

NASA Human Exploration Rover Challenge



Members: Ian Wilcox, Grant Schiermeister, Tanner Smith,
Jayden Trana and Megan Kongable

Mentor: Dr. Karami

Presentation:

When designing your presentation, we highly encourage the presentation to be **interactive** and **engaging**. We encourage you to facilitate discussion with those in attendance and include visual aids that provide meeting participants with a better understanding of your specific NDSGC funded project. We discourage talking through slides that are completely filled with text. A slideshow presentation with high contrast visuals and size 16 font is best for presenting.

Each presenter will have a total of **15 minutes** per presentation, aiming for 10-12 minutes of presenting, followed by 3-5 minutes for audience questions. Presenters are asked to upload their presentations within the registration Submittable form. You may also email your presentation or a shareable web link of it to Tori McIntosh (tori.mcintosh@und.edu) **no later than Sunday, April 3rd, 2022 at midnight**.

Consider the following questions when sharing your experience:

1. Were there any **surprises** in your project (big or small), or any **challenges** you had to overcome?
2. Were there any **lessons learned** that other students or faculty may find useful when participating in NDSGC projects in the future?
3. How did participating in your Space Grant project (NASA competition, internship, fellowship, STEM Ambassadorship, etc.) affect your **academic and career goals**?

You *may* also choose to include the following elements when incorporating the above questions:

1. Project goals
2. NASA-relevance
3. Collaborations established or outreach completed
4. Publications
5. Future plans



- Our Team
- Background
- Our Design
- Safety
- Outreach
- Lessons Learned

Our Team!

Ian Wilcox –
Fearless Leader

Jayden Trana -
COO



Tanner Smith –
CREO God

Grant Schiermeister
– Safety Officer

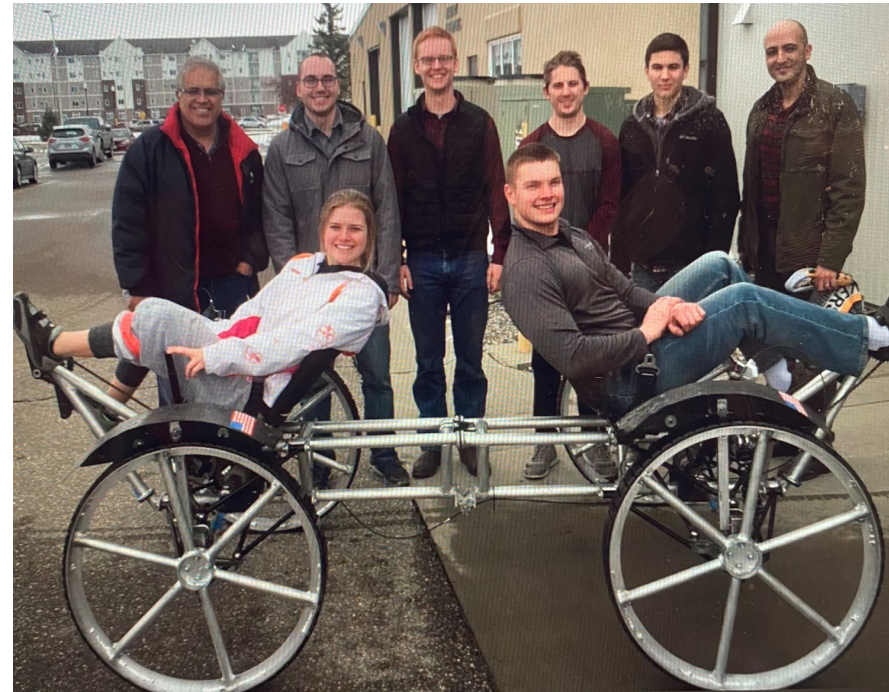
Megan Kongable
– Tool Master

The Constraints

- Must collapse into a 5'x5'x5' box and be reassembled in under 2 minutes
- Must have a turning radius under 15'
- Must have two drivers: a female and a male
- Must be under 5' wide and higher than 12" off the ground
- Should be as lightweight as possible

