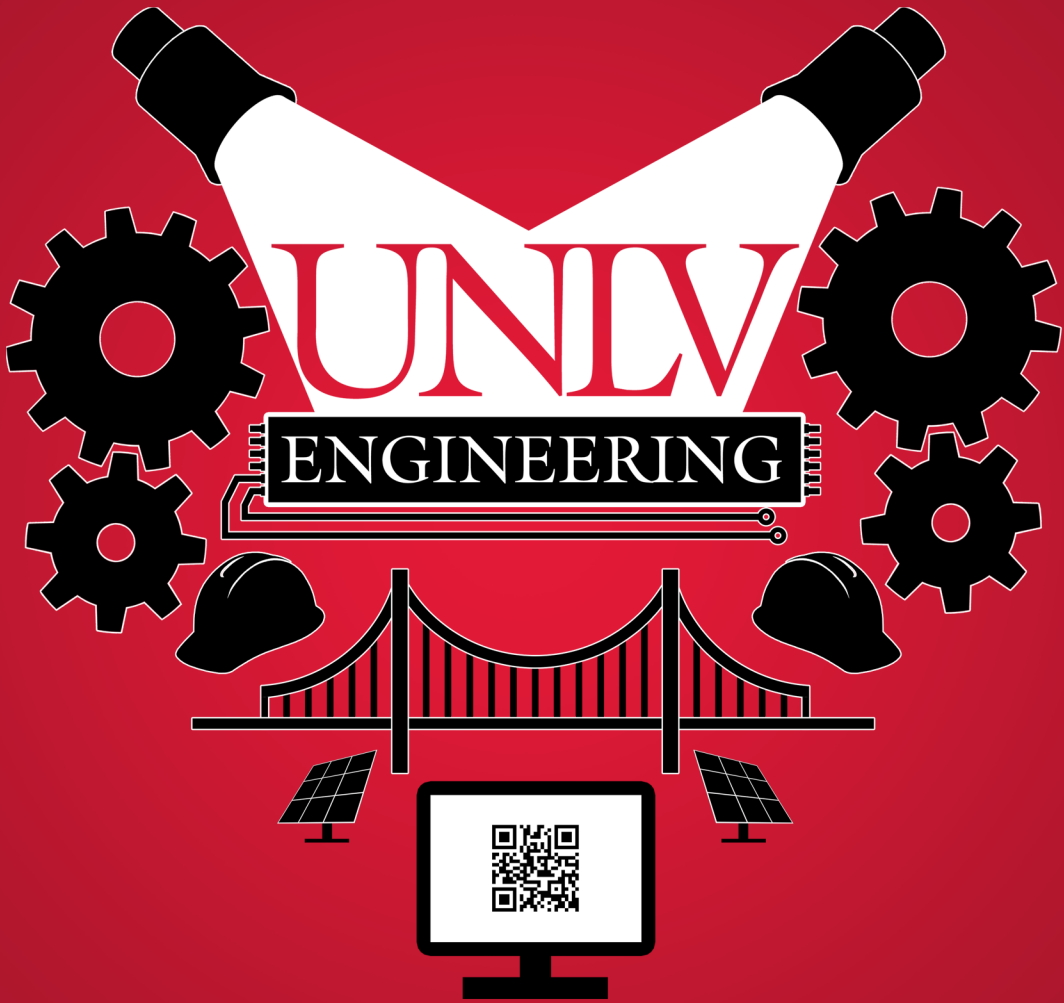
FRED AND HARRIET COX
SENIOR DESIGN COMPETITION



December 7, 2017



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 895-3281.

Senior Design Clinic

The College of Engineering's Senior Design Clinic continues to serve as a unique experience in which companies will be able to partner with the students to work on specific challenges to find business solutions. To find out how to get involved in this exciting new venture, please contact Professor Pushkin Kachroo at pushkin@unlv.edu or (702) 895-4926.

Thank you to our Sponsors!









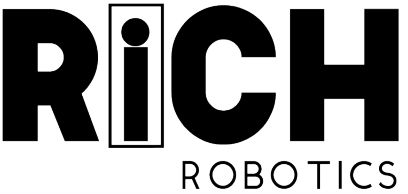












Thank you,
Senior Design Instructors!

Department of Civil and Environmental Engineering and Construction
Dr. Samaan Ladkany

Department of Computer Science
Dr. Andreas Stefik

Department of Electrical and Computer Engineering
Dr. Grzegorz Chmaj

Department of Entertainment Engineering and Design
Dr. Si Jung Kim

Department of Mechanical Engineering
Dr. Zhiyong Wang

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Fall 2017 Senior Design Judges

Olawale “Wally” Adetona



Dr. Adetona has served as primary Analyst and/or Lead Control Systems Engineer in a broad variety of projects that developed pioneering algorithms and novel hardware for: Platforms that can automatically point at Earth targets from the orbiting International Space Station, Unmanned Aerial Vehicles, Submarines, Fuel Cells, Ultra Violet Germicidal Irradiation, ultra-sensitive toxic gas detection, robust smoke and fire detection, model based control of next generation refrigerating systems, etc.

Dr. Adetona received a Ph.D. Degree in Mechanical Engineering from Vanderbilt University in 1997 under the guidance of Prof. Lee Keel and Prof. E. Garcia. He subsequently worked for Prof. Lee Keel as a post-doctoral research fellow at Tennessee State University. He has also worked at United Technologies Research Center (a Subsidiary of United Technologies Corporation) and Teledyne Brown Engineering. He currently works at NASA Marshal Space Flight Center in Huntsville Alabama.

John Benner



As the MSTS Deputy Site Manager, Benner works to integrate NNSS operations across organizations to ensure safe, secure and consistent execution and strengthen external relationships with NNSS customers, including the National Laboratories.

