

# Solar Splash Project Proposal



Lauren DeSimone  
Daniel Johnson  
Eliza Sweet  
Christopher Taylor

*Advisors:*  
Dr. Norman Asper  
Dr. Karen Yan  
Regina Cadillac

*Volunteer:*  
Nick Moriello



# Individual Member Roles

Daniel - Team Leader & Electrical System

Lauren - Team Manager & Weight  
Distribution/Steering

Eliza - Treasurer & Telemetry

Christopher - Webmaster & Motor  
Mount/Power Transmission

## MEET THE TEAM



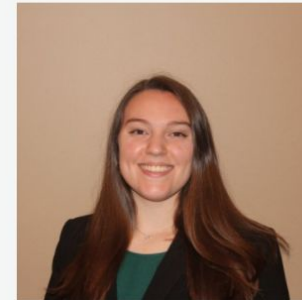
DANIEL JOHNSON (DJ)

Mechanical Engineer / Team Leader



LAUREN DESIMONE

Mechanical Engineer / Team Manager



ELIZA SWEET

Mechanical Engineer / Treasurer



CHRISTOPHER TAYLOR

Mechanical Engineer / Webmaster

# Solar Splash Competition 2021

- 28th Annual Competition
- June 8th-12th, 2021
- Springfield, Ohio
- Champions Park Lake



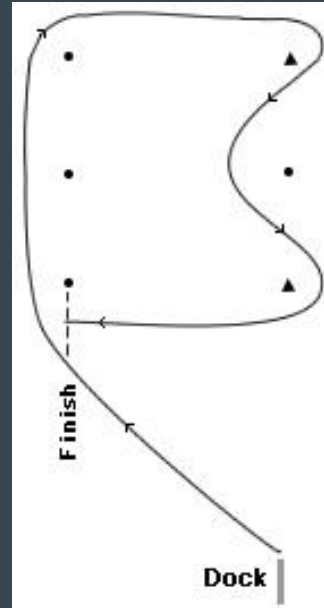
*Daniel Johnson ('21) and Jason Varley ('20) at the 2019 competition*



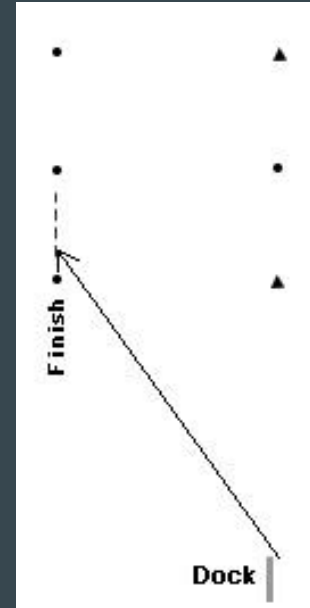
*Lake Champion*

# Competition Events

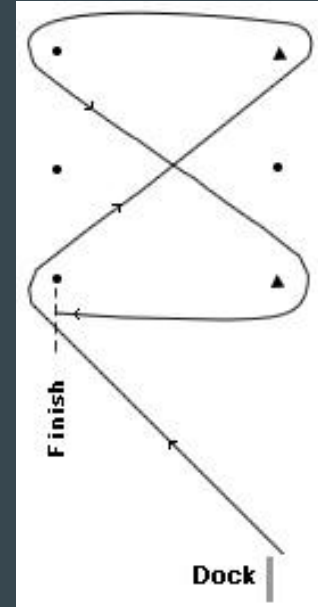
- Qualifying - Eligibility
- Endurance - Efficiency (2 hours)
- Sprint - Maximum Speed (300 meters)
- Slalom - Maneuverability



*Endurance  
Qualifier*



*Sprint Qualifier*



*Slalom*

# 2020-2021 Team Goal

- Effectively modify and improve subsystems:
  - Weight Distribution
  - Steering
  - Telemetry
  - Electrical System
  - Motor Mount
  - Power Transmission

