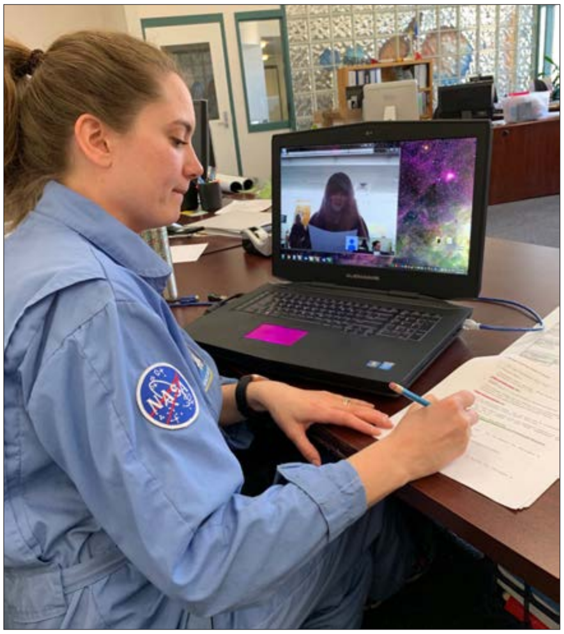
Alaska Space Grant News

Newsletter of the Alaska Space Grant Program • Winter 2020

Promoting Earth and Space Science and Technology and other NASA relevant teaching, research, and public service throughout Alaska.

New educational program brings crisis management to the classroom- *by Jeremia Schrock*



Courtesy of Cecilia Borries-Strigle.

Alaska is no stranger to natural disasters. Whether these disasters are convulsive earthquakes, fierce forest fires, ill-tempered volcanoes, or tumultuous tsunamis, Alaskans can expect to experience some of these events in a given lifetime. It's only natural that Alaskans, even the youngest among them, have a greater understanding of how teams manage these crisis. Enter Alaska's newest educational program – Alaska on Alert.

"The Alaska on Alert mission is an interactive experience for students…that simulates a natural disaster event that may occur within Alaska at any given time," said Teri Diamond, Director Educational Operations at the Challenger Learning Center of Alaska and the lead developer of the program.

Alaska on Alert will provide students the opportunity to learn and role-play as part of an emergency response team. The teams will include an Earthquake team, a Tsunami Team, an Evacuation Team, and a Communication team, with the goal being that all four teams will work together to successfully evacuate a community threatened by an earthquake-triggered tsunami.

"The beauty of this program is that it is internet based," Diamond said. The mission is designed for rural areas, providing students the opportunity to experience a simulated mission from inside the classroom without having to travel to Kenai, home of the Challenger Learning Center.

The lessons are targeted at classrooms of 24-30 students in middle and high school. There will be ten "pre-mission" lessons giving students the tools they need to prepare them for mission day. All lessons will come with instructions, teacher and student materials, and answer keys. Examples of pre-mission lessons include causes of tsunamis and how they're generated, how a tsunami is tracked, locating an earthquakes epicenter, and proper evacuation procedures.

On mission day, classrooms will connect with "mission control" at the Challenger Learning Center. Each of the four teams will relay data to the center and document events as they unfold. Students will receive data from mission control to evaluate and process the details of the earthquake, the impending tsunami, and finally the evacuation process.

The program will provide teachers with a rich and engaging curriculum that is relevant to potential real life scenarios and one section of the curriculum even connects the program to potential STEM careers, enabling teachers to discuss possible workforce opportunities for students to explore. The mission is aligned with Alaska State Science standards and will be offered to schools statewide beginning in August 2019.

NASA / ALASKA SPACE GRANT PROGRAM

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Renewable Energy Course Energizes Students' and Community's Knowledge Base - *by Carol Brzozowski*

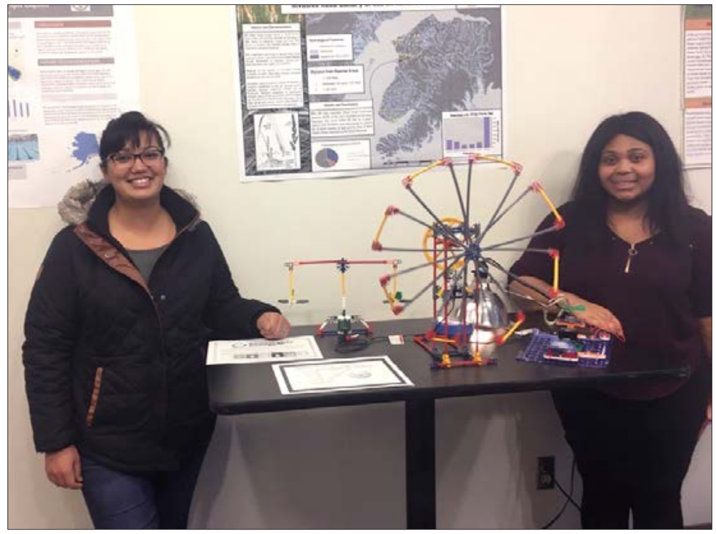
Alaska has been a leader in alternative sustainable energy sources "because energy costs are so high in the villages and so many rural areas have or are thinking about having small microgrid-type systems, says Paul Twardock, director of the Institute of Culture and Environment at Alaska Pacific University (APU).