Before joining MSTS, Benner spent nearly 25 years working at Los Alamos National Laboratory (LANL) in Weapon Systems Development, Life Extension, qualification and testing, stockpile management, production, safety and security.

As the Associate Director for Weapon Engineering and Experiments he led the organization responsible for managing all weapon systems activities, including Life Extension Projects (LEPs), surveillance, weapon surety, explosive testing and development, hydrodynamic testing, LANL subcritical testing operations at NNSS, and integration and planning of major portions of the stockpile stewardship program. While serving as the Weapon Systems Division Leader at Los Alamos National Laboratory Benner played a key role in managing the W76-1 Life Extension Program, reinvigorating the experimental firing sites and high explosive capabilities leading to the strengthening of the companies Weapons Engineering capabilities.

L John Loomis



A Pepperdine University alum, John Loomis has a varied career spanning over 40 years in technology, finance, entertainment, and education industries. Loomis' technical accomplishments include a development engineering background in hardware, software, and telecommunications.

Currently, Loomis is a partner at Inpirium, providing innovation-consulting services as well as a turnaround specialist, providing executive mentoring to medium and large institutions domestically and overseas. In addition to being a member of the board for four corporations, he was also a co-founder for four technology startup ventures.

A few highlights to Loomis' extensive resume include the eight years he spent in the Middle East. During that period Loomis presided over a company turnaround as CEO at International Turnkey Systems (ITS) in Kuwait. ITS provides a unique Core Banking solution to both traditional and Islamic financial institutions in addition to software and consulting solutions to the education, energy and government markets.

Loomis also performed as a COO at Gulf International Bank in Bahrain and CIO at Arab National Bank in Saudi Arabia where he oversaw the implementation of a new Core Banking solution (the first implementation of a MPLS network for a financial institution in Saudi as well as building a tier-3 green data center).

Senior Design Competition

CS- *Computer Science*
ECE- *Electrical & Computer Engineering*
INT- *Interdisciplinary*

Presentation	Time	Project Title
PRESENTATION 1	8:05 A.M.	I.E.D. Rake
PRESENTATION 2	8:20 A.M.	Solar Juice
PRESENTATION 3	8:35 A.M.	Human Powered Vehicle
PRESENTATION 4	8:50 A.M	Betting on Green: Stormwater
PRESENTATION 5	9:05 A.M.	Master Pallet
PRESENTATION 6	9:20 A.M.	Sol-Hydrator
PRESENTATION 7	9:35 A.M.	Pneumatically Controlled
9:50 A.M. – 10:15 A.M.		**BREAK**
PRESENTATION 8	10:20 A.M.	Animatronic Sorting Hat
PRESENTATION 9	10:35 A.M.	I-15 Southbound Ramp at the
PRESENTATION 10	10:50 A.M.	Micro-Grid Test Platform
PRESENTATION 11	11:05 A.M.	Automatic Buoyancy
PRESENTATION 12	11:20 A.M.	Ward:
PRESENTATION 13	11:35 A.M.	OAR Pallet
PRESENTATION 14	11:50 A.M.	Pedestrian Lighting
PRESENTATION 15	12:05 P.M.	Toast.ER
PRESENTATION 16	12:20 P.M.	Super Splint
12:35 P.M. - 1:50 P.M.		**LUNCH**

Presentation Schedule

CEEC- *Civil & Environmental Engineering & Construction*
EED- *Entertainment Engineering and Design*
ME- *Mechanical Engineering*

		Department
		ME
		INT
		ME
r	Infrastructure Upgrades	CEEC
		ME
		ME
	Exponential Springs	ME
		EED
e	Spring Mountain Road Interchange	CEEC
		ECE
	Compensator Device	ME
	Smart Awareness System	ECE
		ME
	Guidance System	ECE
		INT
		ME

Senior Design Competition

CS- *Computer Science*
ECE- *Electrical & Computer Engineering*
INT- *Interdisciplinary*

Presentation	Time	Project Title
PRESENTATION 17	2:00 P.M.	Adjustable Kitchen
PRESENTATION 18	2:15 P.M.	Infrared Object Locator
PRESENTATION 19	2:30 P.M.	Fire Lights
PRESENTATION 20	2:45 P.M.	Smart Ballet Shoes
PRESENTATION 21	3:00 P.M.	A Better Paradise
PRESENTATION 22	3:15 P.M.	DRiO
PRESENTATION 23	3:30 P.M.	Industrial Abrasive
PRESENTATION 24	3:45 P.M.	Automated Optoelectronics
PRESENTATION 25	4:00 P.M.	Speed-O
PRESENTATION 26	4:15 P.M.	Atmospheric Monitoring System
4:30 P.M. to 4:50 P.M.		**BREAK**
PRESENTATION 27	4:55 P.M.	Mirror Image
PRESENTATION 28	5:10 P.M.	UNLV Southern Parking
PRESENTATION 29	5:25 P.M.	Polymer Knee Joint Cap
PRESENTATION 30	5:40 P.M.	Advanced Engineering
PRESENTATION 31	5:55 P.M.	Marco Polo:

Presentation Schedule

CEEC- *Civil & Environmental Engineering & Construction*
EED- *Entertainment Engineering and Design*
ME- *Mechanical Engineering*

	Department
	ME
Mechanism for Audio-Visual Devices	ECE
	EED
	ECE
	CEEC
	ME
Sorting Machine	ME
Testing Platform	ECE
	ME
	ECE
	ECE
Efficiency Movement	CEEC
Testing Machine	ME
Studies Building	CEEC
A New Type of Meetup App	CS

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING AND CONSTRUCTION PROJECTS

Department Chair
Dr. Sajjad Ahmad

Senior Design Instructor
Dr. Samaan Ladkany

A Better Paradise

Project Participants
Meshkat Mirzaei, Lokela Abad,
Aaron Yup, & D'Amato Hyche

Instructor
Dr. Samaan Ladkany

Faculty Advisor
Dr. David James

Technical Advisor
Bryan Osborne

Problem Identified
The UNLV Paradise Campus has a drainage issue which leads to stagnated water in the parking lot and on the surrounding streets. The Campus itself is also out dated and is need of a redesign.

