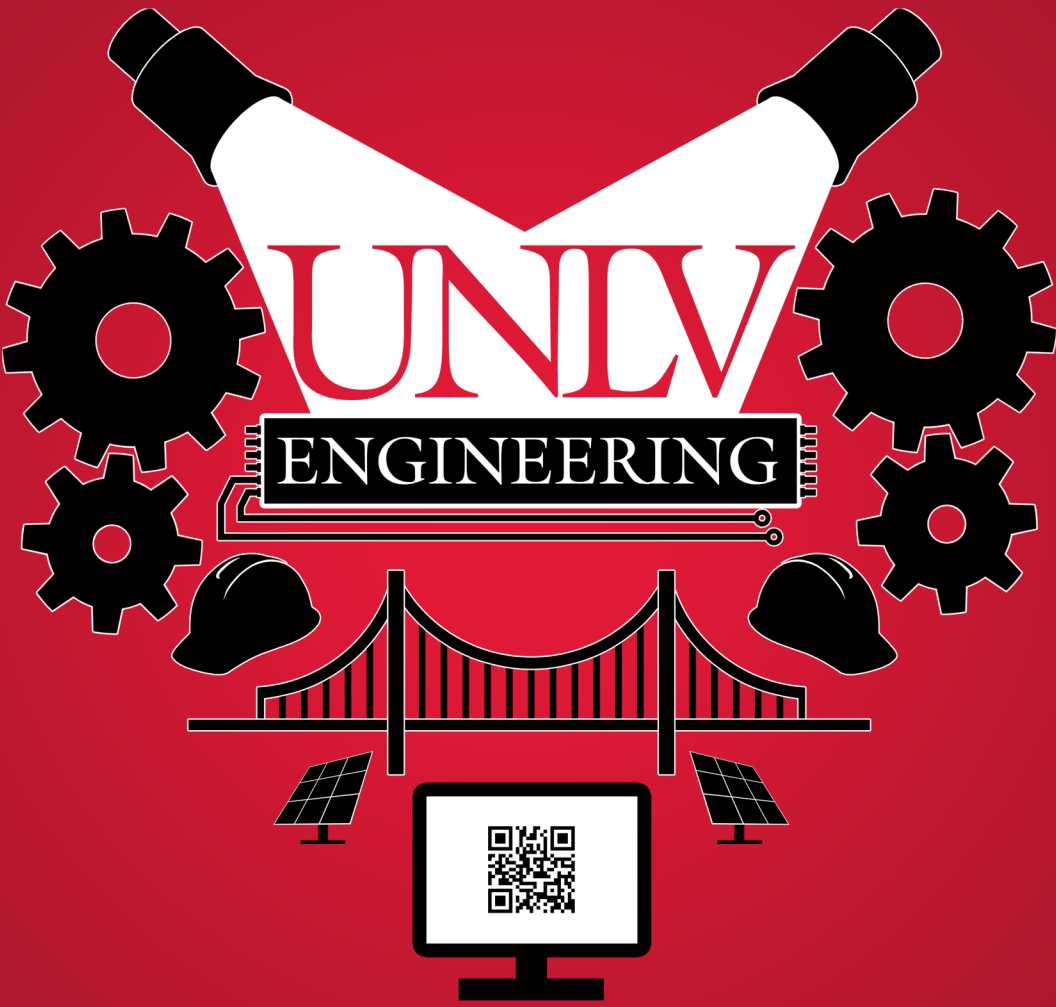
FRED AND HARRIET COX
SENIOR DESIGN COMPETITION



May 3, 2018

Fred and Harriet Cox

Senior Design Experience

Part of every UNLV engineering student's academic experience, the Senior Design project stimulates engineering innovation and entrepreneurship. Each student in their senior year chooses, plans, designs and prototypes a product in this required element of the curriculum. Working in teams, the senior design project encourages students to use everything they learned in their academic program to create a practical, real world solution to an engineering challenge.

Beyond the classroom

Because of the requirement to work in teams, students also build good communication skills, presentation skills, and even business writing skills. They also have to source and purchase the materials for the prototypes themselves, giving them real-world budgeting experience.

Reward and Recognition

A team of industry judges choose winners in each category based on innovation, commercial potential, presentation quality and sustainability. A cash first prize and second prize are given in each discipline, as well as a grand prize. Through the generosity of patrons Fred and Harriet Cox as well as award sponsors, the College of Engineering reimburses teams for the costs associated with the creation of their prototype. This ensures that teams are not working under unfair financial constraints, but have the resources they need to excel.

Taking it Further

Senior Design teams are offered the opportunity to partner with MBA students from the Lee Business School to create a business plan as part of the MBA curriculum. This collaboration has led to great success at competitions such as: the Governor's Cup, and the subsequent creation of many successful businesses.

Students wanting to take their projects to the next level are offered support from UNLV's Research and Economic Development team to pursue a patent for their prototypes. Additionally, engineering alumnus Chad Miller offers pro bono services to assist students in filing provisional patents on Senior Design projects.

Get Involved

Teams often get project ideas from industry partners or friends of engineering who have an interesting problem or concept they would like to submit. Teams may also be looking for an industry mentor or coach to help them throughout the year as they work on a project.

Industry partners and individuals are also offered the experience of sponsoring an award category. To find out what categories are available, or for other sponsorship information, contact Molly Marks, Director of Special Events, at molly.marks@unlv.edu or 702-895-3281.

Thank you to our Sponsors!

Thank you, Senior Design Instructors!

Department of Civil and Environmental Engineering and Construction
Dr. David James

Department of Computer Science
Dr. Ju-Yeon Jo

Department of Electrical and Computer Engineering
Dr. Grzegorz Chmaj

Department of Entertainment Engineering and Design
Dr. Si Jung “SJ” Kim

Department of Mechanical Engineering
Dr. Zhiyong Wang
&
Dr. Stephen Rice

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Spring 2018 Senior Design Judges

Anthony J. Baerlocher

IGT Vice President, Innovation and Mechanical Reels, Anthony J. Baerlocher is a recipient of the Nevada Genius Lifetime Achievement Award. Baerlocher is the named inventor on over 500 U.S. patents in the gaming field and serves as a member of UNLV's Howard R. Hughes College of Engineering Advisory Board. He calculated and designed the first foreign-developed Pachisuro game/machine approved in Japan. In addition to his work at IGT, numerous patents, and pioneer leadership in gaming, Baerlocher is a lecturer at Dartmouth University, University of Nevada, Reno, and the University of Notre Dame.

Jerry Gerber

After 22 years of Air Force active duty Jerry Gerber decided it was time to take all of his experience and start his own financial consulting firm. Within its first 5 years Jerry grew the company to over 95 employees and managed over $12 million in investments. This venture was followed with the start, development and sale of an additional 3 companies, from banking to real estate, all of which were created to either assist in the aid of his local communities businesses or individual families. Jerry's most recent adventure was the development of a hi tech company based out of California which started as a program that would be able to detect child predators on the internet. Using bots to scour all social media, accessible emails and government sites a score would be developed on an individual which would give a baseline to parents or caregivers to see who their child was communicating with. This evolved into using big data to create similar concepts that companies could use to determine the prime audience for future marketing campaigns. Serving as the CFO Jerry is able to work remotely from Las Vegas and just travel as needed for the company.

With the latest venture not requiring much onsite time from Jerry he has turned to helping out his local Las Vegas community serving as the Accounting/Cost Analyst for WVC, Western Veterinary Conference Oquendo Center. The goal of WVC is to provide ongoing continuing education to veterinarians and orthopedic surgeons from around the world to ensure they are up to date with the latest skills to take care of all animals. When Jerry isn't busy developing/running/selling companies, he enjoys being with his family and volunteering in the community. An avid supporter of the Southern Nevada chapter of LLS, Leukemia & Lymphoma Society, he shines as one of the members of the top Friends and Family teams raising thousands of dollars for local cancer treatments and support.

Andy Kieatiwong

Andy Kieatiwong is the CEO and co-founder of the Additive Rocket Corporation (ARC). ARC utilizes state-of-the-art additive manufacturing techniques, coupled with advanced design and test processes, to create custom thrust chambers for the space industry. With a mission to democratize space by providing reliable and affordable propulsion solutions, ARC leverages 3D printing to optimize and enhance the performance of rocket engines that can be produced in a tenth the time and at half the cost of traditional methods.

Kieatiwong was born and raised in Las Vegas, and went on to earn his bachelor's degree in aerospace engineering at the University of California, San Diego (UCSD). While at UCSD, he led a team in 2013 that became the first student group in the world to develop and test an additively manufactured bipropellant rocket engine. He also managed a project in 2015 that designed, manufactured, and tested the world's first entirely 3D-printed ABS plastic hybrid rocket engine.

