A Publication of the Vertical Flight Society

January/February 2020

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Aeromechanics Intern Group Summer 2019 – Graduation Day (NASA photo)

March of the Interns

This article is a follow-up to previous reports in *Vertiflite*, "What to Do with an Army of Interns" (*Vertiflite*, Nov/Dec 2018) and "What Else to Do with an Army of Interns" (*Vertiflite*, Jan/Feb 2019). The saga continues with the "Army of Interns" in the Aeromechanics Branch at NASA Ames Research Center, Moffett Field, California.

By Hannah Dromiack

Summer 2019 brought 70 interns — from Puerto Rico, 44 continental US states, Sweden, and the Republic of Trinidad and Tobago — into the NASA Ames Aeromechanics Branch. Some were high school students learning engineering for the first time, while most were mechanical and aerospace engineering students, though two physics majors and a math major jumped into the mix to provide balance.

This year's interns completed work on 30 different projects with a collective of 30,000 dedicated hours of work. The projects this year were on urban air mobility (UAM), search and rescue vehicle design, all things Mars, Titan exploration concept designs, 3D modeling (i.e. computer aided design, CAD), computational fluid dynamics (CFD), and much more.

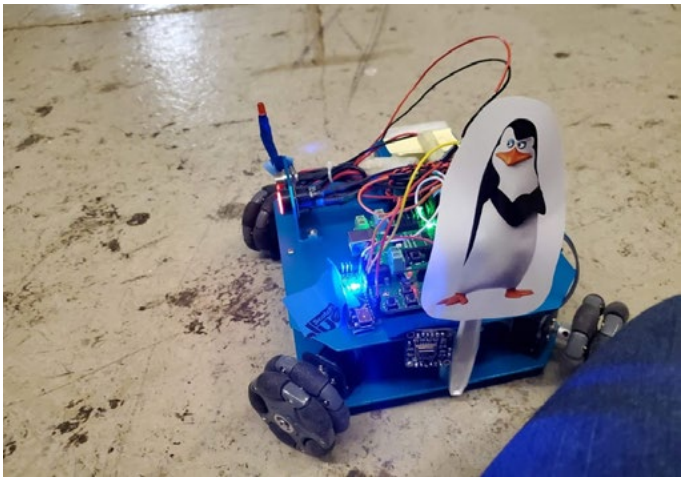
Last year we addressed the question of what to do with an army of interns. This year, we are following its path to change the world.

Computational Fluid Dynamics (CFD)

This year's CFD Team consisted of Asa Palmer, Cuyler Dull, Maven Losey, Jessica Deming and Victor Yang, led by Showvik Haque. They used Rotorcraft CFD (RotCFD) on Martian concept vehicle analysis, turbulence flow studies and further research into rotor configurations and airfoil types. Dull and Palmer worked on determining the feasibility of concept design aerial vehicles' ability to fly on Mars. Haque worked on turbulence flow studies in conjunction with wind tunnel testing of the 1/50th scale model in the 80-ft by 120-ft (24-m by 381-m) National Full-scale Aerodynamics Complex (NFAC) wind tunnel. Deming contributed to the understanding of the aerodynamics that will surround future UAM vertiports. Lastly, Losey and Yang completed research on flow studies over various rotor configurations and airfoil types to verify how the configurations would behave and validate the methodology in studying low Reynolds number flow.

Helicopter Rescue Operation (HERO)

The HERO group consisted of David Bombara, Kaitlyn Eckart, Saanjali Maharaj, Mary Radke, Reid Smith, and was led by Christian Schrader and Quentin Frederick. Inspired by recent natural disasters locally and globally, the students chose to focus on two areas of search and rescue: locating and extinguishing spot fires, and identifying injured individuals in a disaster location.

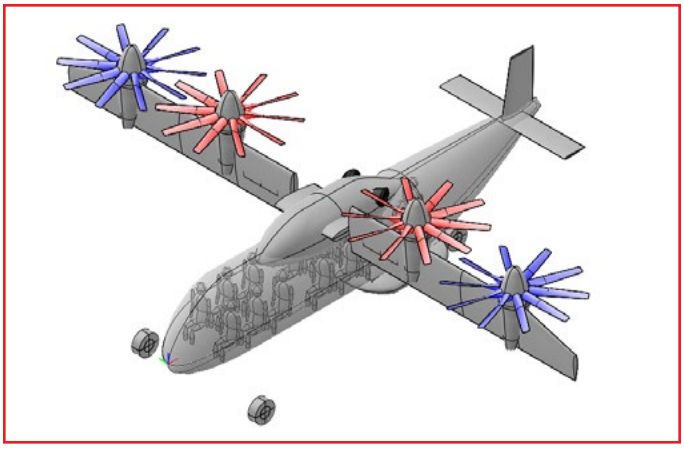


Testing of Firebot's Locomotive Ability

The goal for these students was to design and develop earth-based prototypes of two unmanned vehicles, one that could assist in finding and putting out spot fires to help firefighters maintain fire lines and one to assist in finding injured individuals within a disaster site. Using search and rescue skills, and "Roomba"-like robotic technology, these teams successfully built and tested both vehicles by the end of their 10 week internship.