Current Solutions
There is currently no market solution to this problem; the UNLV Paradise Campus site would have to be redesigned and repaved.

Team's Solution
The best alternative that our team has come up with is to completely redesign the UNLV Paradise campus since there are many different problems. Our design would include a newly designed building, parking lot, overflow channel and landscaping. This design would not only benefit UNLV Paradise staff and students but it would also benefit the whole community to have a new and efficient campus.



Advanced Engineering Studies Building

Project Participants
Walker Chen, Mario Fines,
Frankie Morelli, & Jonathan Sorola

Instructor
Dr. Samaan Ladkany

Faculty Advisor
Dr. Ryan Sherman

Technical Advisors
Dr. Moses Karakouzian,
Dr. Hualiang Teng,
& Dr. Ying Tian

Community Advisor
PGAL

Problem Identified
Lack of space for classrooms and research for the Howard R. Hughes College of Engineering has created a need for additional space. The traffic generated by students and delivery vehicles has also created a safety issue with vehicles parked in a fire access route, requiring modification.

Current Solutions
The current market solutions are to do nothing, expand on existing facilities, or create new facilities. Currently a new building design is in the works for an expansion to the College of Engineering.

Team's Solution
The team proposes to design a turnaround for vehicles and trucks for safety purposes as well as adding to the design of the existing building or expansion to facilitate increased demand. This will benefit the students of the College of Engineering as well as the faculty by creating classroom and research space, increasing the safety of the surrounding area, and reducing the fire risk. The team believes this will be better than current solutions because the current design may lack key features which have been requested, such as a loading dock, and it addresses the safety issues of the current fire access.



Betting on Green: Infrastructure Redesign for the Future of Las Vegas

Project Participants
Miles Buckner, Autumn Lyn Donovan, Jennifer Jarquin, & Jason Shon

Instructor
Dr. Samaan Ladkany

Faculty Advisor
Dr. Sajjad Ahmad

Technical Advisor
Dr. Haroon Stephen

Community Advisor
Saul Gutierrez

Problem Identified

Large cities, like Las Vegas, are no exception to the persistent dilemma of keeping waste from finding its way onto the streets. Waste found in street-side catch basins currently prevents a steady flow of storm water from entering the drainage system; this problem generates serious infrastructure questions over the capabilities of the Las Vegas storm drain system, especially during storms. Floods can damage the roadways, impact traffic flow, and lead to contamination in the water system. This man-made issue has increased steadily, and will continue to do so as the population in the valley grows.

Current Solutions

Scheduled catch basin cleanings are the current implemented solution for street flooding. These systems are not owned by just one entity; therefore, the schedules are not uniform across the valley. This leads to some basins accumulating debris more than others. Dated infrastructures in older areas of Las Vegas are more prone to flooding, and as of now there are no proposed drainage system upgrades in place.

Team's Solution

Redesigning the existing catch basin system is the best way to reduce flooding in Las Vegas, while taking steps toward a greener infrastructure. This could prove more economical than increasing the current maintenance schedule for the basins. It would be difficult to identify how frequently the problematic catch basins must be cleaned, and it can become costly over time to hire workers to perform the upkeep. Improving the system will consist of introducing a new design to the older infrastructure which will reduce storm water volume. Implementing green infrastructure in our community will prove beneficial to the air, water and habitat quality. The locals and tourists who commute in Las Vegas during rain events could benefit from an improved storm drainage system. Because flash flooding is a serious issue that happens in Las Vegas, people are wary when water starts to accumulate on the roadways. Reducing the amount of flooding on the roads during rain events could allow the traveling public to feel safer when driving, resulting in decreased traffic congestion during these events.



I-15 Southbound On Ramp at the Spring Mountain Road Interchange

Project Participants
Artuan McGee & Annie-Laurel Weist

Instructor
Dr. Samaan Ladkany

Faculty Advisor
Mohamed Kaseko

Technical & Community Advisor
Michelle Castro (NDOT)

Problem Identified
The problem our project seeks to address is the traffic that occurs on the southbound on-ramp to I-15 at the Spring Mountain Road Interchange. When peak traffic occurs, there is not enough room for the cars entering from the double left turn lanes, causing them to spill out into the intersection. When this occurs, it does not allow any cars entering the ramp from the right turn lane onto the ramp and traffic backs up in the right turn lane onto Spring Mountain Road.

Current Solutions
Some possible solutions for this project are a ramp extension, a redirect loop and the do-nothing option which will all be compared to decide the best final choice. The ramp extension would lengthen the on ramp to provide more space to entering traffic. A possible redirect loop on the north side of the intersection would redirect traffic which would have originally been entering from the left coming west but would now be entering from the right coming west. The do-nothing option would be to keep the intersection and on ramp as is.

Team's Solution
The chosen possible solutions for this project are: adding an additional lane to the ramp, adding a second lane to the right turn movement and making it signalized instead of the current yield, or to do nothing. Adding a lane to the ramp would allow the double-left turn lanes and the single right turn lane to have their own dedicated space on the on-ramp. Adding a second right turn lane and a traffic signal to regulate it would allow each movement time to fill up and empty the ramp, so that the following movement would have space on the ramp. The do-nothing option would be to keep the intersection and on-ramp as is.



UNLV Southern Parking Efficiency Movement

Project Participants
Adrianna Gould, Alan Heng,
& Lauren Mamaclay

Instructor and Faculty Advisor
Dr. Samaan Ladkany

Technical Advisor
Dr. Alexander Paz

Community Advisor
UNLV Facilities

Problem Identified
Even with an additional parking structure added to the east of campus, the Thomas and Mack parking area has had limited decrease in congestion. This is causing high queuing time along Tropicana Avenue, Swenson Avenue, and within the area itself.