While there has been a fair amount of funding for such systems, the actual understanding of how they work varies among the populace, he adds.

To that end, APU – in collaboration with the University of Alaska Fairbank's College of Rural and Community Development and with funding from the Alaska Space Grant Program – offers a two-semester course to increase students' and the community's knowledge base.

In the Introduction to Renewable Energy course, students develop knowledge and skills regarding energy consumption, energy conservation efficiency, renewable energy resources and technologies including storage and hardware, laws and codes and the renewable energy profession. Systems studied include wind, solar, hydro, geothermal/thermal energy and energy storage. Students also collect and analyze energy data.

The course involves communication, teamwork and science as students learn to create a budget. It also includes a lab component in which they design and test renewable energy kits aimed at teaching K-12 rural and urban Alaska students and educators renewable energy concepts by assembling a solar panel, wind generator and a hydro turbine and demonstrate how they work.



Courtesy of Paul Twardock.

In the second semester, students learn how to develop curriculum for K-12 students as well as adults.

Twardock views the impact of the course on the community at large as "increasing everybody's understanding of how renewable energy systems and electricity work. Hopefully, kids, their parents or other adults will come away with a better understanding of how these systems work and how they are applied to make these villages a better place to live."

Such broad outreach efforts may render small-scale renewable energy solutions "exciting and doable" for the first time, planting seeds for future applications from Anchorage rooftops to remote village wind farms, he adds.

CALENDAR OF EVENTS 2020

February *2020*

- Spring National Space Grant Directors Meeting in Washington DC, February 27-28

March *2020*

- ASGP Higher Education project proposals due
- NASA Summer Internship Applications due
- Summer Undergraduate Fellowship applications due

April *2020*

- Alaska Space Grant Symposium, April

September *2020*

- Undergraduate Fellowship/Scholarship applications due

October *2020*

- Fall National Space Grant Directors Meeting in Jackson Hole, WY, October 8-9

UAF Energy Course Broadens Base to Develop STEM Workforce

by Carol Brzozowski

Energy is one of the planet's most important issues, notes Dr. Tom Marsik, associate professor and program head of the Sustainable Energy Program at the University of Alaska Fairbanks Bristol Bay campus.

"Energy underlies everything we do, everybody deals with energy in their personal lives, and every job has something to do with energy," says Marsik.

While the PHYS 102X Energy and Society course has had a successful impact on Alaska Native and rural students, its synchronous format created challenges for non-traditional students with families and jobs as it necessitated students having to log in at specific times and participate in real-time sessions.

A 2017-2018 Alaska Space Grant Program grant allowed the course to be revised to make the content current and establish NASA presence.

One course component is a project in which students deal with real-life energy-related issues in their communities including hands-on activities and theoretical analysis. The project addresses remote locations and extreme environments similar to NASA's challenges, notes Marsik, who leads the project and develops and delivers the curriculum.

The asynchronous version of the four-credit course enables students throughout Alaska to complete it in their own time through recordings and discussion boards.

Its ultimate goal is to increase access to education and contribute to the development of the STEM workforce in sustainable energy, an interdisciplinary field relevant to NASA.

One of the Exploration Systems Mission Directorate goals is to develop an energy efficient sustained human presence on the moon relying on renewable energy, using it as a springboard for future exploration of Mars and other destinations.

Building a remote base entails challenges associated with the transportation of materials from the Earth with the systems needing to function in extreme environments.

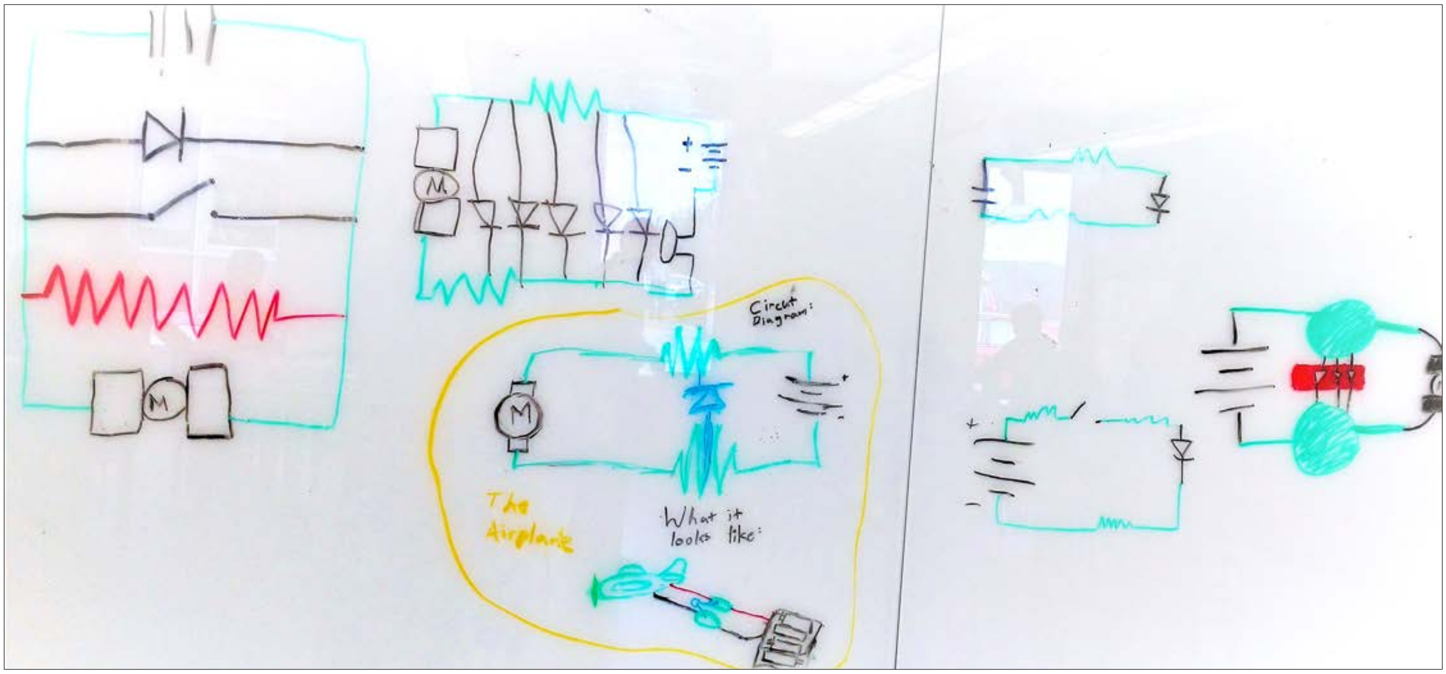
Courtesy of Tom Marsik.

