

# KARL ROUSH

US Citizen

706-873-1987

karlroush.com

karl.roush@gmail.com



## EDUCATION

### MS Aerospace Engineering

Georgia Institute of Technology

BS/MS AE Honors Program

GPA: 4.00, 2020- 2021

### BS Aerospace Engineering

Georgia Institute of Technology

Highest Honors (2017- 20)

ΣΤΤ Honor society

## SKILLS

### Engineer:

|            |        |
|------------|--------|
| NPSS       | MATLAB |
| SolidWorks | Git    |

### Program:

|        |            |
|--------|------------|
| Python | JavaScript |
| C++    | HTML/CSS   |

### Design:

|           |         |
|-----------|---------|
| Photoshop | Blender |
| Premier   | GIMP    |

### Build:

|               |           |
|---------------|-----------|
| Class 4 laser | Water jet |
| Drill press   | Sanders   |
| Mill          | Lathe     |

### Languages:

|        |       |
|--------|-------|
| German | ILR 2 |
| Latin  | ILR 2 |

## ORGANIZATIONS

American Institute of  
Aeronautics and Astronautics  
Graduate Liaison, 2020-present  
Chair, 2019-20

GreyHat, Information Security  
Vice President, 2019-20  
Public Relations Chair, 2018-19

GT Hytech Racing (FSAE)  
Aero/Composites sub-team

## COURSEWORK

Optimization Algorithms  
Propulsion System Design  
Adv. Aircraft Propulsion  
Aircraft Design  
Flight Dynamics & Controls

## INTERESTS

Machine Learning  
Additive Manufacturing  
Information Security  
Special Effects  
Service via *Eagles@GT*

## EXPERIENCE

### Aerospace Systems Design Lab

Graduate Research Assistant

May 2020 – Present

- Designing space-based ISR architectures to support military operations in polar regions
- Analysis of a refurbishable hypersonic reconnaissance vehicle and associated design space exploration
- Review of aviation stakeholder emissions policies & technologies targeting a carbon neutral 2050
- Compilation and analysis of numerous smart airport technologies for FAA prioritization

Fabrication Lead, AFRL APOP

Aug 2018 – Aug 2020

- Yearly AFRL engineering design competition
- Responsible for the fabrication and assembly of all components for both testing and final design
- Increased the thrust/weight ratio of a small gas turbine engine by 13.67% using 3D printed deswirl vanes
- Developed a combined IGV solution for windmill prevention and 2D thrust vectoring

### Southwest Research Institute/Dept. of Energy

May 2019 – Aug 2019

UTSR Gas Turbine Industrial Fellow

- Determined viability of hybrid cycle UAVs for ISR missions created NPSS tool for mission analysis
- Designed & built laser PIV system for <10% of quoted industry cost for low speed turbulence testing
- Standardized NPSS unit conversions and conventions for international use
- Streamlined riblet drag testing data collection (65% time reduction)

### MindSumo

May 2017– Present

Competitive Innovation Consultant

- Ranked in the top five of 350,000+ solvers across over 3,000 universities and 50+ countries
- Chosen as a winner for 93% of competitions (MindSumo All-Star average= 20%)
- Awarded wins from AAA, Mozilla, NASA, Siemens, DoD, NSIN, GSK, Swanson et. al

### Rutgers Wireless Information Network Lab

Sept 2016- Aug 2017

Electrical Engineering/CS Student Researcher

- Mentorship program: 3D Spectrum Sensing Map via Drone Mounted Receiver
- EE/CS robotics-based projects: Drone Gesture Based Control, Smart Electronic Bicycle

## RESEACH

### Analysis of Aviation Emissions Policies

Aug 2020 – Oct 2020

- Compiled stakeholder roadmaps (organizations, airlines) to hit 2050 emissions targets
- Developed attainability metric for influential technologies

### Jet Engine Cycle Analysis & Optimization

Aug 2020 – Oct 2020

- Off-design cycle design + analysis of a separate flow turbofan in NPSS
- Optimized engine for range in a scaled 737-800

### Natural Language Processing Based Game Solver

July 2020

- Built a solver for the Google experiment Semantris
- Utilized Computer Vision + NLP model built from Google News data

## AWARDS

### Wells Fargo Campus Analytics Challenge Winner (x2)

Dec 2018, 2019

- Machine learning challenge, winners present their solutions to Wells Fargo's top data analysts
- 2018= model minimizing carbon footprint, 2019= NASA dataset topic generation

### Eagle Scout Rank Award, Bronze Palm and Gold Palm

March 2015

- Awarded Bronze Palm in October 2015, Gold Palm September 2016

### International Best Use of Data- NASA Space Apps Hackathon

Sept 2016

- Developed Extra-Vehicular Activity search engine in JavaScript over the course of ~14 hours

## PROJECTS

### RTX On Contest, Thermal Management Systems

- Utilized Blender's Cycles rendering engine to demonstrate the importance of Thermal Management Systems

### Titanfall Smart Pistol MK5

- Designed, modeled, and constructed a replicate Titanfall Smart Pistol MK5 (1820 print hours)

### Image Compositing & Facial Recognition Cloaking

- Deployed image cloaking to thwart facial recognition algorithms via Fawkes