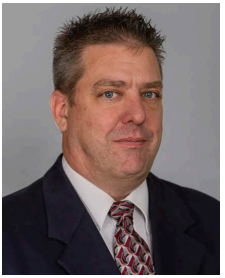
Kieatiwong's experience includes working in the manufacturing engineering department at SpaceX, where he worked alongside engineers and technicians in the company's propulsion group for the Dragon Capsule—a vehicle that delivers cargo to the International Space Station. Additionally, he enhanced his skills designing and building tools and systems that aided in the manufacturing and testing of SpaceX's Draco Engine and SuperDraco Engine.

David Tyburski

David Tyburski is the Global Chief Information Security Officer for Wynn Resorts where he is responsible for leading the enterprise strategy for information security, identity/access, governance, and incident management for the Las Vegas based developer and operator of high end luxury hotels and casinos.

Prior to joining Wynn Resorts, David held various leadership roles in organizations ranging from venture-stage companies to multi-national publicly traded corporations. David has over 25 years' experience in the information technology and security field and has architected several world wide networks throughout his career. He earned a BA degree in Business Administration from Francis Marion College in 1991 and has since served on the Alumni Advisory Council to the College of Business.

Steve Mulcahy



Steve Mulcahy is an Alumni of UNLV's Engineering Department and he has worked in Las Vegas and the Southwest Region for more than 20 years focusing on HVAC, plumbing and controls systems for some of the world's biggest resorts. Currently, as Principal Engineer for Southland Industries, one of the nation's largest MEP building systems experts providing engineering, construction, service, and energy service solutions, Steve and his team continue to pave the way as industry leaders in sustainability and energy efficiency to improve the way buildings are designed, built, and maintained.

Steve is responsible for managing Southland's local engineering department, including the daily operations of the engineering teams, ensuring project managers meet clients' goals, representing contractors on large design-build projects, selling engineering work directly to clients, and continuing to grow the division's regional engineering capabilities.

Notable local engineering work performed by Steve and Southland's Southwest Division include complex casino, hospitality, healthcare and entertainment projects such as the M Resort, SLS Hotel & Casino, Mandalay Bay, Aria at City Center, Henderson Hospital, and the Las Vegas Motor Speedway.

Heather Wilde

Heather Wilde is a multiple award-winning, 6-time CTO and 5x-certified Executive Coach. She is an Author, Speaker, Nonprofit Director, and Howard R. Hughes College of Engineering Advisory Board Chair. Affiliated with 3 Entrepreneurial accelerators, she has also worked with governments on Economic Development projects for over 20 years.

Heather was an early employee of Spirit Airlines and a founding member of Evernote, where she oversaw the company's growth from thousands to 100 million customers. She was also one of the only women to have programmed, designed, produced and published a game at the company THQ. She has worked with the U.S. Navy, NASA and state and local governments around the world.

Heather has received commendations for her work from the United States Government, as well as Awards for Mentor/Coach of the Year, Female Executive of the year, and been named Top Writer on Quora. She writes for Forbes, Tech.co and hosts the "Entrepreneurial Revolution" column for *Inc Magazine* where she influences millions of readers every week.

She is currently the CTO of ROCeteer, a company in Las Vegas, NV, where she oversees the development of software platforms in the US, Asia and the Middle East as well as works with ecosystems and teams around the world on their development and growth strategies.

Roger P. Thomas

Roger Thomas is Executive Vice President of Design for Wynn Design and Development. He has created the interiors of Wynn Resorts worldwide including the new opulent Wynn Palace, Cotai, China.

While a recognized leader in interior design for the hospitality industry, Mr. Thomas has also designed corporate offices and aircraft interiors, as well as the private residences of Mr. and Mrs. Stephen A. Wynn.

The Roger Thomas Collection includes signature designs and products for APF Master Framemakers, Boyd Lighting, Edward Ferrell + Lewis Mittman, Fromental, More and Giles Leather, Rocky Mountain Hardware, Samuel and Sons, Passementerie, Townsend Leather, Veneman, Koroseal, S. Harris, Maya Romanoff, SICIS, Speakman Plumbing, The Phillips Collection, Studio A and Labrazel bath accessories.

Mr. Thomas was elected to the Hospitality Design Platinum Circle in 2005 and was named "Designer of the Year" at The International Hotel/Motel & Restaurant Show® (IH/M&RS) in New York. He is a 5-time member of Architectural Digest's A.D. 100 and, in 2015, was installed in the Interior Design Hall of Fame.

Mr. Thomas serves on the Board of the Smith Center for the Performing Arts.

Mr. Thomas is a graduate of Interlochen Arts Academy and The School of the Museum of Fine Art in Boston, MA. He received a BFA in Art History from Tufts University and an honorary masters' degree from the Interior Design Institute. His work has been published in leading journals, including *Architectural Digest, Elle Décor, Interiors* and *Hospitality Design*.

Born in Salt Lake City, he has lived most of his life in Las Vegas, where he still makes his home.

Jody Walker Belsick

Jody has over 20 years of experience providing civil engineering and site development consulting services to clients throughout the country. As former owner of Walker Engineering and now a Senior Practice Builder with Kimley-Horn, Jody's project experience includes a variety of retail, industrial, sports venues, mixed-use, residential, and office projects. Jody is currently working on the Las Vegas Raiders Stadium and Las Vegas Ballpark projects. Jody is currently on the NAIOP Southern Nevada Board of Directors and the NAIOP National Board of Directors and works with both Southern and Northern Nevada government affairs on development issues at a local and national level as well as the UNLV Howard R. Hughes College of Engineering Advisory Board.

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING AND CONSTRUCTION PROJECTS

Department Chair
Dr. Sajjad Ahmad

Senior Design Instructor
Dr. David James

7th Street Expansion

Project Participants
Noah Mataele & Andrew Park-Murray

Instructor
Dr. David James

Faculty & Technical Advisor
Dr. Moses Karakouzian

Community Advisor
Alisha Auch

Problem Identified
The section of 7th Street from Bridger Ave. to Stewart Ave. addresses the public poorly. The sidewalks are not wide enough, the roads are crowded due to parking, there are no bicycle lanes and little to no shade.

Current Solutions
Cities often redesign roads for narrower streets to reduce speed limit and for traffic safety. They could use light-colored pavement to reduce heat exposure during the summer, as well as adding canopies and trees to provide extra shade along sidewalks.

Team's Solution
Our solution is a complete redesign of the corridor by removing the two lanes traveling from south to north and making it into one complete sidewalk. The idea is to remove the vehicular traffic in the area completely, providing a larger space for the public, both locals and tourists to socialize. A proposal of entertainment and food businesses around the area will attract the public. A large parking structure will be proposed in the corridor to accommodate the public. The project's solution will be following the ENVISION model to provide a sustainable finished project.

Project SU

Project Participants
Darren Chan, Bright Huang
& Borna Majlesi

Instructor
Dr. David James

Faculty Advisors
Dr. Ryan Sherman,
Dr. Moses Karakouzian,
& Dr. Daniel Gerrity

Technical Advisor
Tim Lockett

Community Advisor
Jon Tucker

Problem Identified
The current Student Union is too small for the present and future student population. The maximum seating of the Student Union is currently 575, while the average daily traffic of the Student Union is around 12,000. Statistical analysis shows that in order to solve the growing student population, 150,000ft2 must be added to the existing Student Union.

Current Solutions
Possible solutions include solar panels, incorporation of a green roof, open-space, LEED as well as ENVISION rating, and sustainable framing alternatives. In addition, multiple amenities will be suggested in order to meet the demands of students, including a recreational/entertainment facility, additional dining options, late-night study area, etc.

Team's Solution
These solutions are better because research shows that students are more likely to graduate and have higher GPAs if they are more connected to the campus. If this expanded Student Union results in students becoming increasingly connected to the campus, it will greatly benefit. In addition, by designing a new expansion of the Student Union students will no longer feel cramped in the existing Student Union.

The Great Reb-Canopy (GRC)

Project Participants
Najeem Ansary & Vince Menichino

Instructor
Dr. David James

Faculty Advisor
Dr. Rama Venkat

Problem Identified
The current TBE courtyard has a poor layout and is not an attractive/suitable site for students to gather. The planters, changes in elevation, and stair cases block off much of the available space making it seem congested and un-welcoming for students.

Current Solutions
Current market solutions are: Install typical fabric shade layout which doesn't address that the site is not suitable for students to gather due to the current layout of the space. The planters, changes in elevation, and stair cases block off much of the available space making it seem congested and non-welcoming for students.