The project aligns with the goals of several NASA programs, such as Ames' Greenspace program initiatives of clean energy advancing biofuels, solar and wind technologies.

Past projects students have worked on have examined those components as well as artificial photosynthesis, home appliance energy standby, kite power, in-stream turbines, biomass, and the environmental impact of batteries, food, and transportation.

Junior Engineering Camp

by Carol Brzozowski



From building simple machines to constructing bridges, students in fourth to sixth grades were encouraged to be creative and innovative with hands-on engineering activities at the first-ever Junior Engineering camp offered through the University of Alaska Fairbanks Summer Session Kids Camps program.

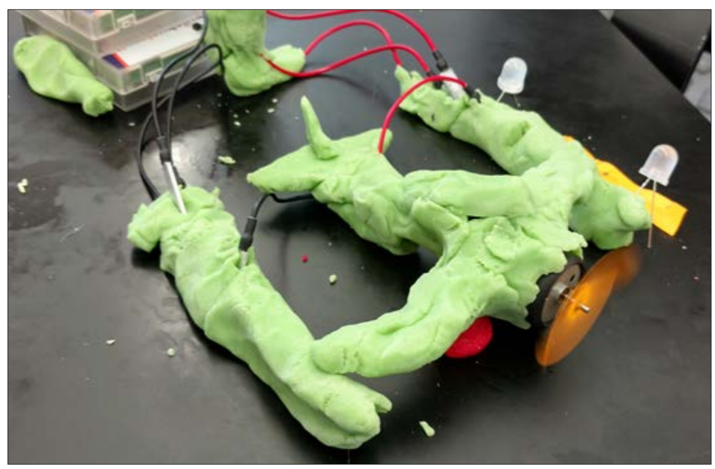
The camp was held in the university's Chemical Engineering lab in the Engineering Learning and Innovation Facility. Students were in a working laboratory and also toured the Space Systems Engineering Lab.

"We wanted to show the students we all benefit from engineering and design," notes Kayde Kaiser, program coordinator for the Alaska Space Grant Program. "The students became familiar with engineering as a field through identifying engineering projects in their communities and how items they use every day are products of engineering."

John Sassman, a sixth-grade general education teacher at Woodriver Elementary School, taught at the camp, leveraging knowledge from a Master's degree project focusing on STEM integration into an elementary school classroom. He points out STEM will underscore the majority of future jobs.

"We had a great time teaching them about bridge design, tower construction, electrical circuits, and even completed an egg drop from the top of our student union building," says Kaiser.

Kaiser adds "we hope that engineering is no longer seen as a strange nebulous thing, but as a critical role in how we live each day. I would like to see each child think of him or herself as an engineer and be inquisitive to how things work and be modified to solve problems."



Courtesy of Kayde Kaiser.

"They have this passion for exploration," says Sassman who observed the students – who are interested in STEM – demonstrate excitement over being in the lab and conducting themselves as if they were they were junior engineers. "For me, it was also a learning experience. Not only do the kids benefit from the camp, but I get to bring it back to my classroom."

A large demand for the camp – which drew 40 students in morning and afternoon sessions – created a waiting list. As a result, additional camp sessions were planned for summer 2019.

Max Heldman of University of Alaska Fairbanks - *by Carol Brzozowski*

Max Heldman had become accustomed to being in an academic setting doing abstract research.

But he found a 10-week internship in the summer of 2018 at NASA Langley Research Center in Hampton, Virginia funded by the Alaska Space Grant Program opened a new world to him, touring NASA facilities and learning about the space program while meeting people with different backgrounds.

Heldman found it interesting to be involved in hands-on work as part of a team as well as being able to later present his work in a group setting.

