

11 WAYS STUDENTS ARE CREATING THE

FUTURE

... AND HOW
YOU CAN
TOO



THE UNIVERSITY OF UTAH



STEP 1:

IMAGINE

STEP 2:

DO!

CONTENT



1.

DESIGN THINKING

Thinking like a designer is a great tool for solving-problem. Read about students who are bringing this approach to topics including sustainability and personal empowerment.

p. 6



2.

ADVOCATING

U students are taking a stand and supporting various initiatives. Take a look at a few examples in areas including criminal justice and women in science.

p. 10



3.

LAUNCHING

Many students are starting companies with the help of the Lassonde Entrepreneur Institute and other resources. Get to know a few of them who are developing interesting products.

p. 12



4.

ENGINEERING

The U has great resources for aspiring engineers. We feature a few students who are using these resources to create smart shoes, accessible docks and more.

p. 14



5.

CONSERVING

Students at the U are at the forefront of efforts to save the planet. They are monitoring air quality and algal blooms and inspiring more people to take mass transit.

p. 16



6.

HEALING

The health care industry is changing rapidly, and many U students are changing with it. They are developing devices, apps and more to bring relief and support to many people in need.

p. 18



11 Ways Students are Creating the Future (and How You Can Too)



7.

ANALYZING

Critical thinking is a vital skill. Read about some of the many students who are using critical thinking to address challenging problems like DNA testing and forecasting algorithms.

p. 20



8.

SERVING

Improving other people's lives is a great focus for any effort. In this section, we feature students helping the homeless, prisoners and those at risk of HIV.

p. 22



9.

CREATING

Creating takes many shapes and sizes. We highlight students working in artistic fields who are creating things that are making a difference in the world.

p. 24



10.

NETWORKING

Bringing people together is an important task. Read about students who are using technology to connect people across the world in unique ways.

p. 27



11.

SIMULATING

Tools for virtual interaction are booming, and students at the U are in the middle of the action. They are using these tools to innovate the way we compete and train professionals.

p. 28



PROGRAM DIRECTORY

How will you change the future? Think of an idea, then use the many programs and resources at the U to make it happen.

p. 30

ABOUT

“Student Innovation at the U” is an annual publication celebrating student innovation and impact at the University of Utah. A digital version is available at lassonde.utah.edu/studentinnovation2018. This publication is produced by the Lassonde Entrepreneur Institute, an interdisciplinary division of the David Eccles School of Business and the hub for student entrepreneurs and innovators at the U. Learn about the Lassonde Institute at lassonde.utah.edu.

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President's Message

CREATING THE FUTURE

At the University of Utah, we celebrate a culture of collaboration and innovation — with the goal of transformation. Students from all backgrounds and fields of study have the opportunity to engage in the U's vibrant innovation ecosystem, which accelerates learning through experiences that connect ideas to actions and classrooms to careers. The power of learning with and from world-renowned experts, as guides to the world of innovations and discovery, is unequalled. The university is an incubator of ideas and provides relevant — and powerful — preparation for the future. The results of students proactively exploring their passions and talents at the U are tangible evidence of what curiosity, hard work and timely guidance can accomplish.

Within this publication, you will find a sampling of how U students are making technological, social and business impacts on our society. Those featured are among hundreds of others who have embodied our motto: "Imagine. Then Do." They are diverse and from every corner of the campus; through their experiences, these students are mastering the skills needed for innovation beyond graduation.

I encourage you to explore their work and challenge you to get involved on a personal level. We look forward to what will be created when you explore the possibilities.

— Dr. Ruth Watkins



DESIGN THINKING





REDUCING TEXTILE WASTE

When Cameron Hooyer (pictured above at left) and Taylor Dickinson (right) were preparing for their senior thesis in the University of Utah's Multidisciplinary Design Program, they had no idea what they wanted to do. "I knew that both Cameron and I were raised in the mountains and deserts of Utah," Dickinson said. "We both grew up backpacking and camping on our irreplaceable public lands." So they did what they do best: they began designing and creating, taking ample breaks to play outside.

It wasn't long before a realization hit them.

"I remember sewing a backpack prototype and thinking, 'Where is this material coming from?'" Hooyer said. "Every

product we consume has a source, a starting point. This bright green ripstop nylon wasn't harvested from a tree. What's the journey textiles take from the Earth's raw materials to the bag on my back?"

The more they traced backward, the more they realized the world has a big problem: waste in production lines. Put more simply, what happens to all of that waste once production is done for the day? All the offcuts, all the rejected designs, materials, they're all thrown away or burned. That's it. Unless a company has adopted a proper recycling plan, which is highly unlikely, that "unworkable" material ends up either in the landfill or incinerated. It's one thing to burn cot-

ton or untreated organic materials, but to burn large quantities of companies' proprietary technical fabrics is a different story.

And so, like a starving college student after closing time who sees the dumpster being filled with leftover bagels, they knew they wanted in.

The result? Situ: a design consultancy that aims to reduce textile waste worldwide by creating new products for softgood companies incorporating their existing production line scrap material and factory rejects.

It works like this: companies are creating waste. It's an ironic truth that the very existence of an outdoor company is destructive to outdoor spaces. They approach these com-

panies and essentially run a private audit. Where is waste being produced, and what can be used most effectively? From there, the two simply get to be designers, creating new products for the companies. In between projects, Hooyer and Dickinson research the industry, exploring how material is produced and what ways it can be re-engineered to expand its uses.

Hooyer explained, "We get to do what we love, and what's more, we are working to protect the places we love. We're not going to singlehandedly save the world, but it's rewarding to see that every product we make is a step in the right direction."

OPEN-SOURCE BRICK- MAKING

What if you didn't need to buy building supplies? What if you could create your own? Motivated by this idea, a team of U architecture students built a machine for making your own bricks out of natural materials. The machine is based on open-source technology that can be used by anyone.

Eric Blyth, Julia Warner, Matthew Cranney and Shay Myers are the students behind the project. They share a passion for increasing access and agency in affordable housing. The project was born from casual conversations in class and grew with the help of the DesignBuild-BLUFF program and more than \$40,000 in grants from the U's Sustainability Campus Initiative Fund. "We are the type of people that are always working on projects and always looking at the bigger picture instead of the assignment," Blyth said.

So far, the team built the machine by working with Open Source Ecology, a Missouri-based initiative dedicated to creating an open-source economy. They learned how to use it and are now working to teach others so it can be used by future students. "Passing on the knowledge of how the machine works is our biggest hurdle," Blyth said.

Next, the group planned a panel discussion, which is the culmination of their work, titled, "Housing Justice as Climate Justice," for April 6, 2018. Ultimately, they hope the machine will be located in Bluff, Utah, and used by the Navajo Nation to build homes with their abundant natural resources.