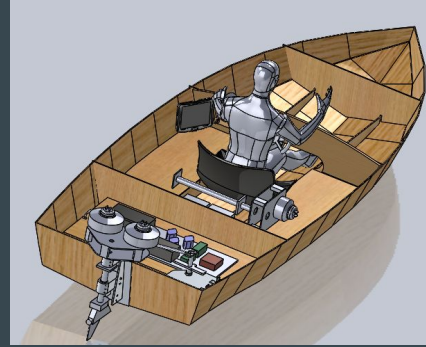


*Solar Splash Competition*

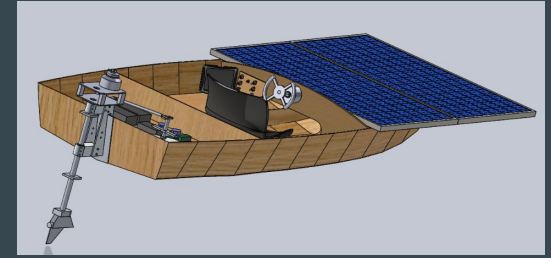


# Weight Distribution

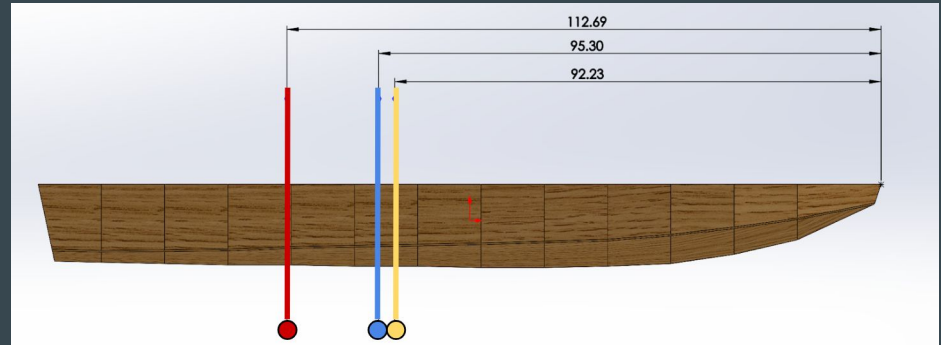
- Recalculate:
  - Center of gravity & flotation
  - Waterline
- Improve weight distribution:
  - Relocate skipper, steering, or dashboard
  - Reposition/take out rib
- Achieve planing & displacement hull
- Easy configuration



*Sprint/Slalom Configuration*



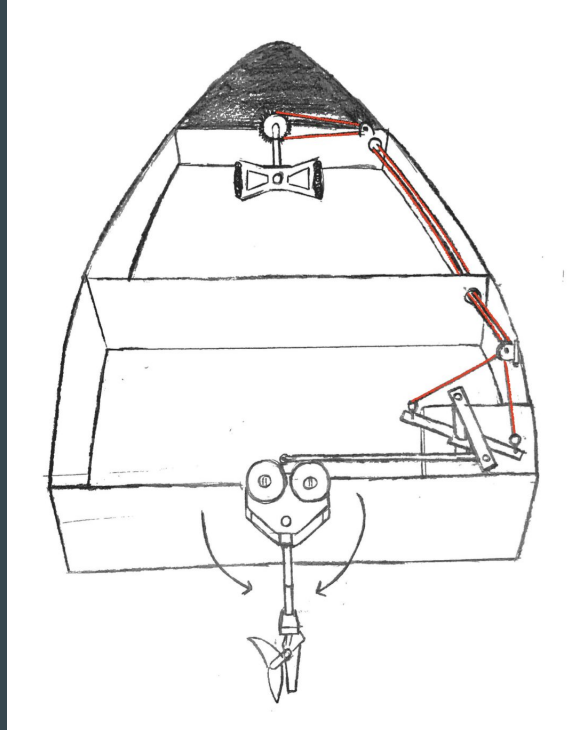
*Endurance Configuration*



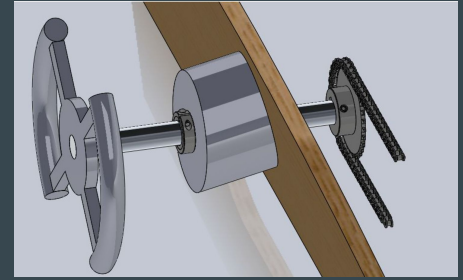
*Center of Flotation (COF) and Centers of Gravity (COG)*  
*COF (yellow), COG Endurance (blue), COG Sprint (red)*

# Steering

- Perform preliminary testing of existing efficiency
- Investigate methods to increase efficiency
  - Machine new parts
  - Reorient parts
- Ensure stability & compatibility