"I had roommates who were working on all different kinds of projects for NASA and that was really cool," he says.

During his internship, Heldman was part of a group working on designing axial flux permanent magnet machines, which are compact, efficient motors as part of the CAMIEM (Compact Additively Manufactured Innovative Electric Motor) project.

CAMIEN's objective is to utilize additive manufacturing methods to achieve new motor designs with significantly higher power densities and/or efficiency.

Working with a prototype for the motors that were developed by another group with 95 percent efficiency, Heldman's group endeavored to increase the efficiency closer to 100 percent.

"There are topology optimization techniques," says Heldman. "You're modeling the air flow through the motor on a computer. You're trying to find an optimal shape for the motor using mathematical models that would optimize some of those quantities such as the power output."

The project has significance for small aircraft such as drones and automobiles, especially regarding improved urban air mobility, notes Heldman.

"The motors could be used in unmanned drones to deliver packages or in small airborne passenger vehicles of 10-20 passengers, for example – both of which could help reduce traffic congestion in cities," he adds.

Heldman – who earned a Bachelor's degree in mathematics and economics at Kenyon College, followed by a Master's degree in applied mathematics from the University of Alaska Fairbanks – is now pursuing a Ph.D. in mathematics at Boston University.

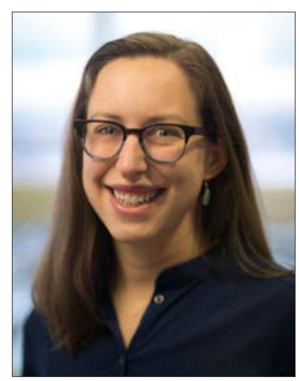
Heldman plans to serve in various internships to get an idea of professional opportunities at NASA after he completes his Ph.D.

Emilie Sinkler of University of Alaska Fairbanks - *by Tiffany Thomas*

"Ice is a hot topic right now," enthused Emilie Sinkler, a PhD student with UAF's College of Natural Science and Mathematics. "What brought me to glaciology was my interest in physics and earth science: I really like the physics side of it; I really like the fieldwork side; and I really like bringing those things together to build a more complete picture."

In fact, the focus of Sinkler's work is to build a more complete picture in relation to how we measure glacier ice flow. The accepted standard for this process, developed in the 1950s, is Glen's Flow Law, which describes the mathematical relationship between ice flow rates and the geometry of the ice sheet. This flow law captures large-scale flow features such as temperature and stress but fails to account for important ice properties such as impurities. Those properties are currently represented by a broad, multiplicable enhancement factor.

"What I'm hoping to do is get a better idea of how impurities actually impact the flow," said Sinkler. In other words, it is like fine-tuning a microscope to produce a clearer, more precise image. "Science generally moves more incrementally. I don't think I'm going to rewrite the flow law for all of the rest of time but I am excited to see what it shows.



"Initially, I proposed looking at each ice property separately but instead I'm combining those into one piece," Sinkler explained. Inspired by work completed in 2000 by Kurt Cuffey at Meserve Glacier, which bases its model off of laboratory results, Sinkler and her advisors are incorporating impurities, crystal fabric, grain size and temperature all in the same equation. "With inverse modelling, you need to have your data and your general model and then your parameters get spit out."

While Sinkler's project has taken a different track than initially expected, she is satisfied with the possibilities and challenges the inverse modelling method has to offer: "I think it's going to give us really robust results. Whether or not that will answer all the questions that we have is to be determined."

Top: courtesy of Max Heldman. Bottom: courtesy of Emilie Sinkler.

Jonilee Polanco of University of Alaska Fairbanks - *by Carol Brzozowski*

Jonilee Polanco still pinches herself, finding it hard to believe that she spent most of her summer in 2018 working an internship at the National Aeronautics and Space Administration (NASA). It was the Alaska Space Grant Program at the University of Alaska that had made it possible.

Polanco served an internship from June 4 through August 10 2018 at the Kennedy Space Center (KSC) in Cape Canaveral, Florida where she was investigating microbiome differences between red romaine lettuce grown from sanitized versus unsanitized seeds.

Polanco says she had learned a great deal during her internship at KSC. "Being allowed this opportunity forced me to recognize my own achievements, which is something that a lot of people don't really like to do," she notes. "For me, it was taking that moment to acknowledge that I was really there at NASA headquarters."

The experience augmented her desire to continue her academic career in research, "not to mention the many new laboratory skills I was able to learn and practice first-hand with advanced laboratory equipment," Polanco adds.

"I absolutely adored going to work every day," says Polanco of her favorite part of the internship. "Going to work meant going to lab and that always excites me."

Polanco, 20, is a senior undergraduate at the University of Alaska Fairbanks pursuing a double major Bachelor of Science in the biological sciences (cell and molecular biology) and chemistry (biochemistry).

Polanco advises other students to apply for internships. "This changed my life," she says. Not only did she get into the program, but got an internship at NASA's primary launch center for human space flights.

"I learned so many laboratory skills and practices that aren't usually taught and used in undergraduate courses, networked with many high-up people, and had the opportunity to view a SpaceX launch, all of which would not have happened if I hadn't applied," notes Polanco. "I also got to shake an astronaut's hand shortly before they were to be departing for the International Space Station and it was very memorable."