Current Solutions
Adding additional parking is a typical solution but due to the limited area on the Southern side of campus this option is not feasible.

Team's Solution
Our team would like to evaluate two different solutions of varying price. One would be to create more visibility of available space and the other is to create a high density of spots in the same area. This is a more efficient solution than simply creating additional parking elsewhere, as it is not always equivalent to the parking closest to the Thomas and Mack. This would benefit any person utilizing the parking in this area in addition to any person simply driving past the area during peak traffic times.



DEPARTMENT OF COMPUTER SCIENCE PROJECTS

Department Chair
Dr. Laxmi Gewali

Senior Design Instructor
Dr. Andreas Stefik

Marco Polo App

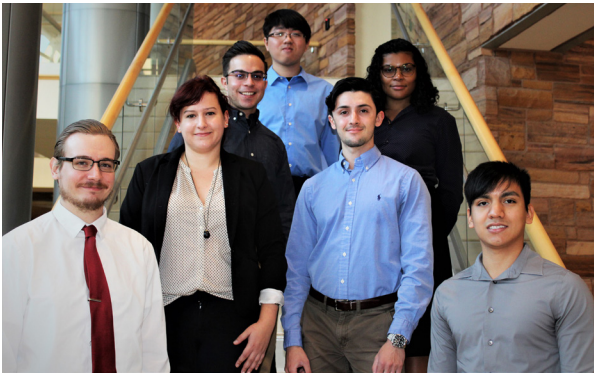
Project Participants
Andrew Chapin, Daphnie Churchill, Aleck Kwan, Kaylan Mettus, Chase Reisler, David Rodriguez, & Joseph Yalenkatian

Instructor
Dr. Andreas Stefik

Problem Identified
Current social apps on the Google Play Store are not social in the physical sense of the word. They provide a virtual location to meet other users, and the focus from human-to-human interaction is transferred to human-to-computer-to-human interaction. Thus people are spending less time physically with each other.

Current Solutions
There are apps on the Google Play Store that market the ability to find a user's list of friends via their GPS location, but most of them, including Snapchat, hap hazardously display this information at all times. Many of these apps hide the location control settings and make it harder for the user to set their privacy. Though the user might agree to the terms of use and to share their location, they might not want to be visible 100% of the time.

Team's Solution
The Marco Polo App provides the ability for a user to share their location privately whenever they want by initiating contact within their list of friends, dubbed as "Sending a Marco." When a request is received, the recipient may accept by "Responding with a Polo." Once both users have engaged in the meetup request, their GPS locations will be shared with one another. Besides sending private meetup requests, a public mode is available to users in order to meet new people and share local event information; both modes are based upon the same functionality yet provide two different socially interactive user experiences. Not only does our app provide a consensual and user-controlled sharing of location, but also encourages users to stay physically and socially active by facilitating an easier way to meetup with friends. The Marco Polo App's goal is to augment more human-to-human interaction within the age of technology.



DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING PROJECTS

Department Chair
Dr. Yingtao Jiang

Senior Design Instructor
Dr. Grzegorz Chmaj

Atmospheric Monitoring System

Project Participants
Alejandro Marure-Sosa, Alexandra Miteva,
Matthew Hoffman, & Mahbob Saif

Instructor & Faculty Advisor
Dr. Grzegorz Chmaj

Problem Identified
Thorough research into the field of air pollution revealed indoor air quality as a top five public health risk. EPA studies have found that indoor air pollutants are approximately 2 to 5 times greater than those found outdoors. The main problem being that while there are existing at-home devices to track these harmful chemicals, those with quick notifications and accurate detection are quite expensive.

Current Solutions
Current market solutions consist of devices of similar aptitude such as the Foobot and Awair. Foobot is an air quality monitor that measures VOC, PM, CO2, CO, temperature and humidity. Awair is an air quality monitor that measures chemicals, dust, CO2, temperature and humidity. Both these products also provide an app for your smartphone to help keep track of the measured levels.

Team's Solution
Our solution will use sensors that have high precision for more accurate results. We will also be implementing an app using the Blynk Cloud Software Platform for a simple dashboard interface for easy to read measurements and graphs. Anyone who wishes to monitor the quality of air in their homes, detect hazardous gases and keep track of specific pollutants can benefit from our product.



Automated Optoelectronics Testing Platform

Project Participant
Luis Soriano-Oliveros

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Ke-Xun Sun

Problem Identified
As modern technology advances and more complex electronics 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, always aiming 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, photoresponsivity 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.



Infrared Object Locator Mechanism for Audio-Visual Devices (IROLM)

Project Participants
Billy Louis & Tone Pondaharn

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Emma Regentova

Problem Identified
Professionally produced video requires expensive equipment and experienced personnel, but the advent of online video content produced by small teams or even a single person demonstrates a need for equipment beyond simple tripods and slings. For single-creator content, a person/object tracking mechanism for a wide array of cameras can be invaluable.

Current Solutions
Various motorized sliders and dollies exist, most geared towards time-lapse and pre-programmed movement and speed. These systems also require a controller and operator for real-time movement yet still command prices starting just below a thousand dollars. Even higher end systems, such as the Camera Corp Video Camera Tracking System, require the help of a person to drive the system from a computer. This and custom tracking systems like it are far out of the reach of hobbyists.

Team's Solution
By leveraging existing technology, the IROLM is low-cost and modular. The IROLM uses an infrared hardware solution, the same kind of technology used in TV remote controls. This does not require a full-time operator can be more efficient compared to purely software-based solutions which rely on fast computer processors.

The object/person wears an infrared emitter that is picked up by a sensor array on the slider/dolly mechanism and is driven to keep the subject centered in the frame. The modular nature of the IROLM means zooming in and out can be handled by a video processor or other method as required.