*2019 Steering Mechanism Sketch*



*Steering Wheel with Sprocket & Chain*



*Steering Linkage System*

# Telemetry

- Data Processing
  - GPS
  - IMU
  - Microcontroller optimization



*Glenn Reese ('12) Tracking Vehicle Performance with On-Shore Communication System*

```
11:12:25.198 -> $GPGSA,A,3,28,12,02,06,19,17,,,,,,,,,1.79,1.50,0.96*05
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11:12:25.333 -> $GPGSV,4,2,13,12,37,306,27,05,17,204,,09,17,103,14,04,13,067,*70
11:12:25.399 -> $GPGSV,4,3,13,28,11,165,18,25,09,323,,03,05,037,,24,01,258,*7B
11:12:25.468 -> $GPGSV,4,4,13,37,,,*,7F
11:12:25.501 -> $GPRMC,151225.000,A,3949.9822,N,07444.9219,W,0.35,217.79,190820,,,A*74
11:12:25.570 -> $GPVTG,217.79,T,,M,0.35,N,0.65,K,A*32
$GPGGA,151226.000,3949.9820,N,07444.9220,W,1,06,1.50,12.4,M,-34.1,M,,*6D
```

*GPS Data when Bypassing Microcontroller, Developed in Arduino Programmer Serial Monitor*

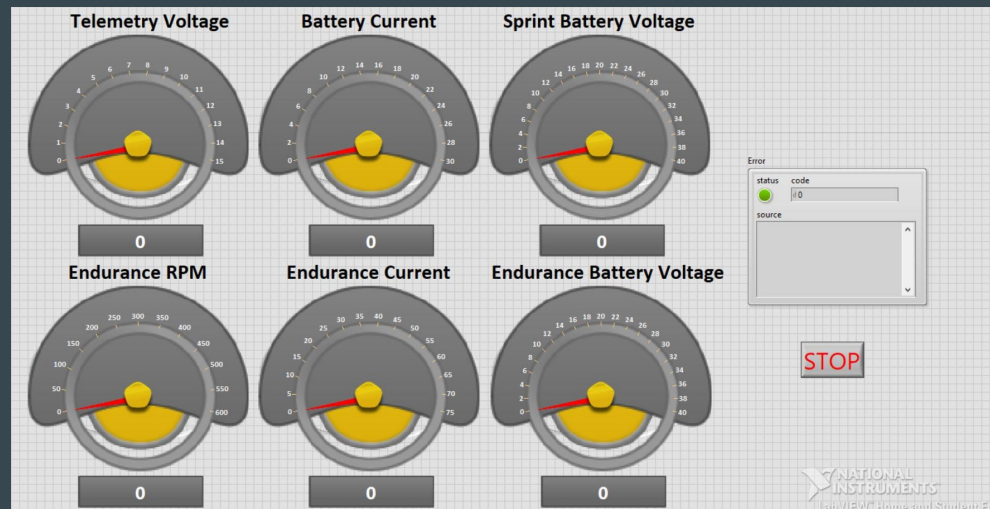


# Telemetry

- Feedback Improvements
  - GUI simplification
  - Bypass notification system
  - Performance review



2011-2012 Team Graphical User-Interface Design



2019-2020 Team LabVIEW Graphical User-Interface Design

# Electrical System

## 2019-2020 Design:



*2019-2020 Electrical Board*

## 2020-2021 Project Plan:

- Simplify sprint and endurance electrical configurations.
- Improve wire organization
  - Wire hooks and clamps
  - Label
- Polycarbonate cover
- Motor controller board supports

# Motor Mount

2019-2020 Design:



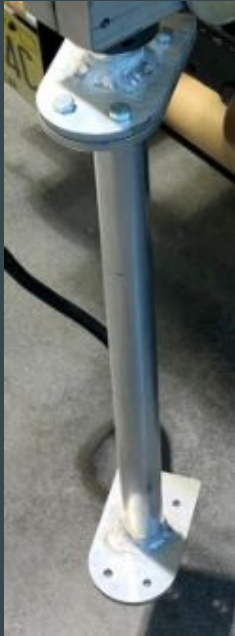
*Motor Mount*

2020-2021 Project Plan:

- Redesign drive shaft mounting brackets
  - Allow for angle selection
- Decrease weight of transom mount
- Maintain current steering components

# Power Transmission

2019-2020 Design:



*Endurance Housing Extension*



*Driveshaft Housing*



*Drive System*

2020-2021 Project Plan:

- Redesign endurance extension
  - Test propeller depths
- Refine driveshaft housing design
- Seal connections

# Solar Splash

Lauren DeSimone, Daniel Johnson, Eliza Sweet, Christopher Taylor

*Thank you Dr. Asper,  
Dr. Yan, Regina Cadillac,  
and the TCNJ School of  
Engineering*

## Questions?



*Solar Splash Sprint Event*