Team's Solution
Our solution is to keep the current red truss system to maintain the original TBE monument. Aesthetics and modern design are also two things we're highly focusing on since this courtyard would be the first of UNLV to implement those two factors. For our solution, we plan to provide shade with solar panels to increase the sustainability of the courtyard. We also want to regrade the site to have all of it leveled to the southern area of the courtyard. Also, we plan on relocating the planters from their current locations to provide a more open space where more tables and chairs could be placed. This will provide students with more open/welcoming space. An expansion of the truss to cover more of the courtyard is a possibility

Vertical Vegas

Project Participants
Leopold Falkensammer & Sean Howard

Instructor
Dr. David James

Faculty Advisor
Dr. Ryan Sherman

Problem Identified
The Fontainebleau Las Vegas is an abandoned building on the Las Vegas Strip and has been for over 10 years. The site has not had development since 2008, even though it has been recently bought by a new owner. It has been a 68-story eye sore for the last decade and only seeks to add to an already crowded number of casinos currently within the city.

Current Solutions
Currently vertical farming development is still in its infancy, as it is a new and hardly scratched field of business and agriculture. The current largest operation is owned by AeroFarms in New Jersey. Our project, at current low estimates, would be more than 15 times the size of that operation.

Team's Solution
Our solution is to utilize the Fontainebleau property to create a vertical farming operation. Clark County stands to benefit the most from this project. The amount of organic, non-GMO food produced (on a 24-hour cycle) will provide a substantial boost to the health of those in Clark County. The diversification of the Strip will transform once again with an operation never before attempted, but that will be copied and started around the country. The infrastructure for the project already exists, the building is up to code and has all major components, but it has never been completed.

DEPARTMENT OF COMPUTER SCIENCE PROJECTS

Department Chair
Dr. Laxmi Gewali

Senior Design Instructor
Dr. Ju-Yeon Jo

Designated Ride

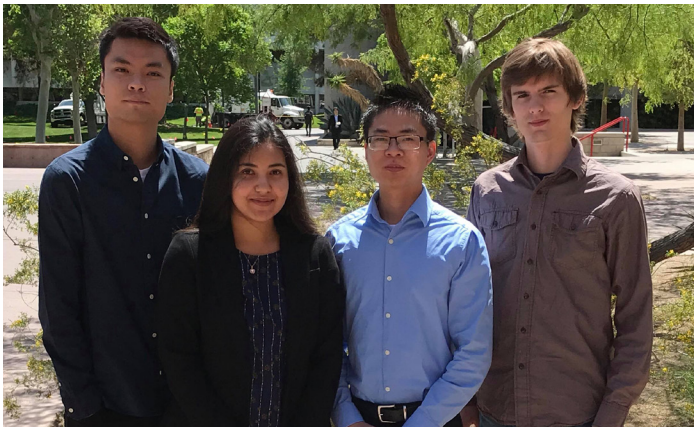
Project Participants
Matthew Brown, Ryan Capala, Bangguo Huang,
Domenick Perrino, Maira Soomro
& Tin Tran

Instructor & Faculty Advisor
Dr. Ju-Yeon Jo

Problem Identified
Some patients who need to make their medical appointments may be unable to transport themselves to the clinics/hospitals due to illness or lack of transportation. Specifically, in the Las Vegas area, public transport services such as the bus can be slow and unreliable. This may make it difficult for people going to their appointments.

Current Solutions
One solution is Veyo, a non-emergency medical transportation service. Other solutions include Lyft and Uber, multi-purpose rideshare services.

Team's Solution
The concept behind Designated Ride is to provide a non-emergency transport/rideshare service that will pick the user up from home, transport them to their medical appointment, and drop the user back home afterwards. This service would be free of charge to the users, as the costs are covered by their health insurance company. Lyft and Uber, although widely available, both cost money and charge a base fare on top of a fee per minute and mile. These costs can increase depending on the area and when traveling during peak times. Thus, riding to and from medical appointments can increase quickly. Veyo is a service that is limited to only few states and those with Medicaid.



Elements of Surprise

Project Participants
Justin Taylor Bauman, Zaid Haque, Joseph Lybarger,
Eric Miller, Reiley Porter, Kameron Schrack,
Alexander Thomason & Erick Wakayu

Instructor
Dr. Ju-Yeon Jo

Problem Identified
Play-Nine is a unique and entertaining card game usually themed around golf. Rather than using traditional hands of cards, players score points based off a field of cards in front of them. With this unique style of gameplay we have discovered a lack of representation of Play-Nine style games in the mobile app market.

Current Solutions
A few mobile apps exist that are based on Play-Nine. These apps have a golf theme like the original card game. These apps include features such as online play and globally-ranked scores.

Team's Solution
Our game alters the traditional Play-Nine rules, and we have given it an elemental battle theme. Rather than playing for a low score like golf, players will attempt to build the army with the highest score. With a system of elemental warriors and modifiers, every turn can dramatically affect the outcome of the game. The social features in our game improve upon what is available on the current market. Our app also features global-rank scoring and allows for competitive and casual play. Players overall will be more entertained with our new app than the currently available options.

Fixed Fit

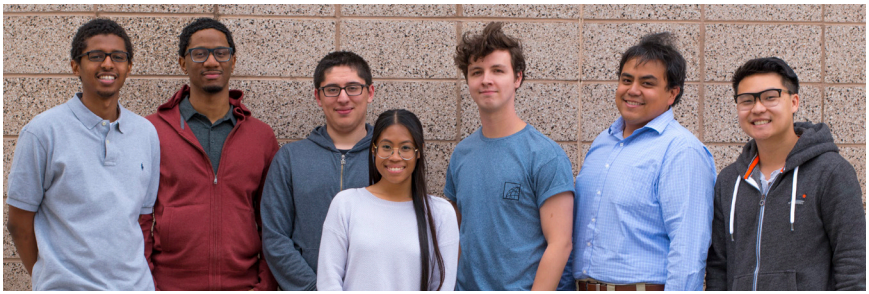
Project Participants
Mario Buenrostro, Khyri Carter, Alexander Cheung,
Carlo De Los Reyes, Amanuel Ketebo, Aaron Gorman
& Kelsey Manglicmot

Instructor
Dr. Ju-Yeon Jo

Problem Identified
These days people tend to spend a lot of their time stressing out about choosing what outfit to wear. They will either be constantly changing, end up not being one hundred percent happy with their outfit, or they may find an outfit they like but it does not agree with the weather for that day. It is also difficult to plan and remember outfits in advance as well as share outfits and their whole closet with someone else.

Current Solutions
There are currently some mobile applications that will allow a user to take pictures of their clothes and create outfits out of them. They display the outfits as a cluster of pictures and not as an outfit as a whole. They are all mostly marketed towards females and do not have a social aspect to them. Some applications have features that others do not.

Team's Solution
This mobile application will allow users to set up their "closet" how they like it using their own categories. It has a built-in calendar where users can plan their outfits days, weeks, and even months in advance. Fixed Fit will have way more features than the other outfit applications and it will be marketed towards everyone. It has a dynamic viewing of outfits so clothing pieces are in the correct placement instead of just all over the screen. Fixed Fit also has user profiles where users can actually post and share their outfits and full closets with other people.



FluffyMates

Project Participants
John Alexander, Rachel Ayuste, Tommy Bonetti,
Chaitanya Ingle, Keely Kang, Lisa Kiyabu,
Tralyn Le & Patricia Payton

Instructor
Dr. Ju-Yeon Jo

Problem Identified
According to the ASPCA, animal shelter overpopulation leads to 1.5 Million euthanized animals per year, yet breeders are still the top source for many pets. Breeders are expensive and mired in allegations of cruelty and neglect. Adopting strays or pets from unknown sources can be dangerous for you and your pet. Connecting with a qualified shelter that can provide services, and support can be time consuming and inconvenient.

Current Solutions
Currently the options for adopting or purchasing a pet are pet stores/breeders, shelters, or third-party/online. Online options can include Facebook, Craigslist, Barkbuddy, Allpaws, and Adopt a pet.

Team's Solution
FluffyMates mobile app will allow you to search any shelter for your next fluffy family member all in one place. Shelters are limited in resources often leaving their web and traditional advertisements missing photos, health and disposition information and care needs of and about the animals. Shelters are often limited to advertising animals in the area, losing ground to breeders who advertise and sell nationally. FluffyMates will include pictures, medical history, and all other information about the animal. You will be able to search for animals all over the country to find the perfect addition to your family. Utilizing in app advertising will allow shelters and adopters to access the app at no cost.

Forgift and Forget

Project Participants
Anna Agoha, Aaron Janushan, Tristan Moore,
Michael Murphy, Anthony Nevarez, Anthony Pallone,
Elijah Ratner & Matthew Raybuck

Instructor
Dr. Ju-Yeon Jo

Problem Identified
Gift giving isn't always an easy task, especially if you're forgetful. Maybe you forgot the date of an upcoming event and had to get a gift last minute, or you had an idea in mind that you just can't remember. Maybe you had saved a link and went to go find it, only for it to be nowhere to be found. This is not an exclusive problem, and even if you're not typically forgetful, you can't be expected to remember everything.

Current Solutions
The alternative to using our app would be using a calendar application for the reminder and a notes application for adding notes and links to websites. The pictures would be stored in the user's gallery on their phone. Essentially, all the different features are scattered over multiple applications, making the remembrance process a hassle.