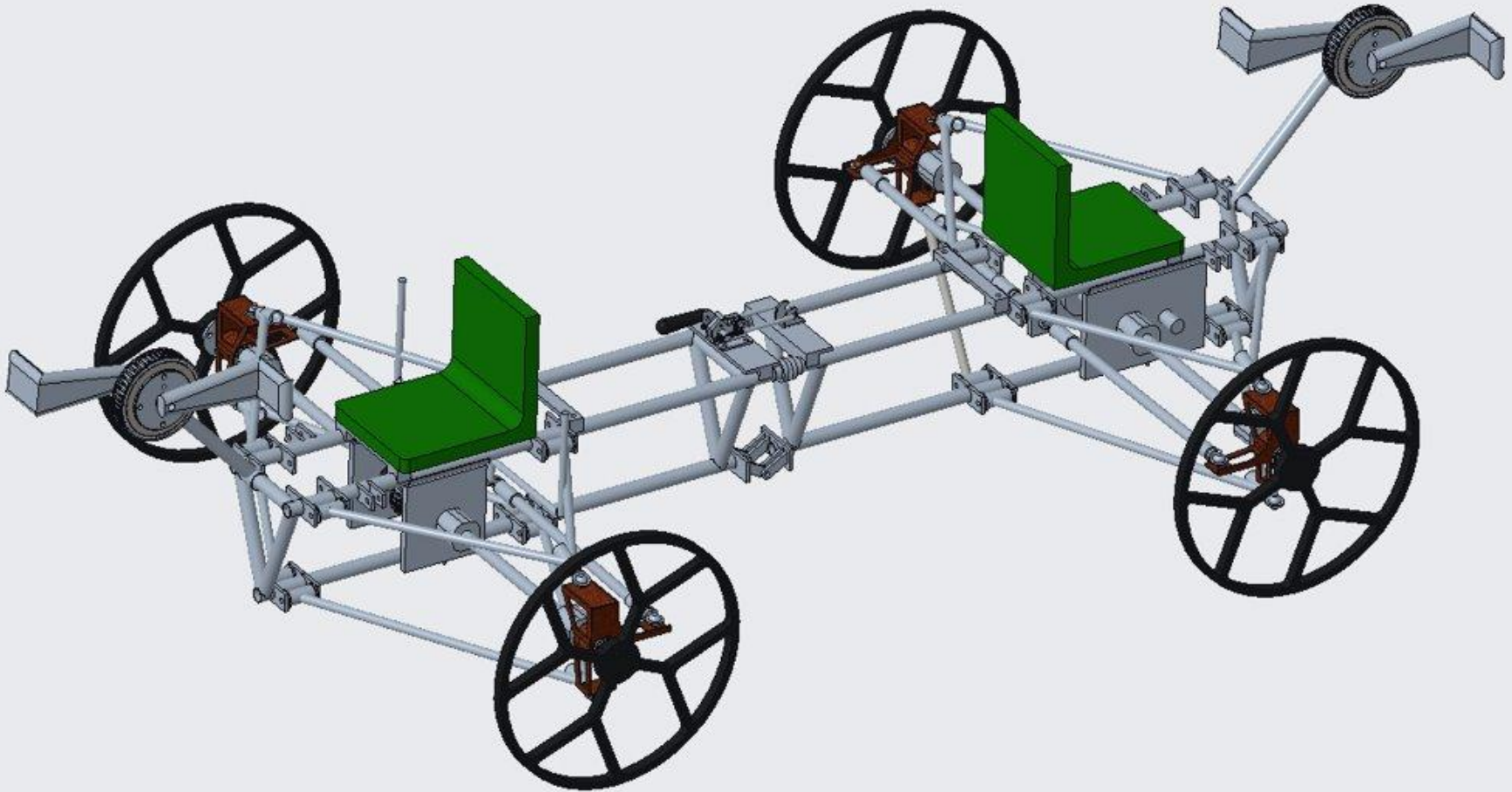
Examining the previous year's rover, we decided to focus on:

- Lightening the wheels
- Designing a lighter Frame
- Improving the seats
- Fix the suspension & drivetrain interference



