

# KARL ROUSH

US Citizen

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## 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

UTSR Gas Turbine Industrial Fellow

May 2019 – Aug 2019

- 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

Competitive Innovation Consultant

May 2017– Present

- 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

Electrical Engineering/CS Student Researcher

Sept 2016- Aug 2017

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

## RESEARCH

### Analysis of Aviation Emissions Policies

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

Aug 2020 – Oct 2020

### Jet Engine Cycle Analysis & Optimization

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

Aug 2020 – Oct 2020

### Natural Language Processing Based Game Solver

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

July 2020

## AWARDS

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

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

Dec 2018, 2019

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

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

March 2015

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

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

Sept 2016

## 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