Hobbyist and prosumer video market segments can benefit from advanced features at an affordable price point. For example, aspiring and even professional "YouTubers" can create more dynamic and entertaining content quickly without the need for camera operators. Instructors and lecturers on sites such as Udemy can produce more engaging lectures and maneuver around multiple whiteboards, concentrating on content rather than videography.



Microgrid Test Platform

Project Participants
Desi Battle, Candace Caimol,
& Michael Tomakili

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Chandon Esplin

Technical Advisor
Octavio Gonzalez

Problem Identified
Currently, microgrids are a developing means to distribute power efficiently. However, due to operating limitations set by manufacturers to protect the microgrid, it is not possible to perform some tests that may be useful in researching the future development of microgrids.

Current Solutions
Microgrids like UNLV's are designed for their specific environment and for that reason it would be unproductive to compare our design with other test platforms.

Team's Solution
Our solution aims to increase the testability of microgrids. This will allow the user to temporarily circumvent the limitations imposed by the manufacturer to run their desired tests and collect data on the results. Increasing the range of tests able to be performed on microgrids is essential for the R&D of microgrids as an efficient future means of power distribution.



Mirror Image

Project Participants
Tyler Ferreira, Kristal Lemieux,
& Sharyn Miyaji

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Brendan Morris

Problem Identified
Exercise is an important routine for maintaining a healthy lifestyle. According to a few research studies, people do not go to the gym because it takes extra time to commute and the price for paying for a membership or a trainer is too much. Having an exercise product that can be placed in homes can help save money as well as time which people commonly used as an excuse for not going to the gym.

Current Solutions
After researching similar products on the market, a few of them are not within a reasonable price range. Other products use a display and camera to show what the individual working out looks like, which leads to a higher chance of malfunctioning than using a mirror. Currently, there are no products that are touchscreen, have a virtual trainer to help guide an individual and does not need internet connection to operate.

Team's Solution
Our team's solution is to be able to combine all the different types of workout mirror products that are available while making it more affordable to the average person. Not only will this product be for people that are workout intensive, it could also be for elders who do not need a strenuous workout. This product will be easy to use for those who have little to no knowledge on how to work out properly. People would be able to work out in the comfort of their own homes and do it on their own time without having to worry about the commute. Instead of paying for a gym membership, buying our product will be a one-time fee saving money in the long run.



Pedestrian Lighting Guidance System

Project Participants
Sarah Africa, Josh Perry,
& Luis Ruiz

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Sarah Harris

Problem Identified
Pedestrian fatality rate is three times higher at night. Per the Traffic Safety Facts (2012 Data), 70% of the pedestrians are killed in the nighttime (6PM – 5:59AM). A driver can only avoid an accident if he/she sees the pedestrian relatively far ahead. Headlights only let the driver see about 350 feet ahead.

Current Solutions
The closest solution in the market is the innovative design Audi has incorporated to their car model; the Audi A4 is more for personal use rather than a pubic design. Crosswalk lighting on the street is available to light up sections of the crosswalk once the light is pressed. Overhead flashing lights, like the Hawk System, are also used with a set timer to warn drivers that pedestrians are trying to cross. One tested solution is setting two posts on both sides of the street, such that once a pedestrian presses a button, the lights turn on to illuminate the crosswalk.

Team's Solution
The Pedestrian Lighting Guidance System is a more efficient way to solve pedestrian fatalities due to poor visibility at night. The system will be very user-friendly. Pedestrians would not have to do anything different than they usually do when crossing the street at night, because the pedestrian detection software will control the spotlight whenever someone triggers it. The system will run autonomously. The main detail of the PLGS is its ability to view any object crossing in the intersection using the OpenCV libraries. The cameras process the incoming images and relay the position to the microprocessors that control the motor servos, which rotate 180 degrees and will be able to move the focused spotlights from one side of the crosswalk to the other. The device we are trying to create is optimized more for industrial use, not for consumer use. It does not require any sort of reconstruction or modification on the road.



Smart Ballet Shoe (SBS)

Project Participants
Melissa Cordova & Shabrya Lott

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Sarah Harris

Problem Identified
In order for a dancer to improve their ballet technique they must have extra practice on their own time. However, how much of that time spent practicing is beneficial? The problem is there's no teacher that can help make corrections like in dance classes. The dancer must use their own judgment to decide if they are executing a move correctly.

Current Solutions
Currently the market has a similar product called Rhythm Shoes. The product uses pressure sensors and vibration features to teach simple dance steps to different beats of your choice. The sensors give feedback on your moves so you can get better at that chosen rhythm. The shoes interact with a phone application via Bluetooth.

Team's Solution
The SBS fits perfectly in the dance market since ballet is one the world's most popular forms of dance. Dancers of all ages who need extra practice to grasp the ballet technique will benefit from this product. It can also be used anywhere and anytime they desire with only the need of a laptop/desktop. It differentiates from the current market solutions in the way that it will focus on the actual ballet technique. The SBS is a great learning and teaching tool also it is easy to use. When it comes to price, in comparison with the current market solutions, our product will be much more affordable.



WARD: A Smart Awareness System

Project Participants
Carlos Lemus & Zach Nelson

Instructor
Dr. Grzegorz Chmaj

Faculty Advisor
Dr. Venkatesan Muthukumar

Problem Identified
Feeling protected and safe while alone isn't always guaranteed. This aims to resolve personal injury while alone, acting independently to alert contacts when you are faced with certain dangerous conditions.

Current Solutions
Currently on the market are Life Alert, FitBit, and anti-rape devices. These devices do not act on your behalf and require you to activate their emergency services or deterrents yourself.

Team's Solution
The WARD will act autonomously on your behalf to provide proper assistance and alert designated contacts. It utilizes an accelerometer, heart rate sensor, and device disconnection alert to mobile devices to maintain an element of safety. This data works together to provide status of the wearers condition without drawing attention to them, while still maintaining a feeling of safety and security.