3-IN-1 CAMP SOLUTION

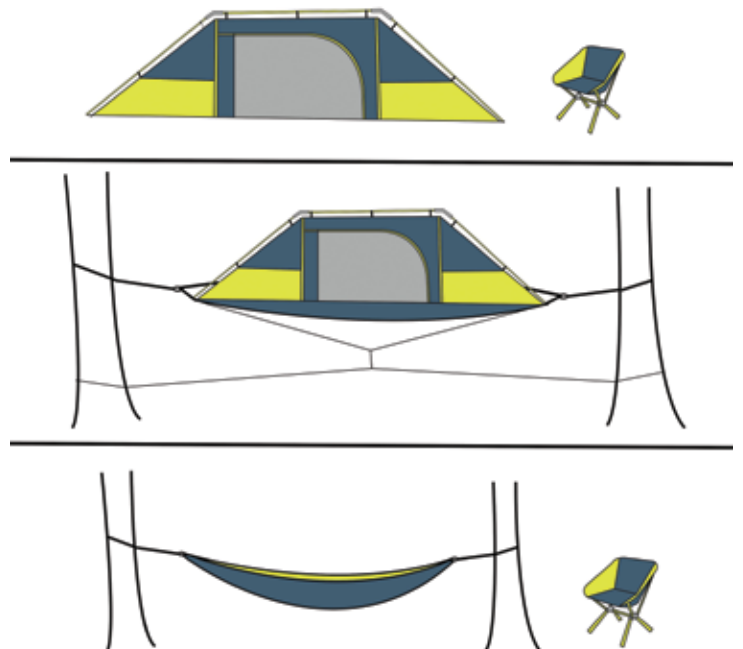
It's a chair! It's a tent! It's a hammock! No, it's Bushwhack, an all-in-one tent-chair-hammock. Designed for backpackers and hikers, this product will be whatever you need it to be, whenever you need it.

Bushwhack is the brainchild of Chase McMicken (pictured above in back center), a double major in entrepreneurship and marketing at the U. He came up with the idea while backpacking and thinking about how to improve the experience. Students Jordan Manor, Jake Rubart and Branson McKell joined the startup after they met in an entrepreneur class at the David Eccles School of Business (ENTP 1020).

"I wanted to pursue the idea before the entrepreneurship class, but it gave me a foot in the door to build a team," McMicken said. "That really pushed us forward and put us in the spot where we are now."

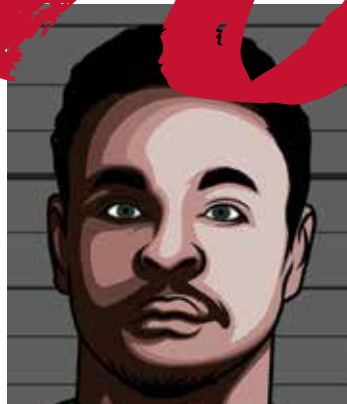
Their product is a convertible device that can be any of these combinations: a tent and a chair; a hanging tent hammock; or a traditional hammock and a chair. They are currently refining and testing their design. They have received support from the Lassonde Entrepreneur Institute, including \$2,600 in Get Seeded grants and office space.

"The ultimate goal would be an outdoor equipment company to create adaptive gear to be able to adventure without limits," McMicken said.



"The ultimate goal would be an outdoor equipment company to create adaptive gear to be able to adventure without limits."

ADVO



JUSTICE.EXE

While many believe that computer systems are the epitome of impartial, a group of students in the “When Machines Decide” Praxis Lab at the University of Utah created an app that shows that algorithms, too, can be biased.

Justice.exe is a mobile app, available for download in the App Store and Google Play, that focuses on the involvement of algorithms in the decision-making processes in the United States’ justice system. The app presents various criminal defendants with background information — such as previous convictions, age, race, education and marital status — and asks the user to determine whether the

maximum or minimum sentence is most appropriate. This process trains the computer system, which is constantly adjusting its algorithm model to predict how the user will sentence future defendants. At the end of the game, the computer makes decisions based on what the user has taught it.

This algorithm is a reflection of the real algorithms employed by justice systems across the United States, including the Utah Sentencing Commission, to make pre-sentencing decisions. The game’s intent is to educate through experience, immersing the user in a world that may have been overlooked or confusing before.

“We wanted to show how good intentions can get screwed up because of the nature of these algorithms, and the best way to do that was to put someone in the driver’s seat and watch their decisions go awry,” said Austin Anderson, a computer science student and one of the creators of the app. “You might look at a racist sentencing and think it was just the judge, or maybe a computer glitch, but when you are making these decisions, training a computer to think like you, and the computer learns the wrong things and makes harmful decisions, the impact is much more long-lasting.”

The app was almost entirely student-driven.

Professors Randy Dryer and Suresh Venkatasubramanian instructed the class for the first semester and supervised the work during the second, but in the end, it was up to the team to create and launch the application.

“Most apps out there are serving a purpose for an individual: you have a game that entertains or a task manager that helps you track your tasks every day,” said Logan Erickson, an Entertainment Arts and Engineering student who also collaborated on the app. “Our app was to serve the community, to spread a message, to communicate something that we felt was important using an immersive medium.”

AdThing

OPEN LETTER TO THE WORLD

"An open letter to the world, from the people of America." This three-minute film, produced by U students Parker Gibbons, Caroline Moreton and Sage Bennett in partnership with the Refugee and Immigrant Center of Utah, has been viewed over 1,100 times and featured by the Huffington Post. The film's goal was to express that "America is a country which was built on the backs of immigrants, and we are open to always accepting new people here," Gibbons said. To emphasize this, the film includes diverse members of the community who all share a

common vision of inclusion and acceptance.

Gibbons, a junior studying multidisciplinary design, is director of production at AdThing, an experiential and collaborative marketing lab "staffed by students and run by pros." He, alongside Moreton, a senior studying advertising and AdThing creative director, thought up the concept for the passion-project film on immigration following the Trump administration's ban on Muslim immigrants. Bennett, a junior studying film and media arts and lead film producer, worked on cinematography and



sound for the film.

Bill Oakley, executive director of AdThing, noted that his student staff had elicited a "new and refreshing sense of (social

justice) obligation in the industry." In the future, the team plans to produce additional social-justice-related films.

STEM CLOTHING FOR GIRLS

After noticing a huge gap in clothing for young girls, Hillary Whitaker, a University of Utah accounting student, started Curie Wear in 2016, a company that designs custom fabrics focused on STEM. They keep their clothing designs feminine for young girls. As Whitaker said, "It is important to emphasize femininity and let girls know it is important and special to be a girl while still loving bugs and astronauts."

Whitaker was inspired by Marie Curie, the first female to win two Nobel Prizes in different fields — one in chemistry and one in physics. Whitaker wants to help young girls follow in Curie's footsteps by finding an interest in a STEM subject while still focusing on being feminine.