Team's Solution
Since this app is specific to the problem of giving gifts, the solution this application provides is mainly convenience to people who are forgetful in terms of remembering dates or ideas. The usual counterarguments to this idea are: "Why should I use your app to remind me when I can just set an alarm or a calendar reminder?" and "I can already take notes in another app, why should I use yours?" Our rebuttal to that is you can absolutely do both of those things, but then everything you're trying to remember is spread over multiple applications. This application centralizes all those tasks into one place.

I Eat Healthy

Project Participants
Ashley Agoha, Michael Alemayehu, Christopher Cho,
Newton Augusto Saad-Cazzaro, Reza Takhti,
Evan Thomas & Jose Jimenez

Instructor
Dr. Ju-Yeon Jo

Faculty & Technical Advisor
Dr. Jan "Matt" Pedersen

Problem Identified
There are two main problems we wanted to tackle with development of this app: the rise of obesity in the United States and the loss of recipe knowledge in families that fail to be passed down through generations. The first problem is widely known, but the second is subtler. We all have someone in our family who has an amazing recipe that is unknown to others, and if they are willing, we would like to share it with the world.

Current Solutions
There are hundreds of applications that attempt to promote a healthier lifestyle and others that attempt to facilitate recipe sharing. We would like to combine the two by allowing users to keep track of their nutrition while having access to widely loved recipes from all cultures around the world.

Team's Solution
By combining the experience of a healthier lifestyle and recipe sharing, we will provide an intuitive and gratifying experience to our users that will serve as a tool while aiding them on a daily basis to continue making smart decisions regarding their eating habits. Its uniqueness makes it special in a way that will allow them to be able to find amazing recipes that were previously exclusively known by the creator and the close family and friends.

Let's Eat

Project Participants
Jesus Ibarra, Eric Feuerstein, Jonathan Lee,
Ryan Pepito, Markus Realica, Adrian San Pedro,
Siwapan Tanthmanatham & Kirubel Tesema

Instructor & Faculty Advisor
Dr. Ju-Yeon Jo

Problem Identified
Let's Eat aims to alleviate the difficulty of customer management by small businesses receiving high customer volumes in their establishments. It also aims to allow customers to reserve tables, check the estimated time of wait in the restaurant, order food in advance, and request their check all within a single app.

Current Solutions
Currently, there are only a few apps in North America that offer the same features that our app will offer. Apps such as Opentable, Yelp Reservations (previously known as SeatMe), and Bookeo. Bookeo, however, is more geared towards reservations for tour and school services.

Team's Solution
Let's Eat benefits smaller businesses with a smaller workforce to work more efficiently in serving customers and allow them to look at the amount of traffic they receive during their operating hours. It allows businesses to plan their inventory based on the demand of items in their menu. It also allows them to efficiently manage the servers in what they need to do and where they need to go based on the number of incoming customers, customer orders, etc. On the customer side of the app, it allows customers to perform the basic functions that apps like those currently in the market and extend these functionalities which helps speed things up in terms of requesting their check and getting a copy of their check right from the app, speeding up the service time for small restaurants during their peak hours.

Vegas GO

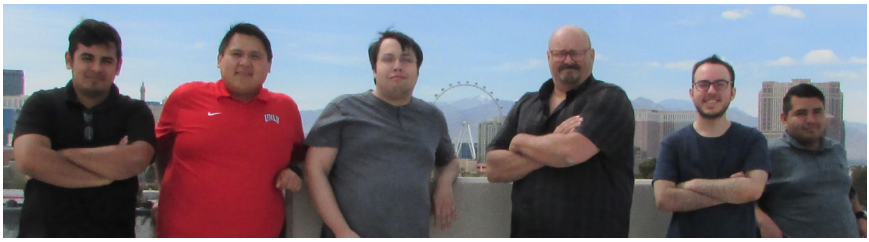
Project Participants
Richard Bromley, Freedom Garcia, Daniel Gutierrez,
Ignacio Junior Regalado Partida, Jerry Rylance
& Alejandro Ulloa

Instructor
Dr. Ju-Yeon Jo

Problem Identified
Millions of tourists flock to Las Vegas every year, many not knowing what to do with the time they have here. They either have to research information themselves using various resources or go to the nearest information center to get assistance. Both options can be a hassle to a tourist with limited time and knowledge of the city.

Current Solutions
Most venues and casinos have their own websites that provide tourists with information about their establishments and activities. There are also limited mobile applications that help tourists with finding information about Las Vegas, although they are not very well known. Most of the existing services require cross referencing making navigation and other services require more effort for something simple. Although the venues' own websites are great for information, one needs to know about it first and you have to do this for every venue causing havoc with conflicting information. It is also time consuming and repetitive. For the apps out there, that are similar to ours, they are limited on the amount of information that they give or require further research beyond its own capability. The application considers the user's location saving search time. They are also not very interactive and convey very limited information.

Team's Solution
Instead of our application just being a hub of Las Vegas information, we want the app to be something you have out while walking. Our app will enhance and expand details that other apps lack and both the tourists and businesses will benefit. Tourists benefit by knowing what is near them and businesses benefit by raising awareness of their presence in the area that would otherwise be under represented.



DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING PROJECTS

Department Chair
Dr. Yingtao Jiang

Senior Design Instructor
Dr. Grzegorz Chmaj

Alarm Shock Patch

Project Participants
Jeffrey Echeverria, Behdad Haddadzadeh Moshaei
& Gabe Kramp

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Pushkin Kachroo

Problem Identified
More than 2.7 million U.S. employers had to fire or suspend their employees due to being late to work in 2016 according to a New York Times' report. Many people have a hard time waking up in the mornings and regular alarms have several disadvantages. The shock patch works like a normal alarm, but with no mercy.

Current Solutions
There are other methods that try to wake the user up besides the standard alarm, but they are either expensive, restricted to certain body parts, or require daily charging.

Team's Solution
The shock patch gives the user a short period of time to wake up, after that the shocker will do the job as it discharges a series of mild (but effective) electrons on the user's skin. This will cause the user to wake up immediately. The alarm shock patch is better than the current existing solutions in the market as it will be priced much cheaper, between $49 and $79. It will allow the user to attach it to most parts of the body, with the head and heart areas excluded for health concerns. Lastly, the shock patch does not need to be charged daily, due to using a very low amount of electrical current, allowing the batteries to last longer.

Augmented Reality Motorcycle Helmet

Project Participants
Reiner Dizon, John Stanley Dye
& Angel Solis

Instructor
Dr. Grzegorz Chmaj

Faculty Advisors
Dr. Sarah Harris &
Dr. Venkatesan Muthukumar

Problem Identified
Currently, motorcyclists have to look down to see their speed or gas levels, blinding the rider temporarily. This action can be dangerous, considering that the driver would need to look away from traffic in order to see their gauges. Moreover, although some solutions to this problem do currently exist, there are none that entirely eliminates this problem without causing other major issues.

Current Solutions
The main product currently on the market is the Nuviz, an external attachment to motorcycle helmets which is able to give information about the current state of the bike. However, because the device is external to the helmet, it creates drag when turning sharply or in high wind environments. Also, Intel has begun developing a "smart" motorcycle helmet, which will be able to give the cyclist information about the motorcycle, such as tire pressure and engine temperature, all of which are available via voice commands, and will communicate to the motorcyclist through the helmet's internal speakers.

Team's Solution
The Augmented Reality (AR) Motorcycle Helmet has greater functionality and accessibility than the other two current market solutions mentioned above. Nuviz causes the helmet to drag to one side, which can be detrimental to motorcycle safely; however, the display and hardware for the AR Helmet is entirely kept within the helmet itself, eliminating any of the potential safety risks of adding hardware to the helmet. Also, we project that the AR Helmet will be more cost effective than Intel's proposed Smart Helmet, thus allowing our device to be more readily available to a larger portion of the public; on top of that Intel's Helmet only has audio capabilities when relaying information, but the AR Helmet has both audio and visual functions available for extended applications, as well as more easily conveying information to the driver.

Automated Optoelectronics Testing Platform

Project Participant
Luis A. Soriano

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Ke-Xun Sun

Technical Advisor
Mario Valle

Problem Identified
As modern technology advances and more complex electronic devices are created, there is a high demand in the semiconductor industry for more sophisticated instruments that can characterize these new devices under various environments. Current testing methods are setup and carried out manually. They also require specialized equipment and personnel which can be time consuming and very expensive.

Current Solutions
As of today, there is no single automated apparatus found that can perform all needed characterization tests. There are only single specialized professionals that perform each test separately, which increases cost and error to the measurements taken.