Modeling Team

This year's modeling team will be the one to beat in future summers. Led by Makynzie Zimmer, this group consisted of



OpenVSP Model of NASA Reference Model 3 Tilt Wing (created by Daley Wylie)

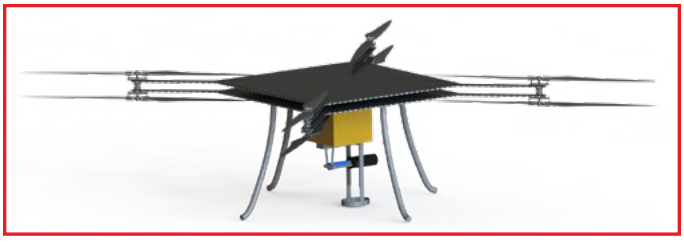
OpenVSP Model of Bell Nexus

five other members: Silas Chu, Tanner Fromcke, Jadzia Graves, Mackenzie Sexton and Daley Wylie. They tackled the OpenVSP program and modeled and/or standardized approximately 16 aircraft models. These models varied greatly, from the Mars Helicopter and current rotorcraft in use today to futuristic vertical takeoff and landing (VTOL) vehicles.

Not only did they model all of those impressive vehicles, but they also undertook the assignment of writing a user manual for the program, complete with "how to" sections and examples. They became so skilled with the program that it was not long until the challenge of modeling Pokémon was undertaken.

The Extraterrestrial Teams

Of the rotorcraft interns, two teams were chosen to leave the confines of this world for another. The Mars Team consisted of Zarya deSouza, Michael Radotich and Sophie Gelhar as the Mars

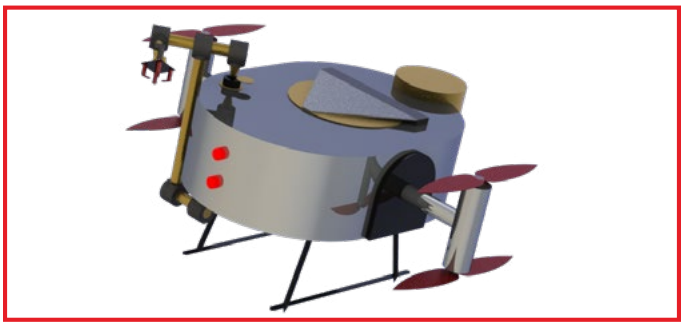


A Mars Concept Vehicle for Remote Rock Sampling Named Storc

Realistic Modeling of a Six-Passenger Quadcopter

Concept Mission Design group and Winnie Kuang, Malorie Travis, Siobhan Whittle, Noah Del Coro and Kaitlin O'Dell as the Mars Science Helicopter Team. Tag teaming with the Jet Propulsion Laboratory, these interns worked side by side to design conceptual entry, descent and landing (EDL) packaging, CFD, conceptual vehicle design, conceptual mission definition, and payload integration for future Mars rotorcraft.

Far beyond our near neighbor, Mars, is Saturn's moon, Titan,



Titan Concept Vehicle

which has a surface mainly made up of solid, liquid and gas methane, which has intrigued scientists for decades. Interns Caroline Osbourn, Cyrus Safai, Sydnee Shadoan, Karelia Silverstini and Lillia Smith took on designing an underwater submersible vehicle (USV) to perform scientific research in the methane seas of Titan. This USV was designed to have both the capabilities of traversing the methane waters and also be able to take low-altitude flight. The mission goals for this vehicle were to perform analysis of the chemical makeup of the methane seas, conduct deep sea research, and look for signs of life. This team completed an incredible design with an equally incredible mission design.

Marching On

Every summer the Aeromechanics Branch is overrun by an incredible amount of intern talent and potential. This is because the Aeromechanics Branch is dedicated to bringing in all types of people, disciplines and backgrounds and providing them with an opportunity to learn and grow as they become the future of the engineering and scientific community. They in turn become a part of something truly special and meaningful: the advancement of engineering, science and team collaboration.

I have had the pleasure of being a part of the Aeromechanics Branch here at NASA Ames for over a year now, and I have finally figured out why this place draws people in, why so many find a future here. There's a sort of magic that lingers here; you don't notice it at first, like a subtle breeze in a hallway or a slight shift in the wind. But, the longer you wait, the more you begin to feel that magic.

That magic is not just because it's NASA or because of the futuristic flying objects they research; it is everywhere because of the truly incredible people that work in the Aeromechanics Branch. They are as good humored as any come, openly collaborative and hard workers, always ready to laugh and enjoy their mission. Never in my life have I ever seen such an incredible group of people, and who would have thought they would all be working hard in a windowless, refurbished centrifuge with dodgy air conditioning.

It has been a true privilege and honor to have worked alongside the members of the Aeromechanics Branch at NASA Ames Research Center.

The future Intern Armies of this branch will undoubtedly change this world in ways we have yet to imagine.

About the Author

Hannah Dromiack is a graduating undergraduate student studying physics at Arizona State University. She is currently a contractor for NASA Ames Research Center's Aeromechanics Branch, working on analysis of wind tunnel performance. She was an intern there in 2018 and 2019.