When Whitaker's daughter was born, she and her husband were looking for clothes with dinosaurs and rocketships on them and didn't have any luck. This is when Whitaker decided to design her own fabric. She now has custom fabrics like the constellations and the periodic table, and of course, dinosaurs and rocketships.

Whitaker is passionate about women in STEM. She said, "I am hugely biased because I want my daughter to be a rocket scientist. I want her to feel comfortable being who she is. If she loves dinosaurs then I want her to wear dinosaurs, but I don't want her to be called a boy."

You can find Curie Wear on Etsy at [etsy.com/shop/CurieWear](https://www.etsy.com/shop/CurieWear).





BOUNDARY BACKPACKS

In the fall of 2015, Cavin Nicholson (pictured) returned to the University of Utah after a seven-year break that began with the start of his first company, Coalatree Organics. After years developing the outdoor apparel company, Nicholson sold his share of the company and decided he wanted a deeper education before starting up his next venture. Upon returning to the U, Nicholson took courses in entrepreneurship, accounting and statistics and got involved with the Lasonde Entrepreneur Institute at the new Lasonde Studios. What started out as a “quest for a piece of paper” turned into a rich experience. “It helped me fine-tune and develop skills I was lacking to be as successful as I wanted to be in my first venture,” he said.

At the U, Nicholson worked with students in the engineering, theater, I.T., statistics and marketing depart-

ments to bring his new dream to life — Boundary, a company dedicated to creating technically innovative and sustainable products. The company is developing backpacks and similar products that have a modular construction, allowing them to be customized on-the-go.

“It was inspiring to surround myself with students who were passionate, educated and had more knowledge than the factories I was working with,” he said. “I got to know the students around me and constantly bounced ideas around because the environment at the U pushes students to develop, prototype and test new ideas. It was key to launching Boundary.”

The facilities at the Lasonde Institute helped Nicholson develop samples “in-house” and sped up the prototyping and testing phase of Boundary’s project. After 17 months



of exploring the university’s fabric selection, laser cutting magnetic buckles and working with students, Nicholson’s dream was brought to a reality through crowdfunding. In summer 2017, he raised more than \$1 million in funding for his innovative, modular Prima Pack and is continuing to gain momentum.

LAUNCH

COLOCLEAN PREP KIT

An estimated 22.4 million colonoscopies are performed in the United States each year. To perform an effective colonoscopy, the patient's colon must be cleared of any organic material. However, according to biomedical engineering freshman Tobin Yoon (pictured), that isn't always the case.

"Twenty-five percent of those patients don't complete their prep or show up to their operation with organic material in their colon," Yoon said. "Colonoscopies are a visual process — the gastroenterologist inserts a camera into the rectum and looks for polyps, which are precancerous nodes. If they can't see those polyps because they're blocked by organic material, they could poten-

tially miss colon cancer."

Yoon's interest in solving this problem was sparked while in high school, working at a local hospital under a gastroenterologist.

There are many reasons why patients don't complete the standard prep for a colonoscopy, which includes abstaining from food for one to two days. For one, the patient is required to consume Miralax and 64 ounces of Gatorade in intervals, which makes many patients incredibly nauseous, sometimes to the point of vomiting, which forces the process to start again. The prep can also be overwhelming, leading patients to ignore or forget the instructions and videos. But, more often than not, patients just get hungry

and eat whatever they want. ColoClean is the solution.

"ColoClean itself is a trifecta of solutions to combat these three issues," Yoon said. "It's an all-in-one kit that combats the nausea, the forgetfulness and the hunger."

ColoClean is a colonoscopy prep kit that comes with anti-nausea medication, Miralax-type powder that has been condensed into pills and a colonoscopy friendly cookbook. The pills contain a different active ingredient, magnesium citrate, which necessitates less laxative to be consumed.

"The end goal is almost like Blue Apron, but for colonoscopy prep, where you'll receive this meal plan, like TV dinners that



you can consume and stay satisfied while perpetuating your prep," Yoon said. "Ultimately, the goal of ColoClean is to increase patient compliance."

IMPROVING ACCESSIBILITY

The Americans with Disabilities Act (ADA) was enacted in 1990 to protect those who are not able-bodied from various forms of discrimination. Some 27 years have passed since the ADA civil rights legislation was signed into law, yet there continue to be frequent building, pathway and parking violations that prevent equality for individuals who are physically disabled in some way.

Grant Acosta (pictured) is working to solve this problem. As a graduate student at the U pursuing a master's of information sciences and graduate certificate of business analytics at the David Eccles School of Business, he was working his way through college as a bartender when he met Ron Johnson, a certified ADA

inspection specialist and owner of ADA Inspection Plus LLC.

Johnson later asked Acosta about geotagging, leading to a serendipitous partnership that evolved into a formal business partnership when the duo formed ADA Mobile Assessment Systems (ADAMAS) in May 2016 and applied to the Company Launch space at Lassonde Studios.

Their interest in creating lasting impact in the community through the use of geotagging technology made Acosta a perfect match for Johnson's idea of creating "a device that a trained person can actually use and collect the data" with for ADA property evaluation.

With the integration of geolocation information systems software



with a unique internal instrumentation device, the mobile assessment prototype is expected to make these sorts of evaluations much faster, more accurate and cost-efficient.

SHINE

ACCESSIBLE DOCK

A graduate student in mechanical engineering at the U, Nicolas Brown is the leading member of a team that is improving the lives of people with spinal cord injuries by creating a dock to help them participate in water activities.

Jeffrey Rosenbluth, medical director of the Spinal Cord Injury Acute Rehabilitation program, hosts camps for people with spinal-cord injuries, and every summer the camp does a boating excursion. Brown and Rosenbluth observed how risky it could be to transfer from a wheelchair to a boat on a sandy, uneven, unshaded beach.

They proposed the problem to the Department of Mechanical Engineering Ergonomics and Safety Laboratory, headed by Andrew Merryweather. Merryweather enlisted the help of 125 first-year engineer-

ing students to develop conceptual solutions to this problem. The top 10 ideas were turned over to Brown for development. After 18 months of research and development, the Portable Accessible Dock (PAD) was manufactured.

While being transported, the PAD looks similar to a 30-foot box trailer on pontoons. On the lake, the sides of the PAD open up to become a shaded, stable, flat structure with mechanical systems needed to better facilitate wheelchair-to-watercraft transfers. These systems include modification of a personal watercraft lift, to bring boater and boat out of the water and onto the dock, and a ramp-and-winch system that pulls an 18-foot sailboat out of the water and onto the dock.

"Nobody told me I couldn't put a storage trailer on a pontoon boat,



so I went ahead and did it," Brown said. "People questioned it, but it worked," he said. With his development, a transfer that once took 45 minutes now takes 15 minutes and is much safer.

