Team Members: Anu Alujjage, Allison Bedrin, Ryan Podell,

Paolo Quattrociocchi, Samantha Robbins, Sebastian Ruvalcaba

HPVC Hardware Review 1

Prior to the Fall semester

- SolidWorks frame
- FEA testing
- Fairing design
- CFD testing
- Drive train
- Steering options
- Rulebook overview by multiple people

Significant progress this semester

- We have started prototyping using PVC pipe
- Contacted Nova Kinetics about making a fairing
- Analyzed previous design assemblies

Steps to ensure we stay on track and why we believe we are on track

- Weekly updates and goals
- August: PVC Modeling
- September: Order raw material and parts, begin building, begin testing the design
- October: Continue building and assembling, continue testing the design
- November: Finish testing the design

Materials Acquired

Part Number	Description	Qty
1	0.5" ID 0.75" OD x 10' schedule 40 pvc	5
2	0.75" ID 1" OD x 10' schedule 40 pvc	5
3	0.5" pvc T fitting	10
4	0.75" pvc T fitting	10
5	0.5" pvc 45* elbow	10
6	0.75" pvc 45* elbow	10
7	0.5" pvc straight coupling	10
8	0.75" pvc straight coupling	10

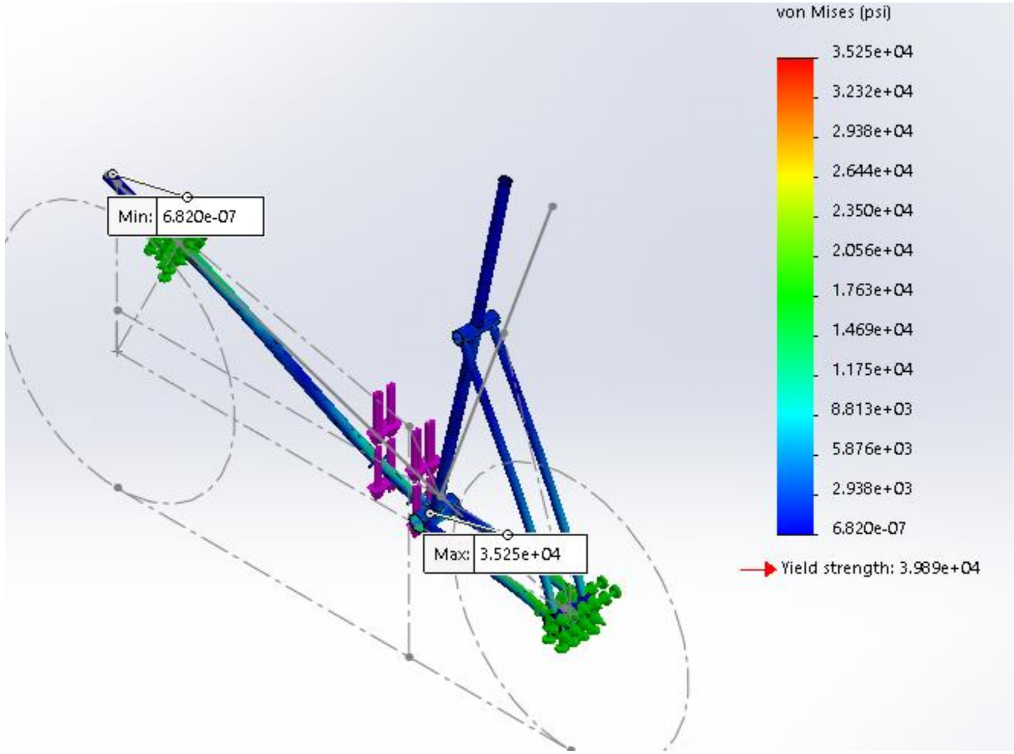
Future Materials to be Acquired

- Dependent on final frame design after optimization
  - Steel or Aluminum for main frame/ roll cage
  - Steel for machining gear train
  - Hopefully placing purchase order for these items this week

- Upon acquisition of sponsors
  - Wheels and tires
  - Brakes
  - Materials for fairing (Carbon Fiber and Kevlar)
  - Assembly hardware (fasteners and pins)