New Design

NDSU NORTH DAKOTA
STATE UNIVERSITY

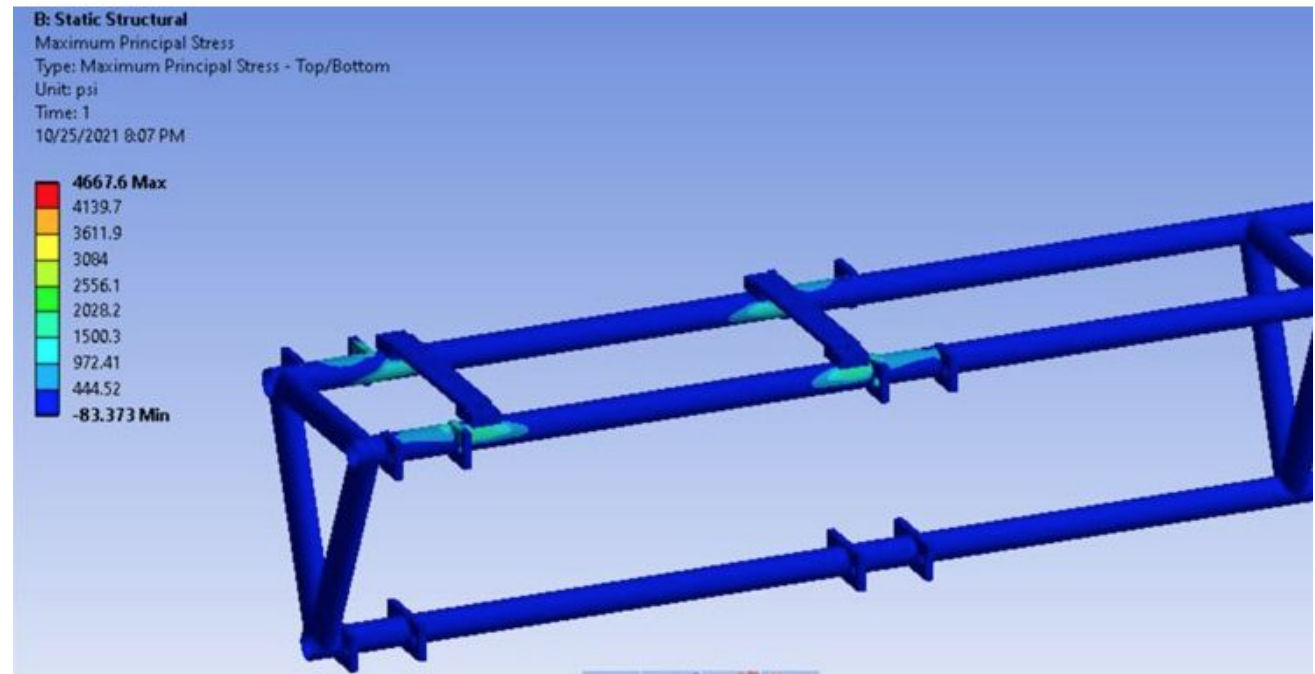




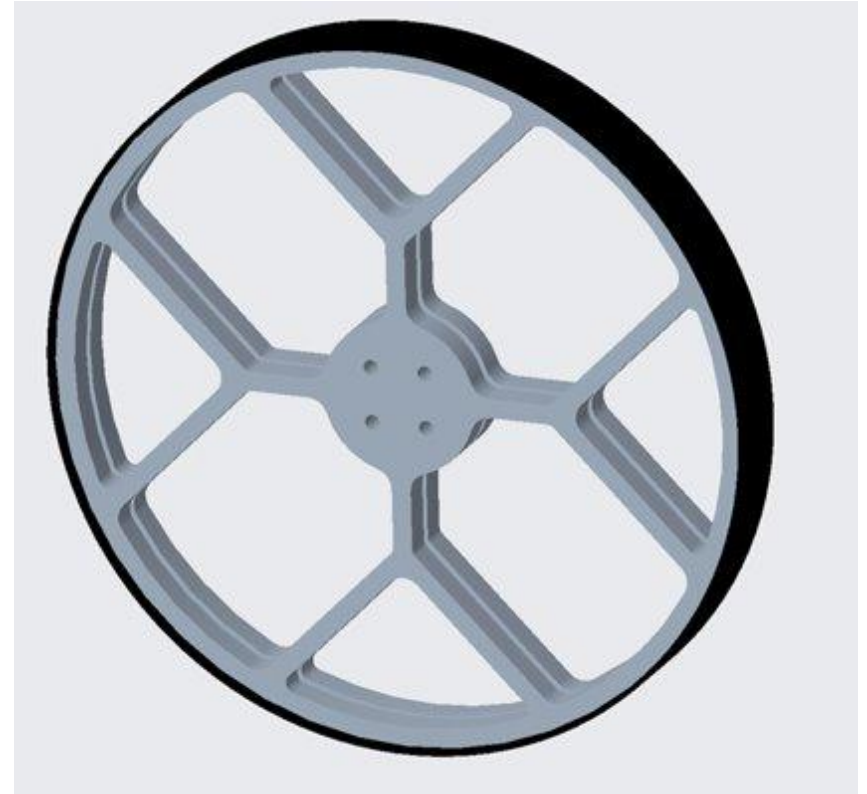
- Tri Beam Design
- Collapsible
- Lightweight