Mirin Morris-Ward and Kyle Tam of University of Alaska Fairbanks

Carol Brzozowski

An internship at NASA Langley Research Center executed by two University of Alaska Fairbanks students from May through August 2018 not only augmented their classroom knowledge with real-life engineering skills, but also provided networking opportunities for them going forward.

Mirin Morris-Ward, a junior studying mechanical engineering, spent her internship time engaged in aircraft design, working on a mechanical flight simulator and doing rapid prototyping with 3D printing.

Kyle Tam, a fourth-year student earning a BS in computer engineering with a minor in mathematics, helped build a mixed reality flight simulator by writing code using the Unity cross-platform game engine and optimizing for the target hardware.

"There is a lot of interesting work out there for mechanical engineers," says Morris-Ward. "What I saw at Langley showed me the prospects of developing new technologies, faster aircraft, and smarter robotics. I learned how a real team works together, the process of developing and designing something and how to be very resourceful when making a product."

Tam says in learning what "real-world engineering" is like, he discovered "it's very different from the classroom, but not different from the Alaska Space Grant lab."

Morris-Ward was impressed by the amount of resources available for her to do her work and was particularly moved by Langley's history.

"I worked in the same hangar as Katherine Johnson, heard about the history of teaching astronauts how to walk on the moon at Langley, and worked around robotic arms. There was always something fascinating," she says.

Tam says he enjoys staying in contact with those he met during his internship as well as the knowledge he gained.

"Everyone there offers some sort of wisdom you can't get anywhere else," says Tam, adding her also learned to work through challenges.

"An internship will help you figure out what you want to do and what focus you want to take," says Morris-Ward, who adds that her internship has steered her education and career in the direction of robotics.

Top: courtesy of Jonilee Polanco. Bottom: courtesy of Mirin Morris-Ward.

UAA's all-women rocket team takes flight at national competition

by Jeremia Schrock

We know the phrase "it's not rocket science," but what do you do when something is rocket science? If you're Trisha Jimmie, a mechanical engineering student from the University of Alaska Anchorage, you use rocketry as a way to break out of your comfort zone.

"I dream of becoming a strong leader in the future," she said. "I was forcing myself out of my comfort zone and stepping up to rise as a leader." Jimmie, who considers herself shy and quiet, has spent the better part of a year directing an all-woman team deep-diving into the world of rocketry.

Jimmie's team has been developing a rocket as part of the 2019 NASA Midwest High-Power Rocket Competition in Minnesota. In past years the competition has released new guidelines for teams to follow and this year proved to be no different. The goal of the event was to have students design and fly a rocket that, among other things, could reach Mach 1 and that could fly twice during the competition.

The team started their project in October 2018, but, being new to rocketry, didn't begin building their rocket (made from fiberglass and carbon fiber) until February 2019. Like any team, they spent time finalizing their decisions for the build before they began construction. The team even spent Christmas break building personal rockets to better understand the basic concept before building the team's rocket.

The team is composed of six members ranging from Mechanical Engineering to Computer Science students."I knew having a broad range of engineering majors would create a more structured team," Jimmie said.

That it did. One of these team members is Helen Segura, a fellow student and friend of Jimmie. Segura, the team's mechanical engineering lead, oversaw the rocket's design and construction. She also ran computer simulations (with Rocksim) to ensure that the rocket would be safe enough to launch and recover.

The team also includes Danica Mike and Monica Heim (who both specialize in avionics coding), Temyka Ayuluk (who constructed the rocket), and Rachelle Griffitts (who acted as the teams safety and code compliance officer).

"The experience of learning about rocketry, leadership, figuring out where to buy materials for the rocket, finding sponsorship, learning how to make design reports was great," Segura said. "If I never would have created the team with Trisha, I wouldn't have learned how much work it takes to be a part of a competition," she added.

Courtesy of Helen Segura.

"The team worked hard from start to finish," Jimmie said.

While building the rocket proved to be a fantastic experience, none of the teams present at the competition were able to launch due to poor weather. The team is instead launching from Alaska and will have both tests concluded by the end of September.

"I appreciate Alaska Space Grant giving us the opportunity to go to Minnesota to be apart of a competition and learn how rewarding it is to be able to say, we built a rocket and it worked," Segura said.

APU researcher uses "watermelon snow" to better understand climate change - *by Jeremia Schrock*

Not many people know about "watermelon snow", but Caroline Brisbois does. Brisbois, a graduate student at Alaska Pacific University, is researching snow algae, the single-celled green algae that blooms on glacial surfaces during summer.

The term "watermelon snow" comes from the reddish-tint that blooming algae gives to the snow it inhabits. "In the harsh, frozen environment of a glacier, vital nutrients and water often only become available when snow and ice melts," Brisbois said.

It's the blooming of snow algae that causes more melt than any other glacial impurity. It's the significant role this blooming plays in melt that has drawn scientists to study snow algae, using new data in glacial melt models, runoff predictions, and the overall cooling effect of glaciers and icefields for the planet as a whole.

"The more we know about the ecology of glacial organisms, the better we can assess and quantify the melt rate and surface area loss of glaciers and icefields across the globe," Brisbois said. Her project is meant to add to the current knowledge about snow algae in Alaska by exploring its distribution and relative abundance, as well as developing a better understanding of its effects on climate change.