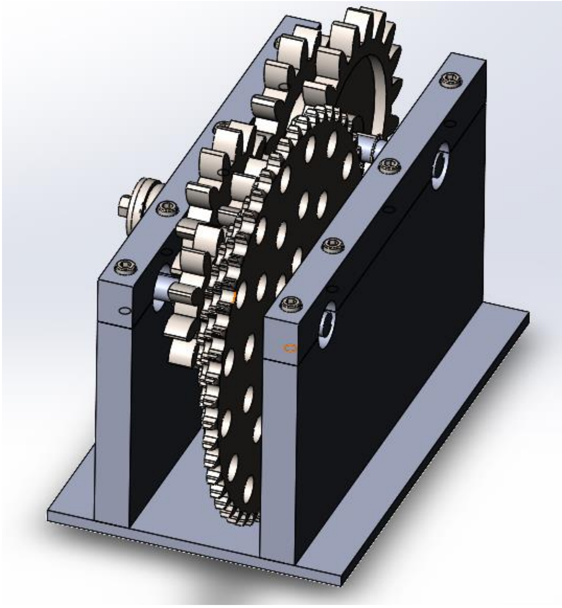
Paolo - Frame

- Frame designed with different
  - AISI 4130 steel tubing
  - 6061 T6 aluminum tubing
  - 6Al4TiV titanium tubing
- FEA performed for all material options using Solidworks Simulation



Ryan - Drive Train

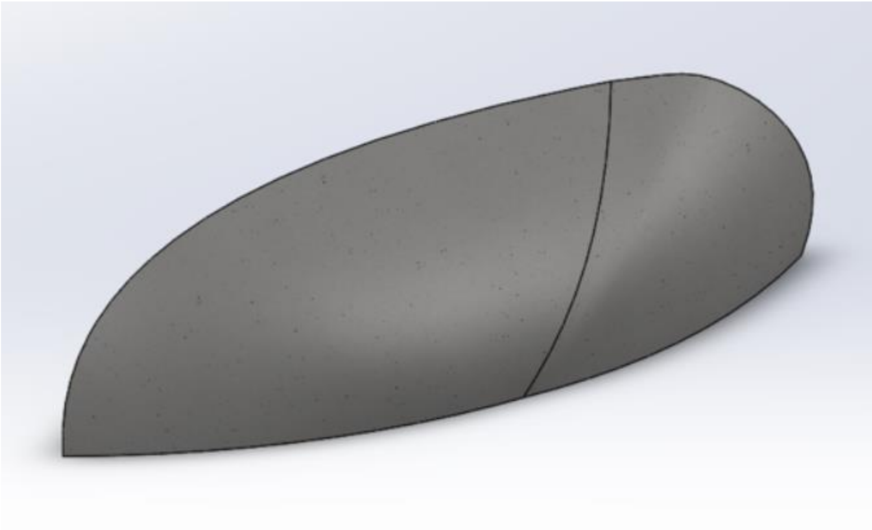
- Choice between 1:1 and 1:2 output speeds
- Connected to traditional road bike chain and sprockets
- Potential final drive ratio of 1:9.45



Theoretical top speeds

Cadence (rpm)	Top Speed (mph)
60	45
90	66
120	87

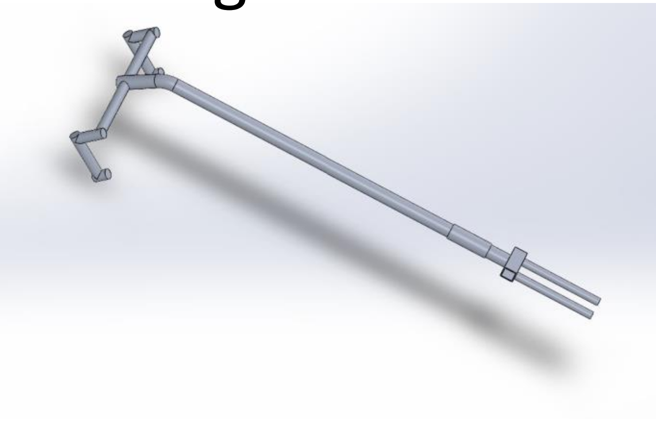
Anu -Fairing



- Researched about different fairing types
- Had 7 Solidworks designs
- Ansys fluent analysis on each (cd=0.16)
- Dimensions H=0.6m, W=1m, L=2m
- Material Carbon Fiber and Kevlar
- Will be working with Sebastian to make design improvements
- Next step- 3D print the fairing and run wind tunnel tests