Finite Element Analysis

- FEA both static and dynamic forces
 - Weight placed over where seats will be
 - Frame given frontal and downward acceleration to simulate frontal or dropping impact.
 - No significant stress detected

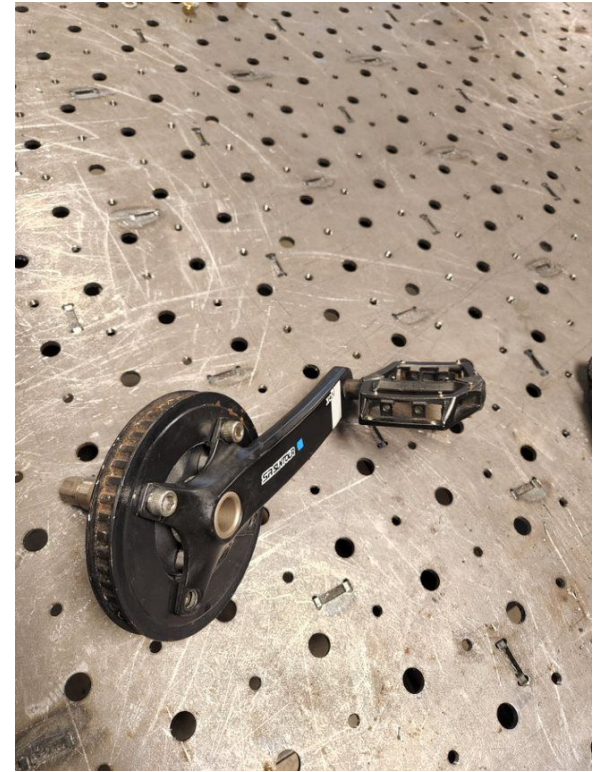


Wheels

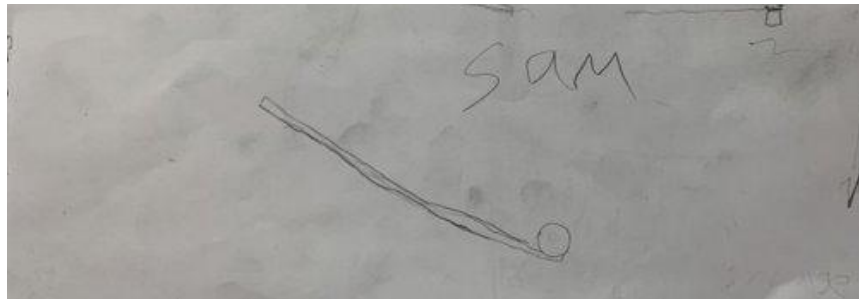
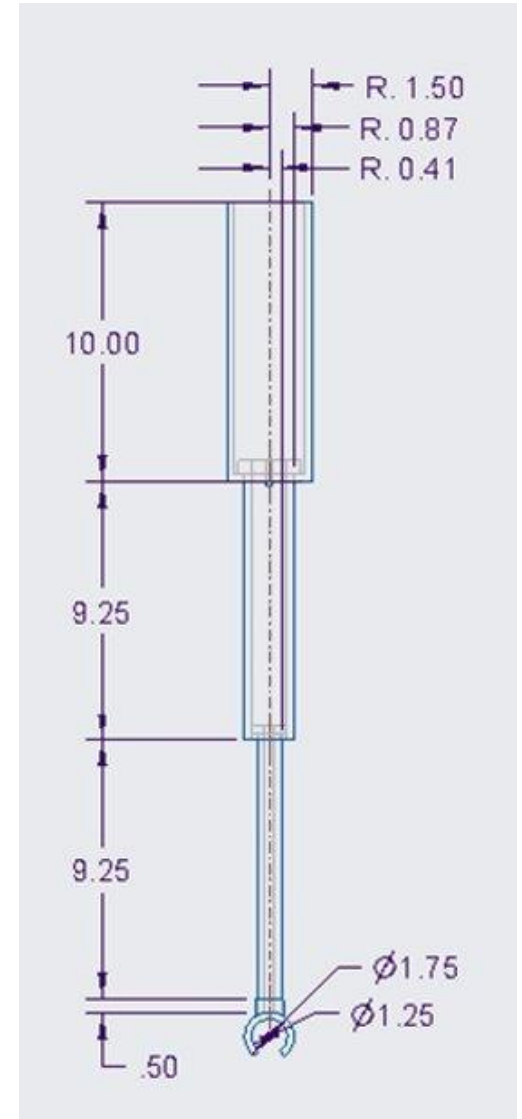
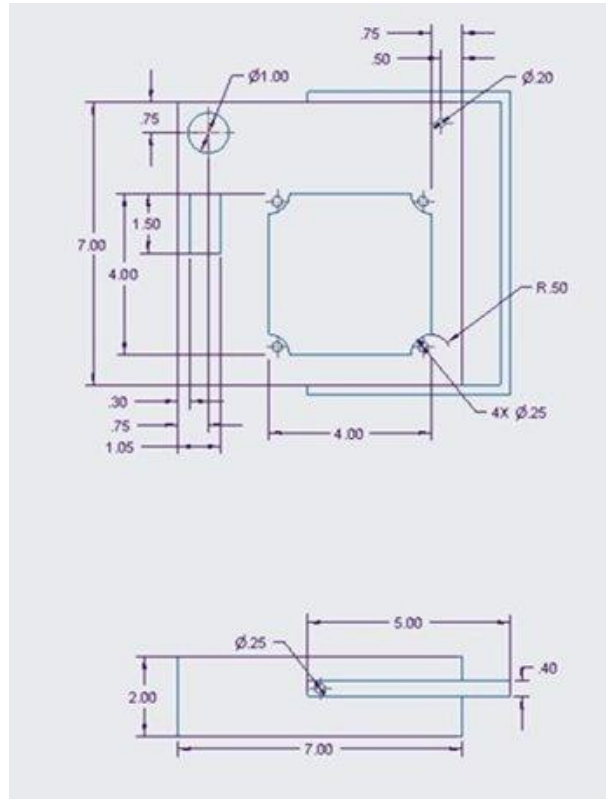
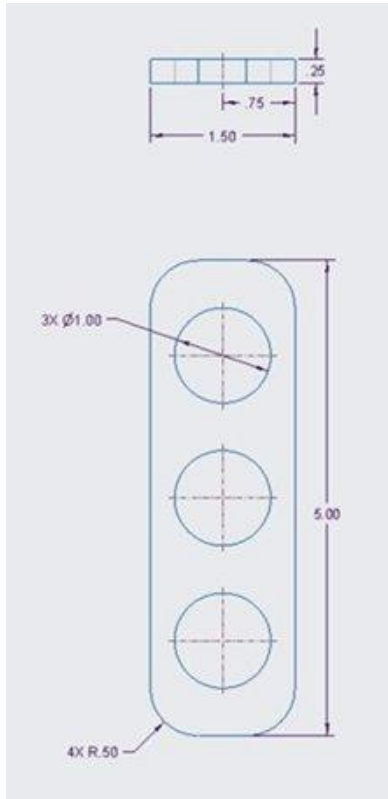