The PADS project is still being developed and will officially launch in summer 2018. The team continues to work on this project to make the device more safe for the patients.

ENGINEERING

SCRAP-METAL SORTING

Jake Salgado (pictured), a senior metallurgical engineering student, works full-time in professor Raj Rajamani's development lab. Salgado and Rajamani are working on an automatic, scrap-metal sorting machine. When asked his role on the team, Salgado replied, "I am an engineer at heart. I like to build things. I identify what we are doing in the processing of metal and make it better by any means."

Salgado made changes to the technological design and processes to reduce cost and increase efficiency. He designed two key components that reduced costs by two-thirds and cut production time from two weeks to eight hours.

While maintaining the same geometrical design that the team decided on, Salgado designed a new way to produce the magnet for the inner core of the machine. Rather than using nine magnets, he used 18 rectangular pillars and three pyramid shapes. As a result, this increased consistency and reproducibility of the process.

Salgado also designed a 3-D printed shape that would feed metal into the magnetic field. Before Salgado's design, the process required something strong to guide the metal into the machine. Unless it was being sorted, there could not be anything metallic next to the magnetic field, so they could not use any-



thing metal as the guide. Through Salgado's contributions, the team was able to advance their technology to achieve alloy metal sorting on a large scale.

"We will have the ability to greatly influence current scrap recycling markets

and possibly create new markets with the expanded capabilities of this exciting, new technology," he said.



For people suffering from Parkinson's disease, walking can be increasingly difficult as the disease progresses. More than one million Americans live with Parkinson's disease and suffer a significantly higher risk of falling than other populations. Roboticist and physical therapists at the University of Utah, however, have teamed up to develop a gait therapy using the latest virtual reality (VR) and wearable technology for enriched and realistic experience.

Yue Wang (pictured at right), a mechanical engineering Ph.D. student at the U, led the effort in developing a soft robotic Smart Shoe for an augmenting sensation of virtual terrain in VR. This Smart Shoe is the core device in the VR gait-training system and the center of Wang's Ph.D. The shoe uses a controlled, durable passive bladder system that allows the sole to deform when stepped on. The embedded miniature valves open and close accordingly to deflate specific bladders for rendering desired terrain features when the user interacts with the virtual world. After years of research

and development, the latest version of the Smart Shoe has been optimized in performance and durability. In fact, when the team tested the new reinforced prototype with a robotic foot, it faltered against the strength of the shoe.

VR has been applied to military and surgical training, as well as interactive gaming, but rehabilitation with terrain rendering had very little research behind it. With the Smart Shoe, users feel as though they are walking on uneven and difficult terrain, all while remaining on a treadmill in a safe and comfortable environment.

"We are making every aspect of our VR system much bigger and better than existing systems: the Smart Shoe is the first fully functional and durable footwear for VR gait training," Wang said. "Our goal is to apply the Smart Shoe in our VR system to render challenging terrain features so that Parkinson's disease subjects can practice walking on difficult terrain without worrying about falling. We hope they can regain their normal walking capability to live a

regular life again."

This new technology can do more beyond gait training. Elderly individuals or those who struggle with balance also can benefit from wearing a Smart Shoe as an assistive device. The sole of the shoe can adjust to compensate for uneven terrain that would have previously knocked the wearer off their feet.

So far, Smart Shoe has been tested on healthy individuals but will start testing with Parkinson's patients in the next month, made possible through a partnership with the physical therapy department at the U.



MONITORING ALGAL BLOOMS

A graduate student trio from three disciplines is collaborating to develop a high-resolution, low-cost spectral imaging drone to measure urban impact on water resources.

"Urban influences play a huge role in water quality," said Carly Hansen (pictured at far right), a civil engineer about to deliver her dissertation on Utah's water quality.

Hansen met Casey Duncan (a geology student, pictured at right) and Sam Chesebrough (a robotics and mechanical engineering student) at the 2017 Global Change and Sustainability Center (GCSC) Symposium. Their radio-controlled, foam-and-glue plane prompted Hansen to apply for a small GCSC research grant to cover the cost of a drone,

Raspberry Pi computers and cameras. Duncan and Chesebrough's original plane was designed for mapping minerals, but Hansen saw potential for tracking algal blooms and water quality.

The challenge of building a low-cost alternative has fostered collaboration, Duncan said. Hansen had the idea for a water quality application, Duncan

designed hardware and drone modifications, and Chesebrough configured cameras and computers.

"With satellites, getting imagery data is like getting a letter," said Chesebrough. "With the drone, it's like getting Tweets." They hope their work will make this technology feasible for researchers constrained by tight budgets.

"With satellites, getting imagery data is like getting a letter.
With the drone, it's like getting Tweets."

CONVSE

TRACKING AIR QUALITY

Kyle Tingey, a computer engineer passionate about innovation, has been instrumental in the design, development and integration of a "hyperlocal" air-quality monitoring solution for the Air Quality & U project (aqandu.org).

As entrepreneurial lead selected by the U's Technology and Venture Commercialization program, which helps commercialize new technologies developed at the U, Tingey's Lean Canvas cohort also helped launch Tetrad Sensor Network Solutions, LLC.

There's currently no air-quality sensing solution for particulate matter that's geolocated and time relevant, said Tingey, who specializes in building devices and computer systems to serve a single purpose.

Tingey's efforts helped reduce sensor cost from thousands of dollars to hundreds. Similar sensors cost \$5,000, Tingey said, whereas his team's air quality sensors are only \$250. AirU sensors can be calibrated remotely to identify particulate matter and air pollutants such as carbon monoxide, or variations in temperature, humidity, ambient light, etc.

Tetrad already has sold 125 sensors to an asthma researcher at the Department of Pediatrics with plans to reach more complex markets with new sensing technologies over the next five years. "These sensors are networked and geolocated for manufacturability, so they can be deployed cheaply to achieve a more granular picture," Tingey said.





DRIVING

CLEANER TRANSPORTATION

At the age of 16, Sam Hirsch (pictured) became a social entrepreneur when he founded CleanFare — a mobile app that gives points to people using clean transportation by walking, biking and taking the train or bus. The app allows users to log in and get points and achievement awards as it tracks their mileage of clean transportation. These points will then get the user coupons and discounts to local businesses.

He has since won multiple awards and recognition for his project, including a \$5,000 grand prize and a

\$1,000 scholarship in the Lassonde Entrepreneur Institute's High School Utah Entrepreneur Challenge at the U. He is now living and working at Lassonde Studios as a first-year student in computer engineering at the U.

Hirsch said, "The key to making an entrepreneurial venture successful is to be passionate about your project and its impact. If you care deeply about what you're doing, you'll be able to work through hardships, your passion will inspire others to care about your idea, and most importantly, you'll be will-



ing to do whatever it takes to make your idea work. You don't necessarily have to be extremely talented as long as you have that

determination to succeed."