DEPARTMENT OF ENTERTAINMENT ENGINEERING & DESIGN PROJECTS

Department Chairs
Dr. Donald Hayes &
Michael Genova

Senior Design Instructor
Dr. Si Jung Kim

Animatronic Sorting Hat

Project Participants
Zackery Biedinger, Danielle Flowers,
& Christopher Frogget

Instructor
Dr. Si Jung Kim

Problem Identified
Many amusement parks and entertainment venues feature areas where children and adults alike can interact with select characters. However, many of said characters are not portrayed as accurately as they could be. Relying on human actors to portray characters of smaller stature or anthropomorphic can be a challenge when trying to create an experience that is fun, interactive, cost efficient and realistic.

Current Solutions
As stated, the current solution to the problem at hand is to use human actors. Many costumes have been equipped with a few more mechanical features, such as moving mouths, blinking eyes, and few recorded sayings. Some parks have chosen to eliminate the actor all together and present a “meet and greet” through 3D simulation. Unfortunately, both of these solutions are met with the same issue of oversized simulation and limited interaction.

Team’s Solution
The solution we propose is to design a system that can be reprogrammed easily for multiple characters. With the system, small characters can easily be given humanistic qualities, such as longer speech patterns, movement, and sensory attentiveness that cannot be translated via a suit or screen. Because of the basic programming and the way the information is transferred and received, the system can be recalibrated and reprogrammed to work with several different characters, thus giving the operator the ability to switch out characters as they see fit to keep up with a demand for diversity. Money invested in the system is money that does not have to be spent on actors, thus the systems is cost affective. The benefits go to both the implementer as well as the guests, as the experience is one that will certainly be remembered.



Fire Lights

Project Participant
Ciara Zang

Instructor
Dr. Si Jung Kim

Problem Identified
In a crisis situation people are often not aware of what to do. If there is a fire, they just go to the nearest exit not knowing if they are approaching the fire. If there is a lot of smoke, people cannot see the fire exit sign above the doorways. When there is a shooter on campus, they panic or are unaware of what is going on around them.

Current Solutions
For fire safety, people are still marketing the newest up to date smoke detectors and alarm systems. This helps to identify the problem, but it does not get everyone out safely. For an intruder on campus, people are being trained to fight back or hide with equipment to barricade the door after a sound alarm is sent out. When a sound alarm is sent out, the intruder is more likely to attack faster than anticipated.

Team's Solution
My solution is to have built in LED lights (total of 5 colors) into the baseboards, carpet pathways, tile, or handrails. In case of a fire, the LED lights will pulse an amber light (known best to be seen through smoke) toward the closest and safest exit. People will not be walking over or under a fire from a different floor and they will not be misled to an exit that is blocked or damaged by the fire. In case of an intruder on campus, a blue color will become solid. This will send out a silent alarm to let everyone know to hide while the intruder is still clueless. You can also use the remaining three colors to be programmed to whatever drill you want it to be; such as, earthquakes, hurricanes and tornadoes.



DEPARTMENT OF MECHANICAL ENGINEERING PROJECTS

Department Chair
Dr. Brendan O'Toole

Senior Design Instructor
Dr. Zhiyong Wang

Adjustable Kitchen

Project Participants
Valentina Alayon, Deric Larkin,
Veronica McKinney, & Jaime Robledo Toribio

Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Mohamed Trabia

Problem Identified
In a short three years, 1 in 5 Americans will be 65 and older with the majority of them living on their own. With this increase in elderly populations, there will be a need for homes which can accommodate aging persons, especially those who are disabled. Current homes are lacking in accessible components, primarily when it comes to kitchen designs. The kitchen is the most dangerous place within the home and as people age there is an increase in cooking related incidents.

Current Solutions
The current solutions such as the Freedom Lift Systems are costly for customers. These systems are also bulky and have limited controls. Many times these systems act as a reminder of a person's need for help.

Team's Solution
Adjustable Kitchen is an affordable and aesthetically pleasing solution. The design of a fully automated linear kitchen countertop system allows users ease of use within their home. The design uses voice command and a well thought out layout to comfortably assist those in need. The team implemented the design into UNLV's Sinatra Living entry into the Department of Energy's Solar Decathlon Competition in Fall 2017. The design was recognized within the team's 1st place win in the Innovation category.



Automatic Buoyancy Compensator Device (ABCD)

Project Participants
Josh Boothe, Nicolo Sta. Brigida,
& Patrick Pacris

Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. William Culbreth

Problem Identified
Scuba diving involves meticulous adjustments to neutral buoyancy control. Divers of varying skill levels may fail to properly correct their buoyancy and will consume more air. Numerous errors will lead to over consumption of air and a smaller dive time.

Current Solutions
Scuba diving requires a diver to have a license. A diver's skill dictates how well they can fine tune their equipment. There is no present material solution.

Team's Solution
The Automatic Buoyancy Compensator Device, ABCD, eliminates the hassle of adjusting the BC. The device will permit a diver, new or old, to ascend or descend at a controlled speed. Meeting the specified depth could also be done with a push of a button. Don't get left behind as you explore the depths below. The ABCD will close the gap between the beginner and the experienced.



DRiO

Project Participants
Dylan Cruz, Alexis Lawson,
Brandon Prokopchuk, & Matthew Viton

Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Woosoon Yim

Technical and Community Advisor
Dr. William Culbreth

Problem Identified
When it comes to drones, one of the most common complaints is that drones have very short, limiting flight times. Currently, even the best drones on the market only have average flight times of about 20-30 minutes. Short battery life places a burden on drone users, hindering their ability to use drones for a wide range of activities.

Current Solutions
At this point in time, the market does not offer too many solutions to this problem. The most common solution to this problem is for drone users to carry multiple batteries on them at all times. A more recent solution to this problem is the concept of a tethered drone system, but this is still a relatively new solution. Only a couple of tethered drone systems have been released to market.