- Aluminum and composite

Drivetrain



- Changed to belt drive
- Lightweight design
- Easier to maintain



Safety

NDSU NORTH DAKOTA
STATE UNIVERSITY

Safety

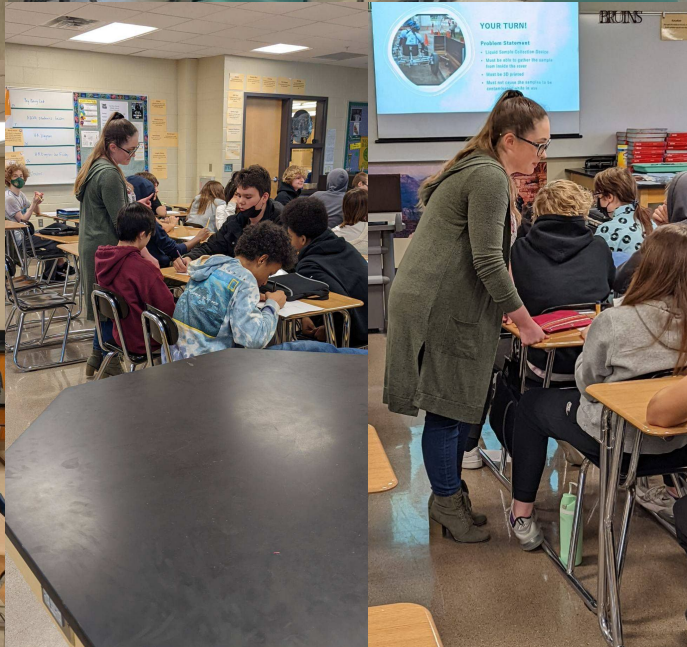
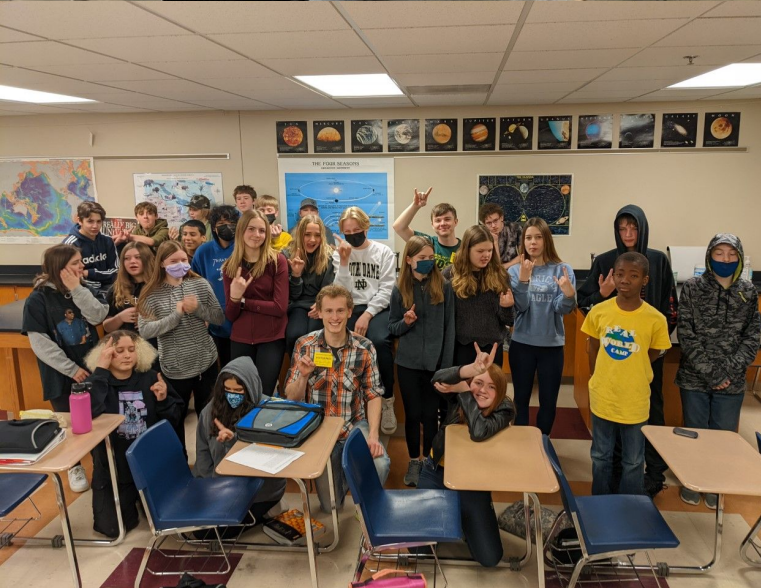
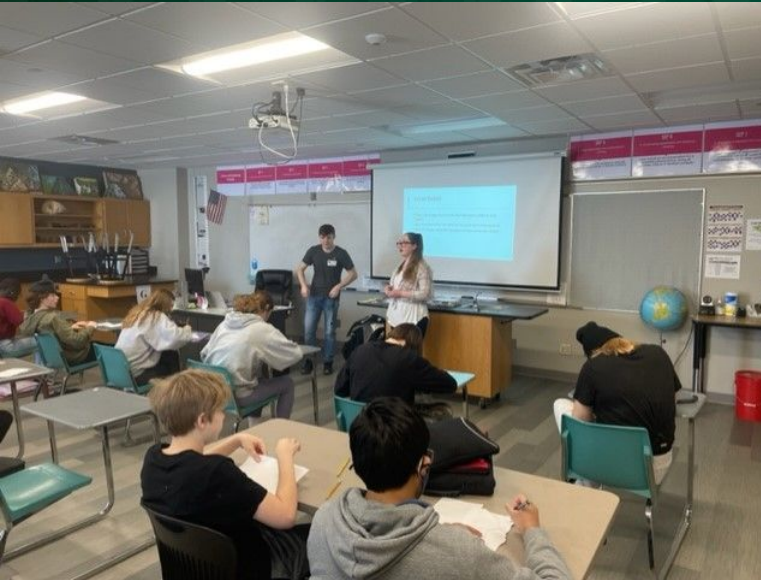


STEM Engagement Results

NDSU NORTH DAKOTA
STATE UNIVERSITY

- Collaborated with 3 other NASA senior design teams
- 3 Schools
- 40 classes
- ~1000 students
- Taught the students using activities that made them think outside the box, communicate well, and gave them a chance to use the engineering design process