Learn more about CleanFare at cleanfareapp.com.

HEAL

GNASH, BZZZT

If you suffer from bruxism, you know the symptoms. Gnashing and grinding your teeth in your sleep causes sensitivity and teeth to flatten and chip. The standard of care for this condition is to just treat the symptoms — aspirin for the pain, a teeth guard for the tooth damage.

That is, until now.



A team of U students is developing a solution that could not only prevent the symptoms but also train people to stop grinding their teeth. Their startup company is called Bruxit.

Their solution is a mouth guard embedded with a circuit board, sensors and a vibrator. They are still refining the device, but they have a working prototype. When the person wearing it grinds their teeth, the device vibrates. In theory, it will wake them up, and over time, they will learn to not grind their teeth.

The team behind the device is interdisciplinary. It consists of Travis Neuberger (pictured), a bio-engineering Ph.D. student; David Williams, an MBA student at Stanford with a master's in bioengineering from the U; William Eccles, an MBA student at the U with a master's in bioengineering; Parker Ence, an MBA student at Stanford;

and faculty advisor John Langell, a surgeon and director of the U's Center for Medical Innovation.

The students started working on the project after Langell presented them with the concept of developing a therapeutic device for treating bruxism. Initially, it was Neuberger and Williams working on the project. Then they brought on Eccles and Ence.

"Since we created the first circuit board we have been focused on scaling it down to make it possible to be put into the mouth," Neuberger said.

They have come a long way since the beginning. What started as a proof of concept is now a scaled-down, working device. The team entered the idea into Bench to Bedside, a medical innovation competition at the U, in 2017 and again in 2018. They also have received a \$1,500 Get Seeded grant from the

Lassonde Entrepreneur Institute and placed in the top-10 in the U's Opportunity Quest Competition in 2018.

"We felt good as a team and built solid friendships, and we wanted to keep working together," Neuberger said.

Now, the team is working toward a clinical trial to show that the device can train people to stop grinding their teeth. Then, they hope to start selling the device and eventually add features like Bluetooth connectivity and an app to record the frequency and pressure of the grinding.

"Within six months, we hope to have data that tells us how well the device works, and we're hoping that it's positive," Neuberger said. "Then we plan to talk to venture capitalists and start to generate funding."

ING

EXPONENTIALLY POSITIVE

Watching positive videos helped fourth-year dental student Alex Piedra (pictured) stay motivated for exams, which gave him an idea. Frustrated with a lack of cutting-edge technology in mental health, he asked himself, "Why isn't there an app that only gives positive feedback?"

With support from faculty at the School of Dentistry, Piedra helped create MoodPal, a "mental wellness social media app" that relieves stress by allowing users to keep in touch only with those closest to them, instead of the usual thousands of "friends" on a normal social media account.

On his way to becoming a pediatric dentist, Piedra frequently works with children. "I realized I

had an opportunity to inspire and give them confidence," Piedra said.

MoodPal won the \$5,000 prize for Best in Entertainment Arts and Engineering at the 2017 Bench to Bedside (B2B) competition, a showcase of new devices and apps designed to improve medicine. Alexander Au and Surabhi Kasera led the B2B team; Mark Van der Merwe and Tarun Sunkaraneni coded the app; and Kathy Tran, U alum and multidisciplinary artist, did the design.

"When people click a meme, smiles light up," Piedra said. "Those positive moments can exponentially affect them for the rest of the day."



"When people click a meme, smiles light up. Those positive moments can exponentially affect them for the rest of the day."

SIMULATIONS OF THE HEART

As his senior research project, bioengineering student Stuart Loertscher (pictured) is fixing problems of the heart with Lucas Timmins, the principal investigator at the Cardiovascular Pathomechanics Laboratory, a multidisciplinary group of researchers studying the role of biomechanics in cardiovascular disease.

Using FEBio, a finite-element modeling software developed by the University of Utah's Scientific Computing and Imaging Institute and Department of Bioengineering, Loertscher is among the first

to begin researching ways to simulate arteries around the heart. Plaque accumulation on artery walls restricts blood flow to the heart and can rupture, leading to a heart attack.

"The problem is complicated," said Loertscher, an Undergraduate Research Opportunities Program student leader. "The heart isn't simple. Trying to understand all those complexities makes it hard to create a model to mimic what the heart is doing."

Eventually, Loertscher's project could become the new way to predict which plaques are more prone to



rupture so that physicians can intervene prior to a fatal event. "The software was developed here, and it has so many potential

applications in biology," Loertscher said. "Saving lives is every bioengineer's dream."

TRACKING VIRUS MUTATION

When the opportunity came to use new DNA sequencing technology, Thomas Sasani (pictured), a graduate student in the Department of Human Genetics, stepped up to the challenge.

The traditional approach to sequencing DNA can be a very laborious process. Researchers extract DNA, cut it into tiny fragments and read each tiny piece, slowly attempting to put together an inconceivable puzzle. The new device, developed by Oxford Nanopore Technologies, only has been adapted by a few institutions and allows researchers to read much longer strands of DNA and disentangle the more confusing sections of the genome.

"There are a number of devas-

tating diseases and disorders that are caused by large, structural changes to the genome," Sasani said. "There's a significant chunk of the human genome that we don't really understand yet, and using this system, we can try and put the pieces together and map these complex situations."

So far, Sasani has successfully used the system to do trailblazing research tracking viruses to identify how and when they are able to duplicate or modify their genome to more effectively infect hosts. Clinicians may be able to use the nanopore platform to better understand disease and prescribe antibiotics, and researchers can develop a firmer grasp on DNA and RNA biology.



PREDICTING ENERGY USE

Buildings consume huge amounts of energy, and as they become more wired and connected, it's increasingly important to be able to predict how much energy they will use and when. Aowabin Rahman (pictured), a Ph.D. student in mechanical engineering, is helping solve this problem by using machine learning.

"We are creating a model that can adapt itself based on the patterns of electricity use it sees in past data and predict what happens in the future," Rahman said.

He is working with

Amanda Smith, a mechanical engineering professor, and Vivek Srikumar, a computer professor at the U. They have published several papers on the topic and tested their model on buildings in Salt Lake City. Their results show that their model is accurate at predicting energy use on an hourly basis more than a week into the future.

Machine learning algorithms are needed because of the complexities involved with predicting future energy use. There are many variables, ranging from doors opening to weather patterns,



and some variables are impossible to track. Rahman's algorithm is able to overcome these challenges and provide valuable in-

sights. "My model creates surrogates that show these variables without having that data," he said.

ANALYSIS

HIGH-SPEED DNA COLLECTION

Labs across campus and the world study zebrafish, a freshwater fish that can be found at pet stores, to learn more about genetics and human disease. Strange as it seems, fish and humans have very similar development cycles, especially in the early stages of development.