While Brisbois has made use of remote sensing tools, studying algae on a glacier isn't all satellite and aerial photography. Sometimes you just have to go to a glacier yourself. The bulk of Brisbois' field work has focused on the Eklutna glacier near Anchorage. This glacier, nestled in the Chugach Mountains, is the primary source for Anchorage's drinking water and its runoff is used to help power the Eklutna hydroelectric dam.

The last time Brisbois went to the glacier for field work she and her team gave themselves roughly nine-hours to complete their work. "Everything takes a little longer than you expect because you are outside, in the snow, making sure you are keeping yourself and everyone else safe from sun exposure and other glacial hazards," she said. The worst part is feeling the need to get everything done as quickly as possible "especially because you don't get to just go back the next day and fix a mistake or keep working," she added.

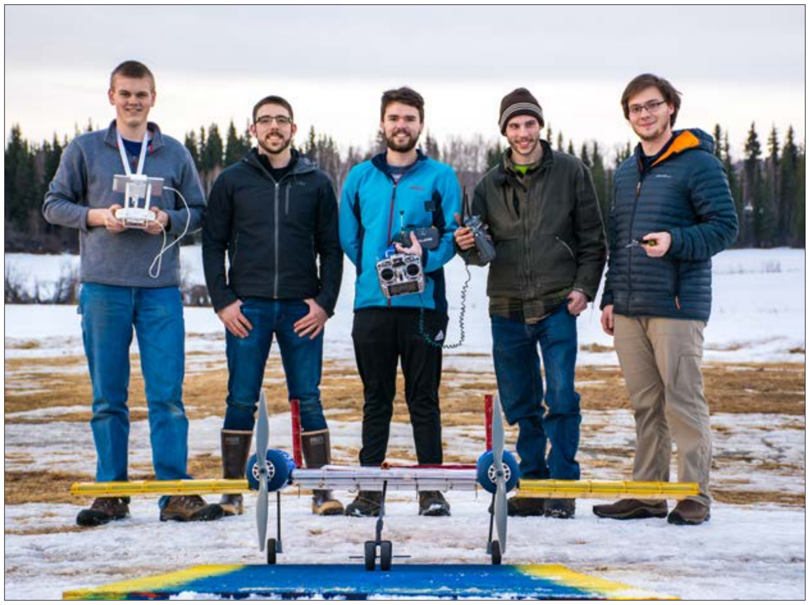
Brisbois has been out to the Eklutna glacier several times since her research began, most recently in April of this year. However, it was a trip to the glacier last summer that proved to be the most difficult and also slightly harrowing.

"We did hike off the glacier one time last summer, but that turned out to be a sixteen-hour and twenty-two mile journey of bushwhacking, river crossing, and route finding from the glacier surface to the Eklutna Lake parking lot," Brisbois said. "We decided not to go that route ever again!"

Courtesy of Caroline Brisbois.

UAF undergrads take to the skies in annual Design Build Fly competition

- by Jeremia Schrock



Courtesy of Levi Purdy.

Carl Sagan once said "If you wish to make an apple pie from scratch, you must first invent the universe." Ask Michael Radotich, a junior in mechanical engineering, how to build an aircraft from scratch and the answer would be surprisingly similar, save instead of inventing the universe one must first create their own 3D printer.

Of course, Radotich isn't a pastry chef and he isn't baking an apple pie, but he is part of a team that has been working since last year to build an aircraft capable of participating in the annual Design Build Fly competition hosted by the American Institute of Aeronautics and Astronautics (AIAA) in Tucson.

Every year the AIAA releases a set of rules for the Design Build Fly competition and every year the rules change. This year Radotich and his team built a fixed-wing unmanned aircraft meant to assist in aircraft carrier operations. It needed to have folding wings, carry a simulated radome (a domelike shell used to house a radar antenna), carry simulated attack stores, and be able to take off unassisted from a 10-foot launch ramp. At the competition, the aircraft would be scored based on how fast it can fly laps and how many attack stores it can drop.

The team used balsa wood built around a carbon fiber frame in order to create an aircraft that was both lightweight and strong. They also used a 3D printer of their own design to manufacture the unique parts needed to create their ideal aircraft.

One of the big challenges the team faced building the craft in Fairbanks was the difference between the testing climate and competition climate. At temperatures as low as -40F batteries quickly lose charge, plastics become brittle, and the air gets dense, Radotich said.