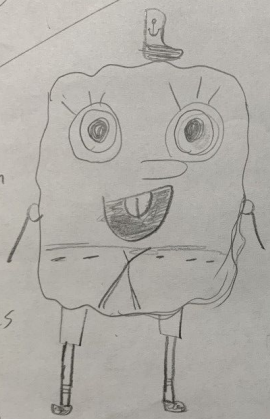
Results



Results

Sponge On a Stick

S
O
S



Cons: Buy him
No


Pro: No holes
Sponge
SpongeBob
[Hit show]
visually the best
Silly
Goofy Goober

knows the formula
NOT Plankton

3-D Printed Part/parts

stick- All solid

Eyes- yeah



Cons: Not fully printed
Sharp

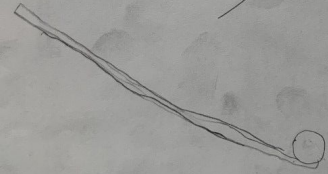
Pro: ~~Sturdy~~
NOT Hollow

SAM

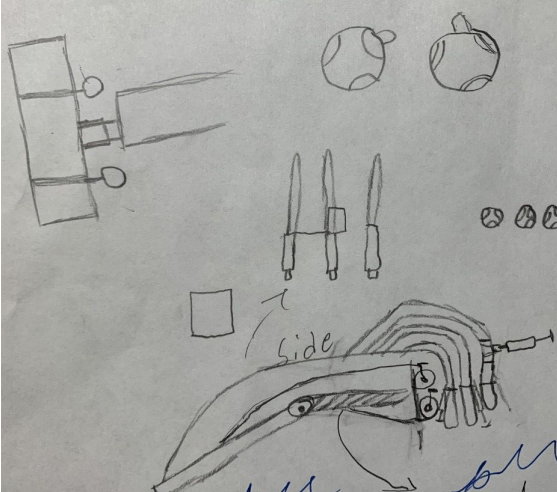
extendable arm with stretchable loop on end to collect water

13 different containers to hold liquid

- 3D printed extendable rod
- rubber



SAM

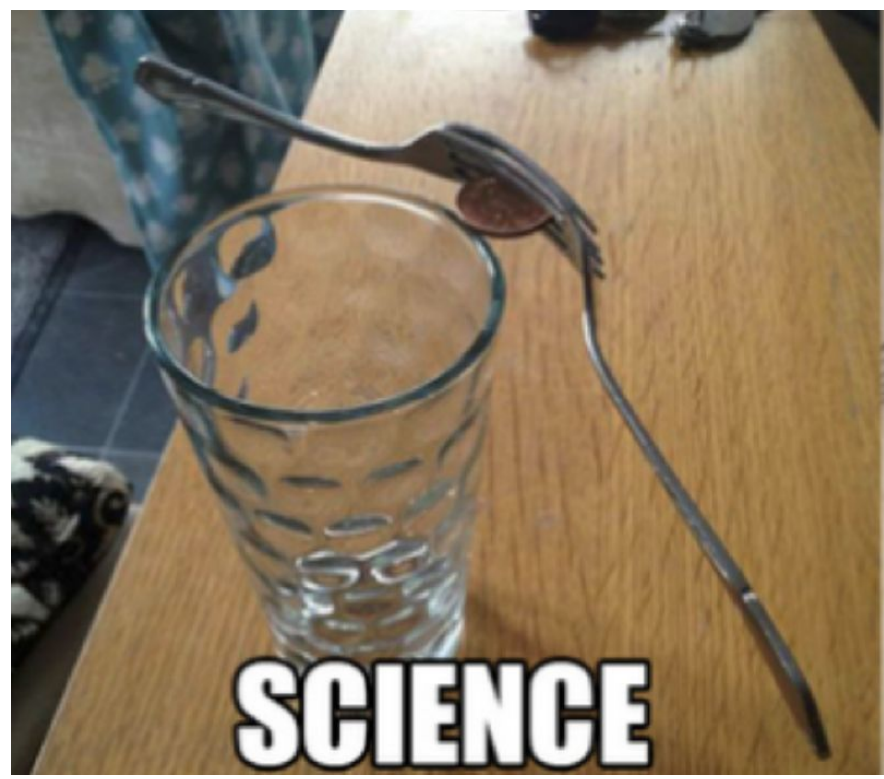


side

Lessons Learned

NDSU NORTH DAKOTA
STATE UNIVERSITY

Lessons Learned



SCIENCE



ENGINEERING

Acknowledgements

- Dr. Karami
- ND NASA Space Grant Consortium
- Dr. Amiri



- NDSU ME Department
- NASA HERC