Team's Solution
The solution proposed in this project is to provide scientists with a system that allows them to perform any necessary number of optical, electrical characterization tests. The system would characterize the samples automatically and remotely while obtaining the data in real time, aiming always for high accuracy and precision. The key feature of this device is customization. The automated platform can be adapted to fulfill any required test in a wide range of applications. For example, when testing a GaN based sensor, the platform will carry the samples to the simulated environment, and then bring them back to the platform to perform various tests, such as emission power intensity, emission spectrum measurement, photo responsivity behavior, and so on. This implementation will save time for the scientists giving them the freedom to perform other tasks at hand. Furthermore, the system will increase productivity and reduce unnecessary expenditures. In summary, the automated optoelectronic testing platform will reduce human error, reduce cost, and increase productivity.

Ergonomic Backpack

Project Participants
Mary Aragon & Donia Shlayan

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Sarah Harris

Problem Identified
Backpacks are carried since youth and are packed to the max. This causes individuals to develop back pain and bad posture, which can affect them from childhood to adulthood.

Current Solutions
Currently there are devices geared specifically for posture correction, but no backpack that is designed to optimize load positing and strap length of backpack to provide the ideal backpack weight distribution on a persons back.

Team's Solution
Our ergonomic backpack is better than current solutions because there is nothing on the market that does what our backpack is capable of doing. Our backpack uses technology to provide the ideal weight distribution and an optimized positioning on the back of each individual in order to reduce back pain and aid in posture.

Fiber Optic Sensor for CubeSat

Project Participants
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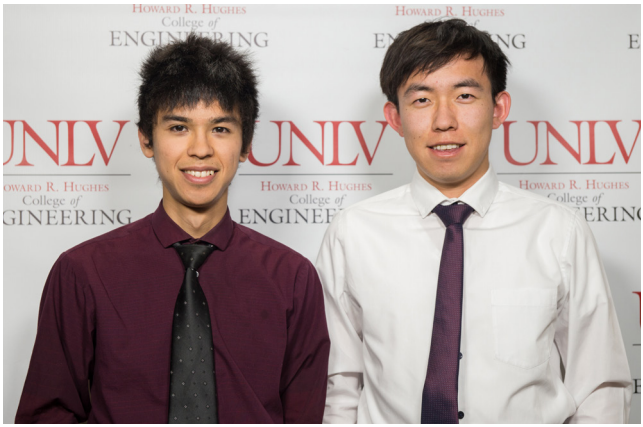
Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Ke-Xun Sun

Problem Identified
Angular correction and alignment in space are extremely important for CubeSat operation in space. Many spacecrafts utilize gyroscopes with complex computational hardware for precise adjustment. These types of sensors can be cumbersome – requiring high wattage and are prone to failure due to the use of moving parts. With the implementation of fiber optics, these issues may be circumvented.

Current Solutions
Most angular displacement sensors for satellites are built for commercial and governmental use only. Usually it requires complex computational systems and uses bulky designs. Since most commercial options aren't available, private companies that do offer custom parts sell them at incredibly high prices.

Team's Solution
With the advent of fiber optics, avionics can take advantage of higher precision, lower power instruments. The objective of the Fiber Optic Sensor for CubeSat is to accomplish this exact premise. Special infrared fiber optic photodiodes are chosen to minimize environmental interference and maximize data reliability. The Fiber Optic Sensor for CubeSat provides accurate angular displacement sensing with complete custom design under a small budget.



Gallium Nitride Usage for Optical Detector

Project Participant
Jesse Garcia

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Ke-Xun Sun

Problem Identified
The usage of Gallium Nitride for the use of optical detector is new and needs further research and development to make cheaper and more effective devices.

Current Solutions
Gallium Nitride is primarily used for research purposes. We are unaware of any current solutions that exist in the open market.

Team's Solution
The device we are creating will have similar implications as infrared being used for communications. It will have the benefit of being able to have a higher band gap to transmit more data but more importantly the qualities of Gallium Nitride will allow for the high power and high temperature uses.

S.A.F. Drum Tuner

Project Participants
Clayton Frister & Jeremy Garrod

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Brendan Morris

Problem Identified
Tuning a drum is extremely time consuming and for the most part not accurate. Our device provides accurate drum tuning with minimal device interaction.

Current Solutions
Tunebot – this device assists in tuning a drum to frequency but requires the user to manually turn each lug for tuning. Drum Dial – this device uses the tension in the drum head that turns a needle to a number that corresponds to a note, the tuning is also done manually to each lug by the user.

Team's Solution
Our solution is a fully automated tuning device. The user navigates to the note that he/she wants the drum tuned to on an LCD screen and then presses the select button. The device will automatically tap the drum, detect the frequency which corresponds to preprogrammed notes, and tune each lug using motors. The device will double check each lug each time to make sure that it is in tune. If a lug is not in tune the process repeats until perfect tuning is acquired. This device is better than current solutions because it will be the first fully automatic drum tuner on the market. Anyone from drum instructors, schools, studios, traveling/professional musicians, or anyone who owns a drum will benefit from this device.

Sharp Edge Detector for Space Station Hand Railings

Project Participants
William Flores & Emmanuel Rodriguez Lopez

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Emma Regentova

Problem Identified
Small craters with sharp edges on space station exterior handrails have become a safety issue for astronauts. Identification of these miniscule dangers is the first crucial step in fixing the danger.

Current Solutions
This being a specific issue, there are no current market solutions that fix this issue. The closest equivalent product would be the back-up camera mechanisms located on automobiles that can recognize a curb or object and change the direction of the car.

Team's Solution
The device being developed includes the power to recognize these small craters from a handheld device. The limited mobility and sight of astronauts calls for this device to be light in weight and easy to operate. The safety of the astronauts is the priority and this being a specialized device, the only ones to benefit are the users of the device.

Smart Fridge System

Project Participants
Cyrill Narcisa & Andy Sam

Instructor & Faculty Advisor
Dr. Grzegorz Chmaj

Problem Identified
Current smart fridge solutions exist, but they are expensive. Our smart fridge system is an affordable product that can be placed inside an ordinary fridge, granting it additional capabilities such as taking snapshots inside of the fridge, monitoring fridge environmental conditions, and managing a database of food expiration dates. The customer will also be able to interface with the fridge through a smart phone application. Essentially, the customer is upgrading their ordinary fridge into a smart fridge.

Current Solutions
Current market solutions for smart fridges are primarily Samsung's line of smart fridges. Their prices range from $3000 to $5000.

Team's Solution
Our smart fridge system is better than current solutions because it is affordable. In addition, it has capabilities such as snapshots, food expiration database, and a smart phone application that current smart fridges do not have. Average consumers who wish to integrate their fridge with the IoT will benefit from using our system.

Smooth Driving

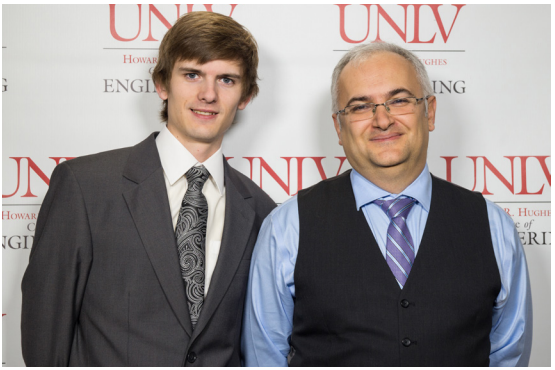
Project Participants
Matthew Brown & Georgi Genov

Instructor & Faculty Advisor
Dr. Grzegorz Chmaj

Problem Identified
According to the U.S. Department of Energy aggressive driving (speeding, rapid acceleration and braking) wastes gas and lowers gas mileage in the range of 10% to 40%. The American Automobile Association estimates that 56 percent of accidents involve aggressive driving. The most dramatic manifestation of this social phenomenon is known as red light running. According to the Federal Highway Administration, 45% of car collisions take place at road intersections and the reason is either running a red light or a stop light. An estimated 8,347 people were killed in 7,528 crashes related to red light running between 2005-2015.

Current Solutions
Currently, there is no solution on the market to address the red light running issue on a personal level. Only expansive professional services such as Queclink and DriveCam for commercial fleets are available. Traditional GPS services – both, dedicated devices as Magellan or mobile phone application as Google Maps resemble the Smooth Driving device in providing useful information about optimal routes and traffic congestions which ideally should minimize the aggressive driving problem.

Team's Solution
The Smooth Driving device provides certainty about the next traffic light state. The system does not require an initial time-consuming setup. The database, held locally on the device, contains the GPS coordinates and the green light duration for the traffic lights in the area. The Smooth Driving system via GPS module pins the location of the vehicle. Based on the change of coordinates the device determines the next intersection, calculates and displays the necessary average speed to achieve the optimal commute.