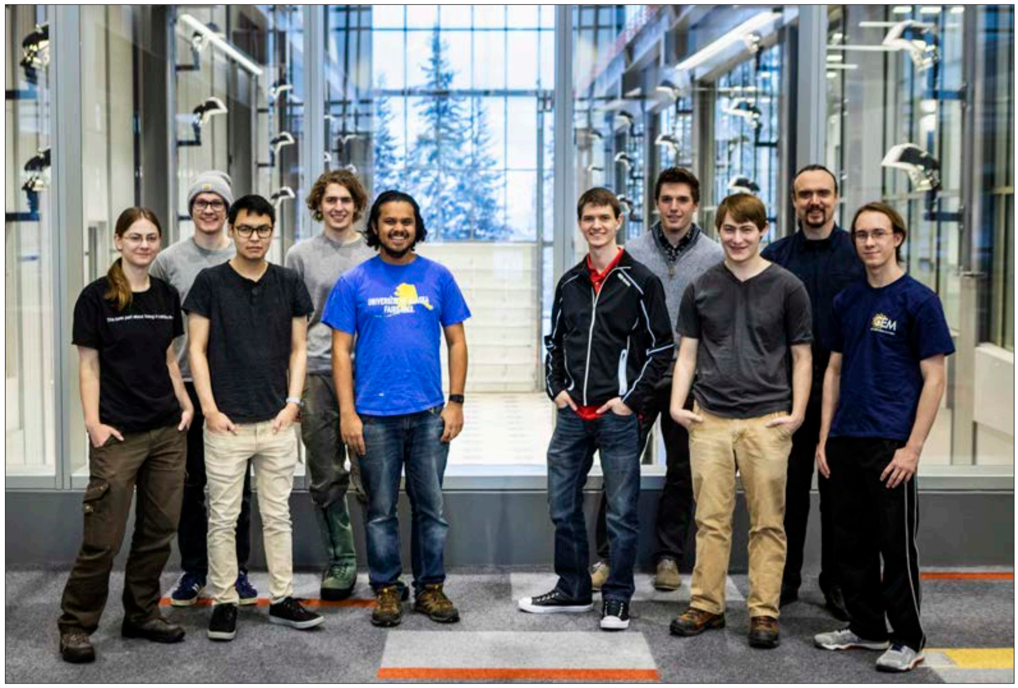
"It is a very different situation at 90F in Arizona and we have to worry about electronics overheating and some components potentially melting on the asphalt," Radotich said. "A plane that flies well in the dense air of Fairbanks may not fare as well in the high altitude hot air in Tucson." He added that simulation software helped the team develop a craft that could, ideally, handle such a wide range of temperature.

No stranger to Design Build Fly, this is Radotich's third year participating. The project was one of several picked to go head-to-head against teams from other universities from around the world. He is joined on the project by a bevy of fellow students including Duncan Fisher, Levi Purdy, Mirin Morris-Ward, Zach Barnes, Terran LaVonne, Jacob Torres, Max Erickson, Rosalee Bertram, Elliot Blair, Mitchell Hay, Cullen Chandler, Trevar Fiscus, Juliana Rivera, Brian Holst, Bremner Nickisch, De Jour Reed and Zion Alioto.

While the original motivation behind UAF competing in Design Build Fly has been lost to the sands of time, Radotich has a working theory: "I can only assume students were looking for an interesting and innovative engineering competition in aeronautics," he said. "Now, the motivation is getting to solve real engineering problems as undergraduates and have an opportunity to get hands-on experience in designing aircraft and apply the knowledge gained in the classroom."

Aurora Robotics team develops low-cost, functional mining robot

by Jeremia Schrock



Any future mission to Mars will inevitably begin on earth. For Elijah Simmons, any future mission to Mars begins squarely in his backyard at the University of Alaska Fairbanks.

For the past several years, Simmons has worked with a team of fellow scientists as part of the UAF Aurora Robotics team. Since 2014, the team has participated in the NASA Robotics Mining Competition. The event is a partnership between NASA and Caterpillar and is a chance for university students to get involved in the proverbial "nuts and bolts" of extraterrestrial mining, specifically on Mars or Earth's moon.

The 2019 event challenged teams to develop and drive a robot across an obstacle field, mine through fine rock dust, gather as much gravel as possible before finally depositing the material in a collection hopper.

The team, comprised of mechanical engineering and computer science students, focused on making their robot (dubbed SPIDER due to its arachnid-like features) have as efficient a mechanical design as possible. Essentially, the robot needed to be as light as possible while still being mechanically robust. "In fact, we had the lightest robot at the 2019 competition," Simmons said, "despite building the frame of our robot entirely out of steel and having one of the largest robots."

Like fellow UAF students participating in this year's Design Build Fly drone competition in Arizona, Simmons' team used a plethora of 3D printed parts for their robot competition in Florida. "3D printing allows us to rapidly iterate our part designs, as well as having the advantage of being low cost," Simmons said.

The team also used basalt fiber composites where they could since basalt fiber can be made directly from basalt rock without any additives, said Simmons. "This means that it would be relatively easy to make on the Moon or Mars and use for building habitats - or robots!"

But why exactly is mining on the Moon or Mars so important that university students in Alaska would spend time as part of a club developing a robot printed from 3D parts?

Mining will be a major part of practicing "in situ resource utilization", i.e. using locally available materials during space exploration missions. "This will be crucial for more extended missions," Simmons said, "because as the duration and distances of extraterrestrial missions increases, the amount of fuel that spacecraft need to take with them from Earth increases exponentially."

The team's robot is designed to simulate mining water ice. On a mission to the Moon or Mars, gathering said ice is a major step in developing an extraterrestrial supply chain (so to speak). Water ice can be used for basic life support functions or could be converted to hydrogen and oxygen for use as rocket fuel. The ability for a such an expedition, let alone colony, to be self-sufficient is a paramount to making any such expedition viable. And to think that a potential trip to Mars could begin with a single step in Fairbanks, AK.