Team's Solution
DRiO will be the first indoor optimized tethered drone system with a drone tracking smart tether system. The tether will eliminate the need to consider battery life and it will open the window of opportunity to drone use. DRiO plans to create a system that tethers to the top of the drone and this will maximize the possibility for warehouse use and surveillance. The smart drone tracking system will help to ensure the safety of product, and it will allow the tether system to be aware of the drone's location at all times.



Human Powered Vehicle

Project Participants
Kyle McCall, Russell Pinnegar,
& Dylan Williams

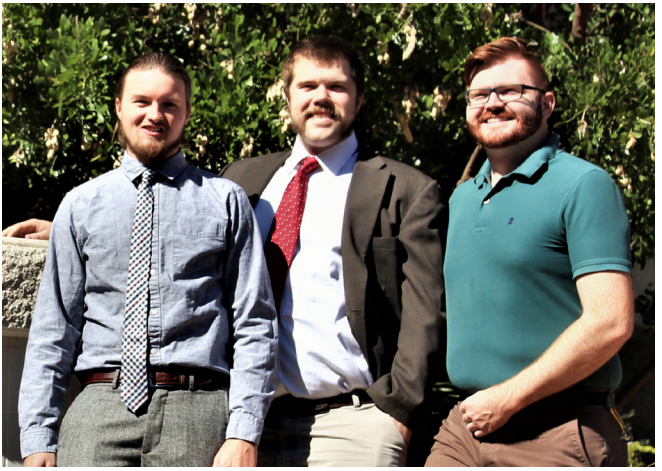
Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Brendan O'Toole

Problem Identified
The majority of an individual's carbon emissions come from personal transport; most of these emissions result from car trips shorter than five miles. Electric vehicles promise to greatly reduce these emissions, however cost and availability place an electric vehicle out of reach of most Americans. An efficient human powered vehicle for short to medium trips is an ideal, cost effective, and immediately available solution.

Current Solutions
Bicycles make up the majority of human powered vehicles, and for good reason: they are easy and fun to operate and are among the most efficient forms of travel. Some bikes and trikes even have enough storage capacity to make them practical for running errands.

Team's Solution
Our solution is the next iteration of design in this competitive field. The design accommodates up to two methods of power transfer: a hand crank and a foot pedal (with the flexibility to add a rear power assist to the rear wheels). The design will also offer enhanced storage options and the ability for improved aerodynamics.



I.E.D. Rake

Project Participants
Nicholas Previc, Jenny Wong,
& Chris Juneman

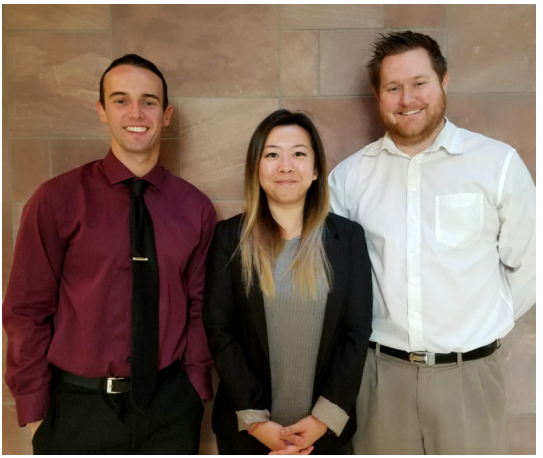
Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Brendan O'Toole

Problem Identified
Since America's involvement in the Middle East picked up in the early 2000s, American troops have been subject to I.E.D. blasts which have resulted in over 1400 dead and 13000 wounded. The Pentagon is currently fighting an uphill battle with these deadly weapons spending over $75 billion on armored vehicles and tools for tackling this problem. As well engineered as they are, they are not as cost effective as they should be in fighting these deadly weapons.

Current Solutions
Currently on the market there are a few I.E.D. detection vehicles that are large armored vehicles such as the Husky MK III VMMD. There are also remote controlled rovers that are used to dig up I.E.D.s.

Team's Solution
The I.E.D. Rake may not cover as big of an area as some of these larger mine detectors, but it does not have direct human operations. A large mine detector vehicle needs a human operator to drive the vehicle so if the I.E.D. blows up under the vehicle, the driver has a chance of getting injured. The I.E.D. Rake is remotely controlled so the human operator is well out of the blast zone. There are other robots out there that do not involve a human driver, but those robots do not efficiently detect for I.E.D.'s as they do not have extension arms like the I.E.D. Rake.



Industrial Abrasive Sorting Machine

Project Participants
Peter Manuinen, Nicco Pappapgeorge,
& Minju Youm

Instructor
Dr. Zhiyong Wang

Community Advisor
Stan Goldfarb

Problem Identified
No two abrasive particles are exactly the same which makes designing a reliable device that can sort industrial abrasives by strength crucial. A proper sorting between high performance abrasives and those of low performance will increase the industrial productivity.

Current Solutions
Current market solutions are to sort abrasive powders by size, shape, composition and/or color.

Team's Solution
The major purpose of this project is to devise a compact machine to sort abrasive powders by strength. By building a EF (electric field) chamber in conjunction with an MF (magnetic field) chamber, the team will provide a reliable source to separate particles by abrasive strength. The team's solution is much more beneficial than current solutions as current market solutions tend to require bulky machine structure or complex programming for sorting operation. Conversely, the team's machine is highly accessible since it is solely dependent on abrasives' susceptibility to EF and MF, ascribed to their defects in crystal lattice.

Master Pallet

Project Participants
Jeffrey Bollinger, Abel Feyisa,
& Treston Rego

Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Georg Mauer

Problem Identified
Current shipping pallets must be moved around one at a time. This costs time, money and effort. Trucks must remain at storage facilities for a long time as they wait to be loaded/unloaded.