Solar Atmospheric Water Generator (SAWG)

Project Participants
Surafel Abera, Zyrus Vance M. Calaor
& Estellar Raganit

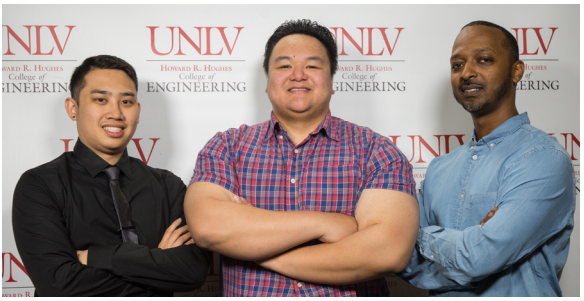
Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Yahia Baghzouz

Problem Identified
Water is at the foundation of sustainable development and is vital for food production, healthy and clean environments, and most importantly to sustain human life. As the universal population grows, there is a greater need for water which in some places is already a major problem. About 2.1 – 4.5 billion people lack access to safe drinkable water or safely managed sanitation services. If this global problem is not addressed, scientists predict that clean water reserves will be depleted within 20 years such as China and India.

Current Solutions
There are several solutions that can help reduce this crisis such as recycling wastewater, improve irrigation and agricultural practices, or inventing new water conservation technologies. Companies like SunToWater and WaterSeer have invented devices that extract water from the air through the process of condensation. However, these devices are expensive and used for industrial purposes.

Team's Solution
The Solar Atmospheric Water Generator (SAWG) is an off-grid living survival kit product. It is a portable water generator that can be setup anywhere which works by pulling in air through a cold condenser where the water vapor is condensed into fresh water. The SAWG will help many countries where drinkable water is hard to obtain due to no water or polluted water sources. In addition, it will provide clean water to campers, off-grid living, and victims of natural disasters. Unlike similar products on the market, the SAWG will be small, lightweight, affordable and portable which operates with solar panels allowing it to be used anywhere the sun is available.



Surgery Assisting Smart Glasses

Project Participants
Byron Gorsuch, Evan Misak
& Mario Verduzco

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Jacob Baker

Community Advisor
Dr. John Menezes

Problem Identified
The current method of performing laparoscopic surgeries require that all surgeons conform to face a centralized visual input (a TV or some other monitor). For that reason, there are no immediately applicable solutions for a surgeon who wants to remain upright and comfortable during surgery. Due to surgeries that last hours in awkward positions, Dr. Menezes, Head of Craniofacial Surgery at UNLV School of Medicine, has suffered vertebrae damage which inhibits his ability to perform surgery effectively.

Current Solutions
There are no current market solutions intended to suit this purpose exclusively.

Team's Solution
To solve this problem our senior design group has looked to create a heads-up display utilizing smart glasses and a controllable camera. This allows for the operating surgeon to directly face the area which is being operated upon, rather than having to look at a television screen that is placed away from the operating area. Our solution gives the surgeon control of a camera which would be mounted onto the operating table that communicates wirelessly to the smart glasses in order to receive visual feedback of their operation without the need for much additional movement. The primary beneficiaries of this project would be Dr. Menezes who could continue his career with extended tenure. Additionally, there are applications of this project which would be indirectly beneficial to a wider audience such as aspiring surgeons. While the heads up display not only gives a surgeon the chance to see where they are operating, the information which is being streamed could also be recorded to be later played back for educational purposes.

DEPARTMENT OF ENTERTAINMENT ENGINEERING & DESIGN PROJECTS

Department Chairs
Dr. Donald Hayes
Dr. Michael Genova

Senior Design Instructor
Dr. Si Jung "SJ" Kim

Shred SLED

Project Participants
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Instructor
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Technical Advisor
Michael Genova

Problem Identified
Children, college students and professionals chose to utilize a longboard to get from place to place. In 2015, 125,145 people were treated in hospital emergency rooms after being injured while skateboarding and more than half of those injured were ages 14 to 24. Coinciding with a young adult's vulnerability to injury is the declining interest in Science, Technology, Engineering, and Math (STEM) related careers. In a recent study of about 1.8 million students, only 16.3% presented an interest in STEM (US News *Interest vs. Intent: The New Stem Gap*).

Current Solutions
Various electric and motor longboards offer features that prevent an injury from occurring to its rider. Additional lights, braking systems, and custom deck sizes are some of the most popular features in these longboards. The only current solution that aims to increase student interest in STEM fields is based in the academic environment. Examples of this would be the production of technical and vocational schools, the enactment of policies for a better education from Pre-K to High School, and the incorporation of STEM related subjects in an educational curriculum.

Team's Solution
Our proposed solution is to design a modular longboard do-it-yourself kit that offers protective features for the rider while simultaneously enhancing their interest in STEM. The Shred SLED will offer protection against obstacles and cars when riding at night via LED strip lights acting as turn signals, an automatic brake system to keep the board from rolling should the user fall off, speaker integration for GPS use, and a foldable feature for easier mobility when walking. In addition, the deck size also varies with each user in order to accommodate various physical types. All of these features are rolled into one STEM themed kit that includes the deck, wheels, trucks, and the mechanical and electrical components that make up the board. The kit is designed so that teens and adults can understand the step-by-step instructions. Every part of the kit will need to be assembled, providing the rider a chance to acquire an interest in STEM related projects in a fun and engaging manner while simultaneously providing them the chance to travel on a safe mode of transportation. Our project will offer the rider a personalized board that they can learn from and take pride in, transcending into a lifelong involvement in STEM.

INTERDISCIPLINARY PROJECTS

Gridlockz: Improvements to Traffic-Accident Intervention

Project Participants
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& Phuc Tran

Instructor
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Faculty Advisor
Dr. Woosoon Yim

Technical Advisor
Dr. Evangelos Yfantis

Problem Identified
Traffic accidents are due to drivers' errors 94% of the time. Accidents due to drunk driving, excessive speeding, road rage are among the most devastating. These drivers often get away with their irresponsible driving behaviors. They are sometimes identified, unfortunately, after serious damages to themselves and other commuters have been done.

Current Solutions
Currently, detection of these reckless drivers is mainly through reporting from other drivers and through the presence of law enforcement officers. There are drawbacks to these detection methods: not all reckless drivers are reported and law enforcement officers are not available everywhere.

Team's Solution
Our solution is to place sensor modules, called the Gridlockz, into the road to create a sensor grid. This sensor grid collects motion information of all vehicles traveling on the road. Driving pattern of vehicles can be extracted from the motion information and reckless driving behaviors such as drunk driving, excessive speeding, road raging, etc. can be identified. Furthermore, the locations of these reckless drivers are automatically sent to appropriate local authority for necessary accident intervention. We also developed a portion of an installation device, called the R.S.I.D (Road Sensor Installation Device), which will automate the installation process. This device will prevent a lengthy and invasive installation process. Marketing the R.S.I.D. along with the Gridlockz will entice buyers and streamline the implementation of our product.

UPstaging

Project Participants
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Faculty Advisor
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Technical Advisors
Dr. Tyler Stalbaum, Michael Genova,
Michael Hill, Terry Kell
& Jeff Markle

Problem Identified
When the average concert experience lacks luster, the gears turn within the machine of innovation. Performers are looking to create more immersive experiences for their audiences, but standing on a classic arena-style stage does not offer the flexibility the artist requires to put on the best performance. Thus, creating a desire for a more involved experience.

Current Solutions
Currently, the majority of concert venues are equipped to house a typical stage and performance. Select performers, such as the artists P!nk and Kanye West, use more complex staging systems.

Team's Solution
UPstaging is designed to maximize to the performer's interaction with the audience. The stage is designed to have omnidirectional movement around the entire arena, thus allowing even the furthest audience members a chance to see the performance up close. The stage will also bloom, extending out even further over the audience, thus offering a more dynamic performance and a more immersive experience. The wide range of movement and extendable stage pieces offer a performance unlike any other.

DEPARTMENT OF MECHANICAL ENGINEERING PROJECTS

Department Chair
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Senior Design Instructor
Dr. Zhiyong Wang

&

Dr. Stephen Rice

ACE Splint

Project Participants
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Julio Figueroa & Ashley Lamb

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Faculty Advisor
Dr. Samir Moujaes

Community Advisor
Anis Khair

Problem Identified
Elbow injuries are quite a common occurrence to an average – active or not – person. While many elbow injuries range in severity, there's a common medical consensus that they need to be treated as soon as possible. The focus of the CORE Splint is to treat these acute elbow injuries. Injuries of this type can be caused by a direct blow to the elbow, a penetrating injury, a fall, etc.

Current Solutions
Current market solutions only tackle one aspect of injury healing. Elbow sleeves provide support, but no cooling therapy; ice packs provide (untimed) cooling, but no support.

Team's Solution
CORE Splint serves to combine two different types of treatment: timed cooling and structural support to the arm/elbow. The two forms of necessary injury treatment are combined into one automated splint system. There is also an emphasis on timed cooling. This is because it is recommended that any sort of cryotherapy only have contact with the injury for 12-15 minutes maximum, with an intermittent rest period of about 90 minutes, repeated for 5 or 6 times a day. Since this splint is for use of acute elbow injuries, it is only a very short-term solution. The splint is not meant to replace proper treatments and should only be worn (ideally two days) until proper treatment by a medical professional is administered.