The Aurora Robotics team is comprised of Simmons (the team captain), as well as Arsh Chaunan, Addeline Mitchell, Louis Bastille, Ivan Rhodehamel, Conall Birkholz, Jacob Cates and Daniel Dougherty. The team's academic advisor was Dr. Orion Lawlor, Professor of Computer Science.

Courtesy of Elijah Simmons.

FROM THE DIRECTOR

Denise Thorsen

As I sit in my classroom proctoring a mid-term exam, I can't help but think that there must be a better way to reach students and excite them about STEM careers. The limitations of the classroom seem obvious to me even as I recognize that there are vast efficiencies in classroom education. Perhaps that is why I've chosen to work at a small university which allows me more flexible access to students. Rather than a 500 student lecture hall where you never get to know your students, in my classroom of 20 – 40, I can call my students by name and when I see them in the hallway, I know them enough to ask how their semester is going. Students also benefit from this "hands-on" relationship with their professors. Research show that faculty who mentor students have a positive impact on the student's academic performance and retention.

The difficulty of small classrooms is, of course, a financial one. As we have all become aware this past summer, the University of Alaska is struggling, in the face of reduced state funding, with the dichotomy of financial exigency and providing optimal student educational experience. Several times over this last summer I fielded calls from students asking if they should come back to school, if their programs would still be there, if Alaska Space Grant would also be cut. I gave them what assurances I could, thankful that Alaska Space Grant was not at risk as long as the state match was still in place. In fact, Congress, who sets our overall budget, and NASA, who administers the program, values the Space Grant programs enough to increase our annual budget. Starting in 2020 the annual Alaska Space Grant budget will increase by approximately $150k.

Increased budget means more students funded, like Jonilee Polanco, Mirin Morris-Ward, Kyle Tam, Max Heldman, each who had opportunities for an internship at a NASA center; Emilie Sinkler, Caroline Brisbois, who are working on graduate research projects; and UAA's all-women student rocket team, UAF's Design/Build/Fly team, and UAF's Aurora Robotics team, who all participated in NASA relevant student competitions. Increased funding also means more support in developing educational opportunities in areas of strategic interest to the state like APU's and UAF's Energy courses, as well as UAF's Space Systems Engineering Program. Finally, increased funding means touching the future generation of students through the Challenger Center's "Alaska on Alert" mission and UAF's Jr. Engineering Camps.

If you would like to contribute to the Alaska Space Grant Program educational mission, please visit our website, https://spacegrant.alaska.edu/About/Support. All donations are used to provide the necessary match required by the Space Grant program before we can can spend any NASA dollars. Your donation provides funding to increase the educational opportunities of students in Alaska.

FELLOWSHIP AND SCHOLARSHIP RECIPIENTS

Fellowship Recipients

Jacob Butler (AY18-19)
Computer Science
University of Alaska Fairbanks

James Campbell (AY18-19)
Chemistry
University of Alaska Fairbanks

Angela Cook (AY18-19)
Natural Science
University of Alaska Anchorage

Hannah Crayton (AY18-19)
Computer Engineering
University of Alaska Anchorage

Julia Ditto (Summer '19)
Environmental Science
Alaska Pacific University

Scout Donahue (Summer '19)
Marine and Environmental Science
Alaska Pacific University

Isaac Hamlin (AY18-19)
Mechanical Engineering
University of Alaska Anchorage

Kodi Haughn (AY18-19)
Biology
University of Alaska Anchorage

Isabelle Jacobson (Summer '19)
Physics
University of Alaska Fairbanks

Sarah Lee (AY18-19)
Biology
University of Alaska Anchorage

Monique Mojica (AY18-19)
Mechanical Engineering
University of Alaska Anchorage

Christopher Seamount (Summer '19)
Computer Engineering
University of Alaska Fairbanks

Elija Simmons (AY18-19)
Mechanical Engineering
University of Alaska Fairbanks

Nicole Sola (AY18-19)
Electrical Engineering
University of Alaska Anchorage

Antonio Won (AY18-19)
Mechanical Engineering
University of Alaska Anchorage

Max Zaki (Summer '19)
Mechanical and Electrical Engineering
University of Alaska Anchorage

Scholarship Recipients

Jaden Anaver (AY18-19)
Biological Sciences
University of Alaska Anchorage

Rebecca Barragan (AY18-19)
Marine and Environmental Science
Alaska Pacific University

Justin Barron (AY18-19)
Aviation
University of Alaska Fairbanks

Emani Clark (AY18-19)
Mathematics
University of Alaska Fairbanks

Kiara Johson (AY18-19)
Biological Sciences
University of Alaska Anchorage

Duy Lai (AY18-19)
Civil Engineering
University of Alaska Anchorage

Daniel Manley (AY18-19)
Electrical Engineering
University of Alaska Fairbanks

Aidan Meyers (AY18-19)
Mechanical Engineering
University of Alaska Anchorage

John Omnik (AY18-19)
Civil Engineering
University of Alaska Anchorage

Marsha Smith (AY18-19)
Nursing
University of Alaska Fairbanks
Kuskokwim Campus

In'uli Toopetlook (AY18-19)
Professional Piloting
University of Alaska Fairbanks

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The Tenth Annual

Education and Research Symposium

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