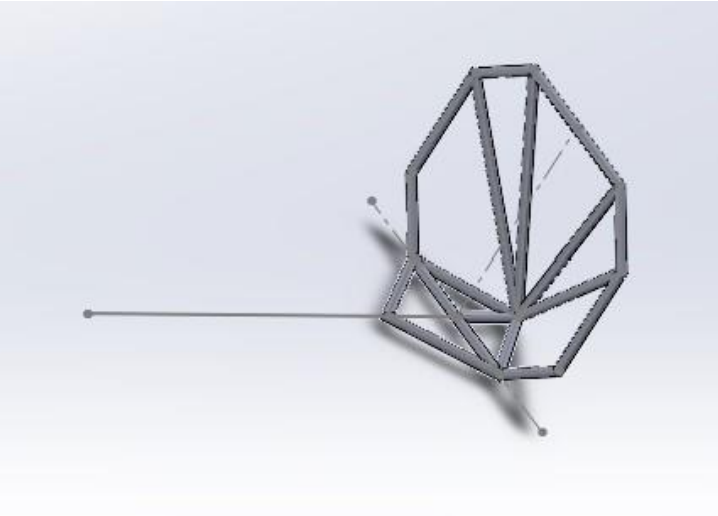
Samantha – Steering

- Has two steering options for the vehicle – handlebar steering or two arm steering
- Head angle – 63.5 degrees
- Trail – 5.30 inches
- Will be working with the team more to figure out the angles needed for the final frame design



Samantha - Safety

- Heavily read the rulebook in regards to safety
- Five-point harness, clip in shoes and helmets – will be working with Sebastian for insights on ergonomics
- Roll cage – working with Paolo to figure out the SolidWorks and FEA analysis different designs of the roll cage will have on the frame



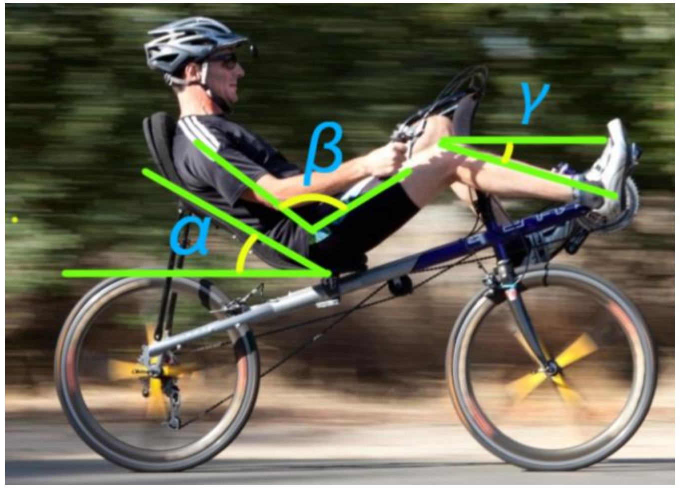
Paolo - Braking

- Calculated approximate braking torque required for competition

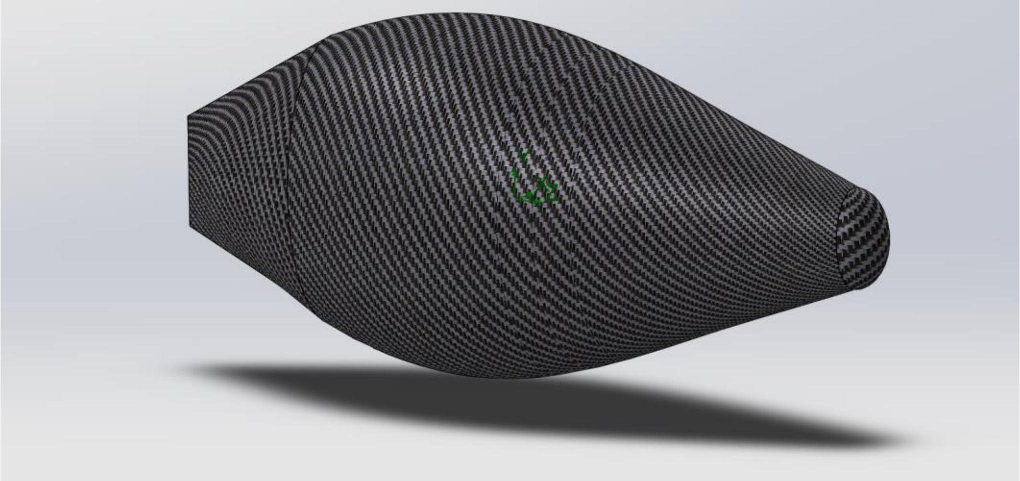
- Research on different braking systems
  - Hydraulic disc brakes
  - Cable disk brakes
  - Cable wheel hub brakes
- Final decision will be based on budget and/or sponsorships

Sebastian – Ergonomics/Fairing

- Ergonomics – Researched ideal seating configurations and best body support for maximum power and endurance outputs
    - Seat Designs/Materials
    - Adjustability



- Fairing – Working with Anu to develop a fairing design that's aerodynamic and will be easy to climb in and out of



Allison – Head lights and Brake lights

- Low Light Endurance Challenge:
  - Head Light – 300 lumens
  - Brake Light – 10 lumens

- Head Light: Switch actuated
- Brake Light: Actuates when brakes are applied
- Turn Signals: Optional, switch actuated with blinking capability