Ankle Cryotheraphy

Project Participants
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Faculty Advisor
Jeff Markle

Technical Advisor
Dr. Mohamed Trabia

Community Advisor
Anis Khair

Problem Identified
Some of us probably know someone who had an injury to the lower leg area, most likely from a sports related accident. These occur very suddenly and tend to worsen over a span of 6 hours, especially if we fail to take action. Our goal is to be able to prevent the post injury complications that usually come with these, and to minimize the length of treatments.

Current Solutions
Current market solutions include wearing a standard splint and then removing the splint in order to cool the injured ankle. In typical cases, the injured ankle is iced without the splint being worn for proper support.

Team's Solution
Our solution is to have a cooling system built into the splint. With this innovation, the splint can provide support to the injured ankle and provide physical therapy using cooling instruments, also known as cryotherapy. This way, support for the injured ankle is not compromised and cooling treatment is provided simultaneously. A splint that has the ability to provide cryotherapy treatment can help reduce the amount of long term damage to injured tissue.

Commoter I: Multiple Degree of Freedom CubeSat Testing Platform

Project Participants
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John Vargas & Jose Vargas-Soto

Instructor
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Faculty Advisor
Dr. Woosoon Yim

Technical Advisor
Dr. Ke-Xun Sun

Problem Identified
Cube Satellites (CubeSats) have emerged as a new trend in space research outside of traditional academic and government projects. With the miniaturization of technology, they are now able to rival capabilities of their big brother satellites for far less of a cost. Their increasing use for amateur and commercial purposes has led to the fact that more than half of all first time CubeSat projects end in failure due to inadequate testing of controls on a system level, they rarely fail mechanically.

Current Solutions
To the best of our knowledge, there isn't anything out there that meets this demand. Most 6 degree of freedom (DOF) testing platforms are incapable of providing adequate range of motion to meet simulation of environments.

Team's Solution
Our goal is to create a 6 DOF testing platform that will simulate the dynamic conditions of space and test the control systems of a 1U CubeSat. Our idea is novel in that it will be designed to be mounted on the ceiling in a specially dedicated room to provide minimum signal interference. The ceiling will be designed to allow for multiple testing configurations. It is also capable of continuous rotation. Our future goals are to allow these platforms to perform in irradiated environments.

Drink Mate

Project Participants
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& Delven Angelo Tan-Torres

Instructor
Dr. Stephen Rice

Faculty Advisor
Dr. William Culbreth

Technical Advisor
Dr. Pushkin Kachroo

Problem Identified
We wanted to streamline the process of making cold mixed drinks with the simple touch of a button. We wanted to design a machine that is capable of producing bar favorites in your very own home. The system would be perfect for parties, serving chilled drinks to guests. The machine would also contain a self-cleaning function that makes cleanup a breeze.

Current Solutions
Currently there is only one household drink mixer in the market, the Somabar. These units are specialized for alcoholic drinks and can add in bitters and flavorings for specialty cocktails.

Team's Solution
The Somabar retails at $750 and is only currently available to investors from online funding campaigns. The Drink Mate costs half of the MSRP of the Somabar. Our design includes refrigeration, as well as a clean water reservoir to flush out the tubing after each drink request. The machine also incorporates an LCD screen that makes it simple for ordering drinks and even automatically dispensing a cup if needed. The main highlight of the Drink Mate is the affordability for an at home novelty drink mixer.

EvoGlove

Project Participants
Isaiah Henry, Keitaro Nishimura & Truc Trung Tran

Instructor
Dr. Stephen Rice

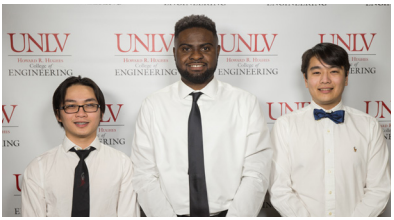
Faculty Advisors
Dr. Georg Mauer &
Dr. Merrill R. Landers

Technical Advisor
Jeff Markle

Problem Identified
Parkinson's disease is a chronic and degenerative disorder of the central nervous system that affects the motor cortex of the brain. It has a variety of symptoms: tremors (involuntary movement in the form of shaking), muscle rigidity, postural instability (lack of balance), bradykinesia (slowness in the initiation of movement), psychiatric complications of anxiety, and depression. The primary objective is to focus on mitigating tremors appearing on the hands. As it is an early stage symptom, it causes patients to become self-conscious and to lose their social life. This will result in an increase on their anxiety, depression, and can accelerate other symptoms.

Current Solutions
The closest to the topic competitor is GyroGear, whose solution uses gyroscopes to cancel out any involuntary movement by the wrist. The device is able to detect any tremors through a change in angular momentum of the gyroscopes. When tremors are detected, a servo motor below the gyroscopes is used to create an opposing momentum to cancel the tremors. The fingers, however, are left unattended. Moreover, two gyroscopes and a large servo motor will take a lot of space and add a lot of weight, making it difficult for patients to use it in their daily lives.

Team's Solution
Taking a completely different path from our competitor, the Evo-Glove aims to be lightweight, affordable, and unobtrusive. The design uses strings attached to motors located at the wrist brace to control the oscillations of the finger from the first digit. In addition, each finger is attached with an accelerometer to read the shaking frequency. The data will be recorded and analyzed through an Arduino. If involuntary movements are detected through the fingers, the Arduino will activate the motors providing tension on the fingers through strings. The majority of Parkinson patient are pensioners who can't afford or withstand any expensive and invasive surgeries or other medical hardware solutions that are available on the market today. The components used on this device are relatively cheap. This will improve the price of the device significantly.



FireHUD

Project Participants
Kyle DeBerardinis, Levi Dieter
& Cameron Elwardt

Instructor
Dr. Stephen Rice

Faculty Advisor
Dr. Darrell Pepper

Technical Advisor
Richard Brenner

Problem Identified
During initial search and rescue or overhaul operations, fire safety personnel carry a handheld thermal imaging camera. This handheld camera is quite cumbersome and can get in the way of firefighting and rescue operations.

Current Solutions
In the market currently are handheld thermal imaging cameras from various companies such as FLIR, Bullard, and Draeger. There is also a mask mounted thermal imager from Scott Safety. These do not have a universalized design that can be used on various helmet and mask styles.

Team's Solution
The benefit of our design is that it will give the user hands-free thermal imaging capabilities. Furthermore, the design will allow use on different fire helmet designs, making it almost universal. Having this universal design allows for a range of users such as interior firefighters, search and rescue personnel, and wildland firefighters.

FK Tactical Competition Carry

Project Participants
Grant Anderson & Dan Chuan "Jason" Fan

Instructors
Dr. Stephen Rice & Dr. Zhiyong Wang

Faculty Advisor
Dr. Yi-Tung Chen

Problem Identified
For concealed carriers and competition shooters alike, no single gun exists to excel at both roles and remain legal in all 50 states. No longer do you have to make the choice between race gun performance and conceal-ability.

Current Solutions
Only a couple of production handguns attempt to do this, and fail in one area or another. Some compensators that don't use threaded barrels also try and accomplish this feat, but fall short in performance, ergonomics, structural integrity, or price.

Team's Solution
Of the best competitors, they are only decent at one area, which is typically competition shooting. Of those top choices, you will find guns which are still too large to conceal for self-protection, which leaves you just needing a traditional race gun for the range, and "carry gun" you conceal every day for self-defense. With FK's solution, your ultra-high performance competition gun is now your everyday carry. All of your training can now be spent on the same platform you entrust with your life. The FK Tactical Competition Carry is built on a Glock 19 frame, using a concealed carry size 4" custom integrally compensated barrel for massively reduced muzzle flip as well as a custom low-recoil slide to accommodate this barrel. Because you're supposed to win a competition as well as save your life, this pistol has nearly every upgrade found on the world's best race guns. These features include a custom trigger, various coatings for increased durability, corrosion resistance, performance, and ergonomics, a customized grip, and improved magwell. For all those who care about their personal safety from California to New York, this is the solution for you.

