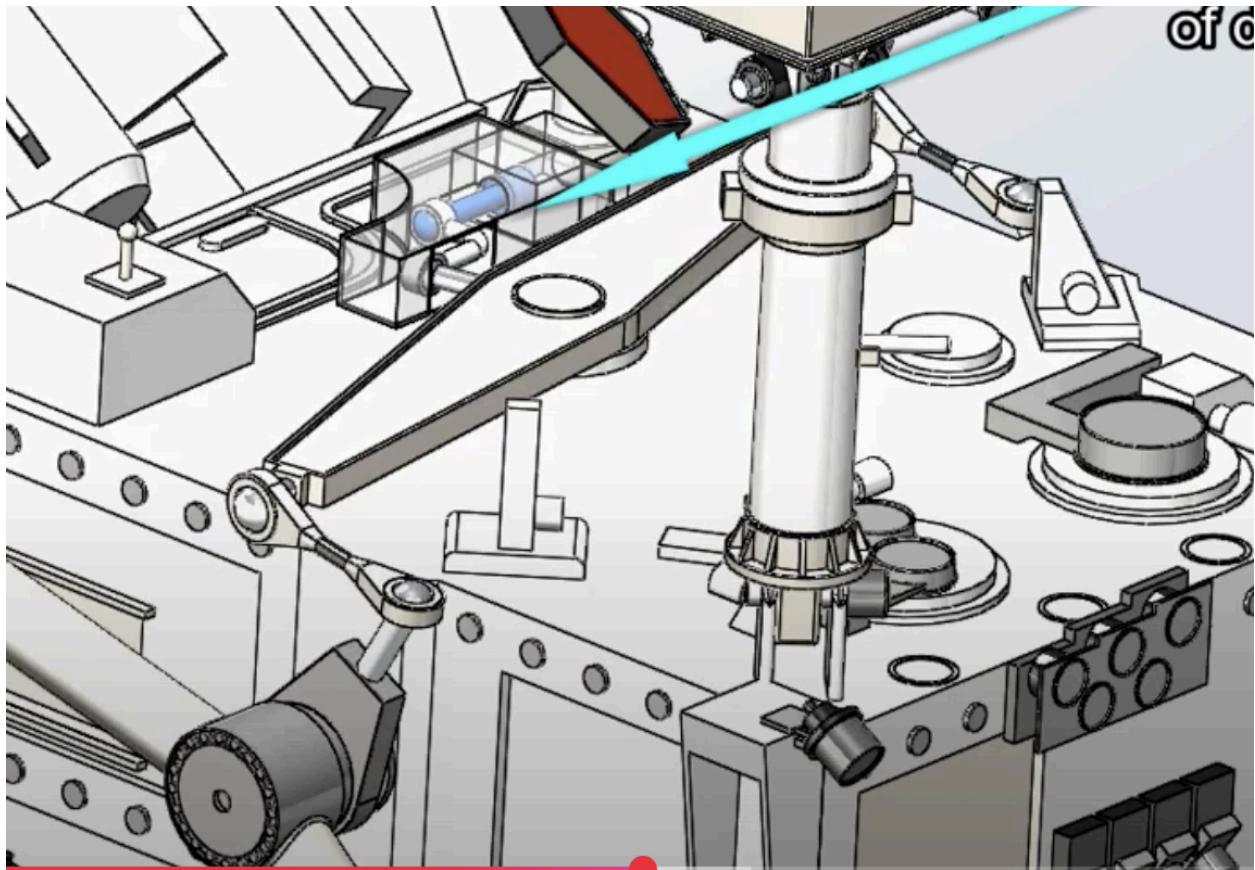
Next meeting Wednesday:

Find snap ring pliers

6/25

Order Parts

Planned revision design for differential bar system



<https://www.youtube.com/watch?v=007SnaUxi40>

What was wrong before:

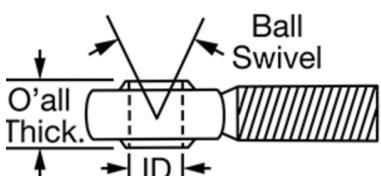
Lack of flexibility with the joins hindered movement

New Plan:

Diamond centerpiece with small dowels sticking out on each side

Ball joint rod ends allow for more flexibility than before

Rod end - bolt - 3D printed mount attached to rocker piece



TO DO:

Emma:

Rebuild Suspension System:

with new differential bar plan
Possibly add some holes for wiring
Check out stock (try and get smaller plate)
Start thinking about code for motor control

Hudson:

- \Look into coupons and student discounts
- \ORDER ALL STUFF (except McMaster) - group orders by company for shipping!
- Model Phone Mount [iPhone 16 pro max] lateral movement with stepper
- Model wire clips along arm
- Create the full assembly
- Color code all components

Next Meeting: Monday

- Create full assembly

6/30

3D Print Material Choices

1. ASA
2. ABS
3. Nylon 12CF

Colors:

- Aluminum: Appearance->Metal->Aluminum->brushed aluminum
- 3D print material (XXX): GENERAL: Appearance->Plastic->Low Gloss->Green Low Gloss
 - Structural Components [RGB]: 73 100 84
 - Mechanical Components [RGB]: 73 220 84
- Electronics/Motors: Appearance->solid->red
- Steel/Fasteners: Appearance->Metal->Steel->sandblasted steel

Todo:

-H: finish model, machining research, 3d print research, color code components, categorize delivered materials

-E: 3d print research, finish model, color code components, work on steering motor code

Meeting on 7/3

Tighten up models

E: make minor adjustments to model, finish up motor steering code, look at stepper code for camera, fix hole sizing on chassis

Edit Chassis model to final form (screw holes for turntable, add pilots for angle brackets)

Meeting on 7/7

Meeting on 7/9: Meet up at Emma's to work on wiring and code

Worked out steering and drive bugs

Created a mockup of the steering and drive system for code demonstration

Interim plan:

Continue working on code

Check worm gear assem, make necessary adjustments to top plate & turntable

Confirm dxfs are up-to-date

Complete camera mount

Meeting 7/21

Complete camera mount subassembly

Finalize 3D print files and send to print

TODO:

Servo Holder:

Delete C-Ex3 done

Mirror C-Ex2 done

Carriage Arm:

Mirror C-Ex2 done

Update Servo Arm Print to reflect changes to servo type (edit the original boss extrude and remove irrelevant features) done

Make sure the holes appear in the gear when you go to print!

Press fit dshaft hole ~ 1/2" to 3/4" deep in base for 6mm dshaft

8/1 - 8/17

Construct Robot

Home Depot - Steel and aluminum sheets

Emma - continue research on improvements to rocker-bogie suspension model, calibrate steering, strengthen updated chassis, test robot over terrain, maybe incorporate sensors