Current research involves studying and understanding the development of zebrafish embryos and applying this knowledge to human biology and disease. This research often requires extracting DNA samples from the fish. To extract DNA from a human patient, researchers would draw blood, or take a hair or skin sample. Due to the size of human beings, removing a sufficient sample is relatively easy. In contrast, retrieving DNA samples from such tiny fish is rather difficult. This is especially the case when attempting to collect DNA samples from zebrafish embryos, which are only a few millimeters in length.

In response to challenges of collecting DNA, Chris Lambert (pictured), a graduate student in mechanical engineering, and his team are developing an automated zebrafish DNA collection system. This new system allows researchers to collect DNA samples from live zebrafish embryos at almost 100 fish an hour. The instrument is currently being tested in several labs across the world and is projected to be for sale in spring 2018.

"Our aim was to develop a tool that would streamline the way DNA samples were collected from zebrafish by increasing throughput while maintaining fish wellbeing," Lambert said. "We also aimed to enable research that was previously not feasible with existing equipment. Our instrument appears to have accomplished this."

WINNING



RECYCLED MATS

In August, 2017, Kaitlin McLean's mom sent her a Facebook video about crocheting plastic yarn. McLean (pictured below at right) had been avoiding her mom's hobby for years, but after reading an article about the number of deaths in Salt Lake City every winter due to cold temperatures, she thought she'd try it out. That month, McLean began crocheting plastic yarn into sleeping mats.

"I started working on my own mat just with the bags I got from shopping, and in about a foot into my own mat, I knew I wanted to make it a lot bigger," McLean said. "I realized that if I taught two other people, then we would have triple the impact: three mats instead of one. I decided I'd teach my friends and see how it went."

Balancing degrees in biomedical physics and psychology, McLean

introduced the mat idea to the Lowell Bennion Community Service Center, and they jumped on it. That day, they set up a collection bin for plastic bags in the building, and a week later, the U's athletic department connected with Kaitlin. She taught more than 50 athletes how to cut up the bags into plastic yarn and weave it into mats. Since then, the organization has boomed into a non-profit with a board of four students and a faculty advisor.

The organization hosts events at the Bennion Center on occasion, but mostly, McLean said, groups contact her to teach them how to make mats. She's worked with Fit to Recover, Maud's Cafe and several University of Utah departments to crochet these mats.

"Making sleeping mats out of plastic bags is not an original idea, but making a non-profit out of it and a long-term, sustained goal in the valley has never been done before," McLean said. "It's all about increasing impact for me. I want the valley to realize that we as students care, and while we don't have money to give we do have time and plastic bags. I think this is a great way for people to be exposed to community service in a way that is approachable from a lot of different angles."

As of February 2018, the effort had completed four mats and have 25 in progress. McLean hopes to have 100 done by next winter and to drop them off all at once at the homeless shelters downtown.



INNOVATION

PRISON LITERACY PROGRAM

Roots is a student startup that wants to teach literacy to inmates by using music.

"Reading is such an important skill to have in the modern world, and more than 60 percent of inmates cannot read above a fourth-grade reading level," said Brendan Cody, a student and company founder. "Roots is trying to change that number and believes that people in incarceration will be less likely to go back with this new skill."

Other Roots team include Hakan Ashaboglu, Mauricio Guerrero, Ryan Belnap and Camile van Ginkel.

The students won first place at the fall ENTP 1020 Bootcamp hosted by the Department of Entrepre-

neurship & Strategy at the U's David Eccles School of Business.

Fifteen teams and about 80 students competed in the Bootcamp while enrolled in the same entrepreneurship class. Teams from Chile and France also competed virtually in the competition, making this the program's first global competition.

For winning, the Roots team was admitted into the Lasonde Entrepreneur Institute's Company Launch program, where they will receive expert advice and peer mentoring.

Roots strives to keep people from going back to prison. They are doing this through education, specifically literacy. The team has been developing a curriculum that uses known



tactics infused with music. Music is the way that they attempt to bridge the socioeconomic gap between teachers and students, while leveraging the proven power of rhythm, rhyme and repetition.

"We plan to push our idea forward and help our

intended market," Cody said. "First, we are developing our curriculum and going to do some research to make sure it works the way I intend it to. Following that we are going to be looking for volunteers to help turn this dream into a reality."

HIV PREVENTION CLINIC

Utah is home to one of the nation's few free PrEP (pre-exposure prophylaxis) clinics, thanks to Jorgen Madsen (pictured), who came out during his first year at the U's School of Medicine thinking he might never date openly as a medical student or be accepted as a gay physician.

Any at-risk Utahn can now access the PrEP medication, shown to be 90 percent effective at preventing HIV.

Wanting improved relations between the LGBT community and health care providers, Madsen brainstormed with Adam Spivak, an infectious diseases physician and researcher at the School of Medicine.

"People shouldn't have to seek out a gay friendly clinic or doctor, regardless of where they go or who they see," Madsen said.

Collaborating with Susana Keeshin, an assistant professor of pediatrics and HIV specialist, and nursing student Ben Holdaway, they worked to come up with the idea for a clinic to bypass traditional health systems of insurance approvals and doctor referrals.

"Our community is small enough we can actually show there will be a decrease in HIV prevalence, whereas Atlanta and New York, with so much efflux and influx into the city, can't," Madsen said.



CREA



PAINTING FOR CLEANER AIR

When Casey Clifford (pictured), a graduate student in environmental humanities, moved from the San Francisco Bay area to Salt Lake City, she didn't expect that air quality would be an issue.

"The mountains are much taller, and it traps all the pollution," Clifford said.

With the mentorship of Professor Valerie Kim Martinez, Clifford created three original, 3.5-by-4-foot art pieces that communicate the impact that poor air quality has on

the human lungs, heart and brain.

Clifford uses oil paints, mixed with a wax-like medium and scrapes with a pallet knife to give a rough effect. The protest art is designed to inspire dialogue and promote awareness of Utah's air quality.

"It's not given an appropriate sense of urgency," Clifford said.

Her work will be converted into more simplistic designs that can be screen printed onto patches and banners and distributed for clean air quality rallies.



HEALING THROUGH DANCE

During the first six months into her intensive dance training as a freshman, Jessica Baynes (pictured) suffered a traumatic brain injury. “I slipped on both feet forward, fell backward,” she said. “I underwent rehab. I went through speech therapy, I couldn’t exercise.”

Eager to dance nonetheless, Baynes discovered adaptive dance therapy through “Grey Matters: A Dance for Parkinson’s,” taught by former University of Utah dancer instructors Juan Carlos Claudio and Lennie Swenson Harris.