Lifsink

Project Participants
Xinke Cao & Nazanin Minaian

Instructor
Dr. Stephen Rice

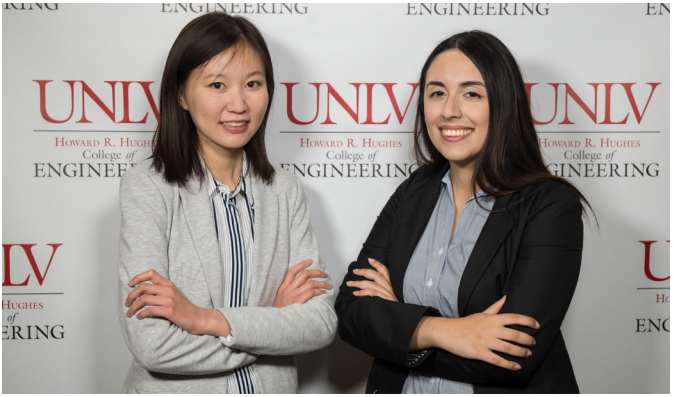
Faculty Advisor
Dr. William Culbreth

Technical Advisor
Dr. Tyler Stalbaum

Problem Identified
Traditional sink designs in North America have been implemented in households and hotels with little to no change in design over the last hundred years. The design has not been optimized in terms of sustainability or considering ergonomics such as comfort, functionality, and aesthetics. In this project, a novel sink has been designed which utilizes radial fountain-like spouts to create unobstructed hand and face washing in an aesthetically pleasing and comfortable way.

Current Solutions
The current market for sinks in North America offers only traditional style sinks made from various materials, or exorbitantly priced “luxury” sinks which offer little-to-no innovation in design in terms of sustainability or comfort, focusing primarily on aesthetics.

Team’s Solution
Lifsink offers an eye-catching, unique hands-free control and ergonomic design that standard bathroom sinks fail to meet. The radial fountain-like design will provide more comfortable hand and face washing, while the laminar glass-like streams will provide an aesthetically pleasing environment. The current price estimates are also very reasonable in comparison to competitors in the luxury sink market.



RebelRot

Project Participants
Justin Cole, Darwin Cody Mao
& Ian Souza

Instructor
Dr. Stephen Rice

Faculty Advisor
Dr. Georg Mauer

Technical Advisor
Terry Kell

Community Advisor
Tara Pike

Problem Identified
In recent years, campuses, hotels, and restaurants in Las Vegas have made significant efforts to reduce their waste production. UNLV Campus events are now organized for a goal of zero waste and daily operations now employ consumable items that can be refurbished for alternative uses. However, a significant contribution of the campus' waste production comes from the biodegradables that requires contractor disposal at UNLV's expense. The UNLV recycling center attempted to compost such material but was unsuccessful due to the lack of medium-scale aerobic composters on today's market.

Current Solutions
Large-scale composters are commonly found at commercial agriculture industries and are priced fairly high due to its industrial-level efficiency. At the other end of the spectrum, composters designed for recreational use are relatively inexpensive but require a tenacious amount of manual labor. Green Mountain Industries provides a viable solution in the form of the Earth Tub, but requires the user to manually operate the components that mix the compost.

Team's Solution
Team RebelRot proposed the idea of converting an ordinary six-cubic yard cathedral dumpster into a fully functional in-vessel composter. Cathedral dumpsters are common and relatively inexpensive. The benefit of turning a dumpster of this size into an in-vessel composter can be seen in the economical solution for mid-scale commercial composting. It utilizes a fully automated xy-table with an attached auger blade to efficiently mix all areas of the composting material. The xy-table and auger assembly is powered by a single 120V outlet and operates on DC logic. The composter will provide sufficient conditions to turn biodegradables and food waste into fresh and nutrient-filled soil.

Rescue-Jet

Project Participants
Alan Bruno, Kimberly Gonzalez & Alyssa Lai

Instructor
Dr. Stephen Rice

Technical Advisor
Dr. Hui Zhao

Problem Identified
Since the beginning of time, floods, careless swimmers, and riptides have often caused and will continue to cause the need of rescuing people. Lifeguards and first responders have been trained to appropriately react to such situations, but there is always room for improvement when it comes to the technology used to assist them. A common problem lifeguards and other first responders face is they may get tired of walking or swimming through water, and as a result, not have sufficient energy to return to shore. The Rescue Jet was created for this specific purpose, to assist lifeguards and first responders when saving people from dangerous, life threatening circumstances.

Current Solutions
Similar designs include motorized surfboards that were created for recreational purposes such as the Jetsurf GP Motorized Surfboard and the Surftek Aquasurf Jet Surfboard. None of these products were built to ease the process of rescuing someone. Although not originally intended for this purpose, personal watercrafts such as Jet Skis and Sea-Doos have proven to be useful and efficient to save people since they're fast and durable. The only problem is that they are expensive and heavy to move to the shore.

Team's Solution
The Rescue Jet is a motorized, jet powered surf board that comes with a rescue sled attached to the back of the surfboard. The rescue sled provides life jackets to multiple drowning victims when arriving to the location and then serves as an additional support for the victims until they are brought back to shore. The Rescue Jet will also be equipped with turn signals. Traditionally, when lifeguards are saving someone, they have a partner who stays on shore so that they can direct them on where to go through the use of hand signals. However, the lifeguard has to keep turning back in order to see where their partner is directing them and in turn they can get disoriented. To make things easier and safer, we will incorporate turn signals on the board which will be controlled by that person who stays on shore.

Something Trashy

Project Participants
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& Eric Ng

Instructor
Dr. Stephen Rice

Faculty Advisor
Dr. William Culbreth

Technical Advisor
Jameson Lee

Problem Identified
Trash must be taken out on a daily to weekly basis depending on the institution/ individual preferences. Removing an old trash bag is quickly done, but replacing the trash bag is significantly more involved.

Current Solutions
Currently, there are no market solutions available. There is a myriad of product ideas that will help reduce the time needed to replace a trash bag, by prepping or conveniently storing bags, but the market lacks a product that can autonomously replace bags.

Team's Solution
Our goal is to eliminate the need for involvement from the user in replacing the trash bag by creating a product that will autonomously grab, open and place a bag in a trash can. This product allows users to walk away from an empty trash can and return to a bagged one. This would allow, janitors for example, to place the empty trash can in our product, clean the office area/room, and return to a trash can that is ready to be used.

Trailer Trash

Project Participants
Adrian Lee, Justin Neubauer
& Joe Travis

Instructor
Dr. Stephen Rice

Faculty Advisor
Dr. Tyler Stalbaum

Problem Identified
Residential homeowners need convenient and affordable solutions for their dirty and foul-smelling trashcans. Trashcan cleaning services are available to serve this need. However, the current cleaning systems are very expensive. Ambitious individuals looking to start a trash can cleaning service need an affordable product to lower the barrier of entry into the market of trash can cleaning services.

Current Solutions
The current system is adapted to fit either a large flatbed truck or a retired garbage truck. This immediately increases the cost of the trash can cleaning system due to the cost of the vehicle upon which the cleaning system will be permanently installed.

Team's Solution
The trailer trash system will utilize a small 4'x8' utility trailer that can be hauled by any small-mid size pick-up or SUV. The smaller platform greatly reduces the cost of the system and allows business owners to use their personal truck or SUV as a work vehicle to haul the cleaning system. The trailer trash system will also reclaim the water used to clean the trash cans which will reduce operation costs and improve the productivity of the business.

The Turbinator

Project Participants
Anthony Ghanem, Lily Sender
& Hannah Carolyn Woods

Instructor
Dr. Stephen Rice

Faculty Advisor
Dr. Yi-Tung Chen

Technical Advisor
Jeff Markle

Problem Identified
During the aftermath of hurricane Maria, many citizens of Puerto Rico were left stranded without access to power. Our solution to this problem and others like it is to create a wind turbine that provides the same power output as commercially available wind turbines, while being more efficient and smaller. The turbine must also be portable, easily constructible, and provide 400 watts of power.

Current Solutions
While there are 400-watt wind turbine generators readily available to the public, there are no mass market solutions that allow the complete turbine package to be easily collapsed and reassembled. The current generators used for power outages rely on resources that may not be available such as gas.

Team's Solution
The goal of our project is to create a more efficient wind turbine than what is currently available on the market. Our turbine will be portable and easily constructible, while still providing 400 watts of power. It will benefit people who have limited access to power after natural disasters or during power outages, or people who live in remote locations away from power lines. Unlike typical gas generators, our product runs completely on renewable energy so there is no additional cost.

Window Breeze

Project Participants
Randy Bae, Joshua Nacional
& Henry Paiz

Instructor
Dr. Stephen Rice

Faculty Advisor
Dr. Yi-Tung Chen

Problem Identified
A vacant car parked in the sun gets hot. A common thought is that if the windows are opened by even a few inches the inside of the car will be cooler upon the owners return. The problem is that opening your windows a few inches invites vandalism or theft.

Current Solutions
Kulcar utilizes the concept of applying solar powered fans to cool the inside of a vacant car. However, it does not install properly in cars that have curved windows. It also has the issue of letting rain into the vehicle.

Team's Solution
With our solution not only do we see greater performance through our solar powered fans, but the Window Breeze gives the added benefit of security and installation. Installation is as easy as screwing down a clamp to a door frame while the security is seen in the design. People who live in hot environments and park in the sun a lot will see the most benefit from this product… i.e people who live in Las Vegas!

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