Her volunteering for “Grey Matters” led to a full-time teaching opportunity through “Healing in Motion,” which Baynes currently teaches at the L.S. Skaggs Patient Wellness Center at the U. “The class combines my dance experience and my experi-



ence as a physical therapist aid in a rehabilitative environment,” Baynes said. “It’s rehabilitation through dance. Participants are doing their PT exercises without knowing it.”

Baynes’s students enroll

in a typical ballet barre class, adapted for their physical therapy needs. The exercises — which include physical therapy exercise through adaptive dance moves — culminate in a dance recital at the

end of the program.

“One of my students said she never thought she’d get that far,” Baynes said. “I was honored to provide a platform for her to do that.”

BRIDGING CULTURES WITH MUSIC

While on a family trip to Hawaii, Christopher Bradford (pictured), a sociology and percussion performance major, discovered crystal singing bowls, musical instruments typified in many Eastern spiritual traditions to promote healing that, when struck, make a pleasant, traveling ringing sound.

After talking with the shop owner, Bradford learned that the leading manufacture of crystal singing bowls was in Utah. “We had to go all the way to Hawaii to discover that these singing bowls were not even a two-minute drive from our house in Holladay,” Bradford said. “It’s kind of amazing that it happened to be right there.”

Inspired by his father and art director of the Utah Chamber Artists, Bradford wrote “Bridges,”

which was performed at Salt Lake City’s Cathedral of the Madeleine and performed by the Utah Chamber Choir.

Bradford tested thousands of singing bowls. “We’d go to the shop (as a team) and find the particular pitches we were after. Most of them were not true pitch.”

The end result was dedicated to their late grandmother Dorothy Bradford, who passed away in December 2016 and who Bradford believes was a bridge-maker.

“She (my grandmother) was LDS,” Bradford said. “There was an issue with (gay) family members coming out, and she was amazing, and she reached out, and she attempted to re-evaluate and be open minded.”



NETWORKING

THE AIRBNB OF STORAGE

All of us are familiar with peer-to-peer marketplaces like Uber and Airbnb. These disruptive companies are changing the way we get around and travel. A University of Utah alum is now working to disrupt the way you use storage. Neiybor, considered the “Airbnb of Storage,” is an online marketplace that connects hosts with extra space in their home to renters in need of storage. Just like other peer-to-peer marketplaces have done in their own markets, Neiybor is attempting to break into the \$38 billion storage industry.

Colton Gardner, who

majoring in finance, co-founded Neiybor while at the U in 2016. His cofounder and BYU alum, Preston Alder, came up with the idea of Neiybor when trying to find cheap storage space for his possessions during a summer internship. After driving two hours to store his items in a family friend’s garage, he thought there must be empty garages closer to him that he could store in — and thus, Neiybor was born.

Gardner and Alder teamed up and utilized many of the Lassonde Entrepreneur Institute’s resources to help them



get started. “Hours with Experts, Get Seeded, Opportunity Quest and the Utah Entrepreneur Challenge were crucial to Neiybor’s success,” Gard-

ner said. “Nearly \$8,000 in grants from Get Seeded and Opportunity Quest allowed us to validate our business model and build a beta website.”

A VIRTUAL BUSINESS CARD

The Index app, created by University of Utah students, in essence is a virtual business card. It puts all of your contact information — including social media accounts — into one spot. Not only that, but it also creates a QR code containing all of that information so that it can easily be scanned by another Index user instead of having to enter it manually.

“We hope to simplify the process of exchanging contact info,” said Taren Rohovit (pictured), Index CEO, U student and resident at Lassonde Studios.

The app allows full customizability, allowing users to pick and choose which social media accounts they want to share with who. This eliminates the struggle of having to individually add

someone’s phone number, email, Snapchat, Twitter, Instagram, Facebook, etc. by providing a simple one-button solution.

The Index team is comprised of three members, all students at the University of Utah. Rohovit is pursuing a major in cognitive psychology. Mathew Beseris, CTO, and Jackson Leach are both computer science students and leading the software development.

“If I wasn’t living at Lassonde Studios I never would have even considered attempting a startup company,” Rohovit said.

The app is available now by searching for “Index connect” on the Apple app store. The Android version is coming soon.

Learn more at indextheapp.com.





LEVEL UP: ESPORTS

Utah Esports competed in four well-known online video games during the past year, including “Rocket League,” “League of Legends,” “Overwatch” and “Hearthstone.” Around the world, people of all ages compete in tournaments featuring high-profile video games for thousands of dollars in prize money. Aside from prize money, students on the team receive a \$1,000 scholarship for playing video games competitively.

The U was the first school in the Power 5 Conference to establish an Esports team. The team was unveiled in 2017, and nearly 200 students tried out for a spot. Thirty-three students from many majors were selected to play video games together competitively. Esports are multi-player video competitions, generally played online rather than in-person, that feature professional players. Many of the team members have been playing their games of choice for years and were ready to step up to the plate with the new team.

“What makes this group so great

is that we’re more or less the same. We laugh at the same things, make fun of the same things, and have one goal in mind: win,” said Joshua Shieh, a biology/chemistry student and one of the teammates. “Since we acknowledge that we’re all at the top, there’s a level of trust that we’ve built, and that has made our practices and hangouts more lively and fun.”

To compete, students must be full-time and maintain a GPA of 2.5 or above.

“Esports is massive at both a global and national level. In fact, the League of Legends World Championship gathers more viewers than the NBA finals, and giant corporations are sponsoring teams,” said Joshua Shieh, another teammate. “Honestly, this level is something I never would’ve thought possible. Esports isn’t well known on a local stage, at least in Utah. I believe the creation of this team in a Power 5 Conference is a stone’s thrown into a lake, a move that will cause ripples in this ‘movement.’”



During last year’s tournaments, the U came close to the grand prize: the team traveled all the way to the Top 8 nationally. This year, Utah Esports is prepared to play better than ever.

“I’ve been a part of this gaming community as a player for three years,” said Alex Zhu, an economics student and another team member. “To see Utah Esports come to fruition and for us to be recognized at this level is very satisfying.”

SIN



VIRTUAL SOCIAL WORK TOOLS

Imagine walking into an unfamiliar home to assess risks and protective factors for child abuse. Now, imagine doing this without ever leaving your desk.

Chad McDonald (pictured), a Ph.D. candidate and faculty in the College of Social Work, developed this idea while trying to improve training for undergraduate students and employees at the Division of Child and Family Services, where he has worked as a trainer and administrator for many years. McDonald is leading a team of researchers who are focusing on workforce development within child

welfare, which has led to the creation of a virtual reality photography-based learning tool known as the Virtual Home Simulator (VHS).

McDonald and colleagues collaborated with students and experts from the U's Therapeutic Games and Apps (GApp) Lab, to produce this state-of-the-art VR training and simulation tool. With the first prototype completed, pilot testing with undergraduate students is the next step. The team also will compare increases in student skill levels against experts to assess the tool's effectiveness. Future develop-



ment plans include core casework skills such as engaging, teaming, planning, court-room etiquette, and documentation. "The goal is to focus on the key

competencies that are expected of a child welfare worker," McDonald said.

MULATING

START

PROGRAM DIRECTORY

ArtsBridge: An interdisciplinary arts education outreach program. artsbridge.utah.edu

ArtsForce: A two-day conference for art students to learn about how to share their creative work. artsforceutah.com

Arts Entrepreneur: Connect with your peers, learn the value of your skills and explore connections between the arts and entrepreneurship. lassonde.utah.edu/art

Bench-2-Bedside: A competition for medical, engineering and business students to collaborate to develop or improve a medical device. bit.ly/UUb2b

bioDesign: Teams of engineering students work with clinicians to develop prototypes and test medical devices. biodesign.utah.edu

bioInnovate: Graduate program providing a comprehensive biomedical, device-design training program. bioinnovate.utah.edu

bioWorld: A two-semester course enabling students to develop a business plan for a medical-device in a developing country. bioworld.utah.edu

BlockU Program: Take full advantage of your time at the U by enrolling in courses organized thematically to maximize your learning. blocku.utah.edu

Business Scholars: An experiential program for high-achieving students offered by the David Eccles School of Business. eccles.utah.edu/scholars

Center for Innovation in Banking and Financial Services: Help innovate financial services, guide regulatory issues, and examine and support the deployment of new financial products and services. lassonde.utah.edu/cibfs

Center for Research on Migration and Refugee Integration: Students connect as refugees, immigrants or volunteers. CRMRI encourages research, academics and outreach. bit.ly/uucrmri

Company Launch: Apply for dedicated space at Lassonde Studios through the Company Launch program. lassonde.utah.edu/launch

Cowork: Take advantage of the many opportunities and areas in Lassonde Studios to work together and collaborate. lassonde.utah.edu/cowork

Designbuildbluff: A year-long program for graduate students in architecture who design and build homes in southern Utah. designbuildbluff.org

Campus Founders Fund: Apply for an investment from this unique fund or apply to be a student leader. campusfounders.com

Entertainment Arts & Engineering: Interdisciplinary program where students design and develop video games. eae.utah.edu

Entrepreneur Certificate: The David Eccles School of Business offers an undergraduate Interdisciplinary Certificate in Entrepreneurship. eccles.utah.edu/entp

Food Entrepreneur: Learn about food entrepreneurship, test your recipes in the Miller Cafe and more. lassonde.utah.edu/food

Foundry at the Lassonde Entrepreneur Institute: An experience-based educational community where entrepreneurs can act on their business ideas and access resources to help. lassonde.utah.edu/foundry

The Gapp Lab: A student game-development center for health-related video games and apps. eae.utah.edu/the-gapp-lab

Get Seeded: Pitch your business idea to your peers to receive seed funding for your venture. lassonde.utah.edu/getseeded

Global Public Health: Promotes health and medical development leading to measurable improvements. globalhealth.utah.edu

Global Health Scholars: Students get exposed to a variety of perspectives on global-health practices. bit.ly/globalscholars

High School Utah Entrepreneur Challenge: A statewide business idea competition for all students ages 14-18. More than \$20,000 in prizes. lassonde.utah.edu/hsuec

Hinckley Internship Programs: Internship opportunities are available to students interested in politics. hinckley.utah.edu

Honors Praxis Labs: Students work together to find original solutions to problems our society faces while a faculty mentor guides the work of each group. honors.utah.edu

HERE

Hours with Experts: Sign up to meet with an expert in fields including law, business, design and engineering. lassonde.utah.edu/exporthours

Innovation Scholar: Students learn how to match their passion with a purpose and create a personal plan of impact. innovation.utah.edu

International Exchange/Study

Abroad: Students participate in hundreds of programs all over the world based on their interests and career goals. learningabroad.utah.edu

International Leadership Academy: Students examine global leadership in business, government and non-profit organizations. Community mentors assigned. Email lehman@poli-sci.utah.edu

Sorenson Impact Center: Marshals capital for social good, empowers data-driven programs, breaks down silos across sectors and equips the next generation of leaders with social purpose. sorensonimpact.com

Lassonde Entrepreneur Institute:

The hub for student entrepreneurs and innovators at the University of Utah. Many programs and opportunities open to all students. lassonde.utah.edu

Lassonde New Venture Development Center: Graduate students are paired with a faculty inventor and spend a year preparing a business plan. lassonde.utah.edu/new-venture-development

Lassonde Studios: The home for student entrepreneurs and innovators. All students welcome to live, create and launch here. lassonde.utah.edu/studios

Legal Scholars: Students interested in law school learn about current legal issues and how to prepare for law school. bit.ly/legalscholars

Make Program: Learn how to use prototyping tools and see your idea come to life at Lassonde Studios. lassonde.utah.edu/make

Meetups: Join the Lassonde Institute at a meetup event to find teammates and learn about the community. lassonde.utah.edu/meetups

My U Signature Experience (MUSE): A database of research, leadership, community engagement, scholarships and internship opportunities across campus. muse.utah.edu

Opportunity Quest: A business-plan competition for students across the state, addressing the executive-summary stage of business development. lassonde.utah.edu/oq

RoboUtes: Students interested in robotics participate in competitions. roboutes.utah.edu

Sorenson Center for Discovery and Innovation: Helps unleash the creative genius within the U and the community to innovate the way we live, work and play. bit.ly/sorensoninnovation

SPARK: An online community all about ideas — inspiring students to collect, sort and finally implement them. spark.utah.edu

Sustainability Scholars: Students work across disciplines to research, imagine, create and implement strategies that will positively affect sustainability practices at the U. bit.ly/sustainabilityscholars

Sustainable Campus Initiative Fund Program (SCIF): Innovative and motivated students are awarded grants to team up with a faculty or staff member to bring about sustainable changes to the campus. bit.ly/sustainablefund

Undergraduate Research Opportunities Program (UROP): Students are paired with faculty members and work closely with them in research experiences. urop.utah.edu

University Venture Fund: Students work with entrepreneurs and investors to learn about investments and see how successful companies are managed. uventurefund.com

Utah Entrepreneur Challenge: One of the largest business-model competitions in the nation. Students across Utah develop full, comprehensive business model. \$40,000 grand prize. lassonde.utah.edu/uec

Utah Real Estate Challenge: Real-estate development competition for undergraduate and graduate students throughout Utah. bit.ly/realestatechallenge

Workshops: Attend regular workshops at the Lassonde Institute to learn new skills. lassonde.utah.edu/workshops

Something Missing? Do you want to add something to this list? We want to hear from you. Email us at lassonde@utah.edu.



HOW WILL YOU CREATE THE FUTURE?



lassonde.utah.edu
/studentinnovation2018

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