Current Solutions
From our research we have found no other products that deal with this problem.

Team's Solution
Our solution is the Master Pallet. This enhanced shipping pallet can be connected with other Master Pallets, so that an entire truck can be loaded and unloaded in mere minutes. The Master Pallet is also made of aluminum, which means it is designed to last much longer than the standard pallets in use today. The pallets are equipped with wheels, grips, and brakes which allow them to be pushed and pulled rather than lifted and hauled. The prototype will most likely be made of wood, since it is more of a proof of concept and won't need to actually support a full load.



OAR Pallet

Project Participants
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Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. William Culbreth

Technical Advisor
Terry Kell

Community Advisor
Sheldon Jefferson

Problem Identified
The OAR Pallet plans to replace an outdated wooden pallet that was introduced in 1930 with a patent granted in 1938. Current Pallet technologies cause longer truck loading and unloading times which can range between 1–3 hours. Wooden pallets do not offer much functionality and can restrict achieving higher warehouse efficiencies during truck loading and unloading.

Current Solutions
Current market solutions include the ATLS (Automatic Truck Loading System). While this system can vastly increase the efficiency observed during truck loading and unloading, the cost and maintenance of the ATLS equipment make this option not economically viable for most warehouses. This solution requires the warehouse to be reconfigured such that, it supports a much more demanding system infrastructure. Although this market option provides a solution to increase warehouse productivity, it may also contribute to a more complex and costly working environment.

Team's Solution
The OAR Pallet aims to provide innovative solutions by combining existing technologies and mechanisms together to maximize the potential efficiency of warehouses around the world. Comparing this to standard wooden pallets, the OAR Pallet will reduce loading and unloading truck times and improve the general mobility of the pallets around the warehouse. Results are accomplished by utilizing a coupling mechanism to connect multiple pallets together, along with a robust multi directional wheel arrangement, which provide increased product maneuverability, throughout any facility. Additionally, the OAR Pallet features a concealed, operator friendly mechanical braking system, implementing the ability to lock the pallet in place, when necessary. With our current estimates, this system has the potential to reduce the truck loading and unloading time by over 75%, which can be a great investment for any company that seeks to maximize their efficiency. Currently, there are over 1 billion pallet units in service with a market value of over $10 billion. Over 90% of this market is captured by outdated wooden pallet products. This new system would be most beneficial with companies that utilize a closed-loop pallet program where goods are regularly shipped between consumers and suppliers.



Pneumatically Controlled Exponential Springs (PCE Springs)

Project Participants
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& Cooper Madrazo

Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Brendan O'Toole

Technical Advisor
Terry Kell

Community Advisor
Kevin Bunderson

Problem Identified
Current racing suspension set ups require predetermined and limited spring rates for the vehicle. The consumer often has to buy many sets of springs to achieve the desired spring rates they are looking for. These springs result in linear and/or semi linear rates, creating unwanted behavior in suspension.

Current Solutions
Modern day vehicle suspensions often utilize standard coil over units. A coil over unit combines a spring and damper into one system. Newer versions of this coil over utilize thinner lighter springs but are still quite heavy. The other market solution is FOX Shock's FLOAT Air Springs. This is FOX's attempt to solve this problem but they have only proved it on a small short-term time scale with less than ideal results. The heat from their integrated damper affects the spring rates of their air spring, resulting in an inconsistent and constantly growing spring rate over time.

Team's Solution
We have designed a system that is lighter than the traditional coil over springs, and more predictable and stable than the FOX FLOAT Air Springs. Our design makes use of two separated air chambers which allows for consistent spring constants during runtime while being able to handle strenuous off-road conditions. Because each chamber is separated, the system allows for custom adjustments to match the form and environment of racing and application. Our product will benefit both on road and off-road racers, and has the potential to move into the consumer automotive market.



Polymer Knee Joint Cap Testing Machine

Project Participants
Kevin Imada, Joshua Quinlan,
& Michelle Quizon

Instructor
Dr. Zhiyong Wang

Technical Advisor
Terry Kell

Community Advisor
Dr. Thomas Grotz

Problem Identified
Annually over 700,000 people in the United States are subject to the debilitating effects of osteoarthritis of the knee joint. Total knee arthroplasty, introduced in the early 1970s, remains the most promising form of treatment for osteoarthritis. However, it comes with obtrusive long-term consequences: decreased job productivity, diminished quality of life during the long period of recovery, and the likelihood of revision. The synergistic confluence of medicine and modern material science and engineering has yet to elevate treatment for this condition.

Current Solutions
Individuals experiencing osteoarthritis of the knee joint today must meet certain criteria for diagnosis. Total knee arthroplasty is a major invasive surgical procedure that entails permanent sacrifice of damaged bone tissue and replacement with prosthesis that is subject to wear, risk of infection, aseptic loosening, and revision. There is no regeneration of bone tissue. The patient is subject to meeting private or public managed care criterion and subsequent approval for the surgical procedure.

Team's Solution
This team aims to design a machine to test the biopolymer cap for fatigue and wear, taking into consideration the biomechanics of the knee joint and loads that the knee joint may encounter. A less invasive solution for resurfacing osteoarthritic surfaces using biopolymer caps 3D printed from radiological images can pad damaged cartilage, restore cushioning, and deliver stem cells/drugs for joint surface regenerations. Materials and additive manufacturing techniques exist by which this solution is viable. A critical step in bringing this new treatment modality to the market is approval by the United States Department of Health and Human Services, Food and Drug Administration. The biopolymer joint cap is considered a medical device and must be evaluated to show "substantial equivalence" to a predicate legally marketed device. An independent demonstration of safety and effectiveness must be supported with data.



Sol-Hydrator

Project Participants
Dylan Nanni, Kobe-Dean Neuhaus,
& Norberto Torres-Reyes

Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Robert Boehm

Problem Identified
97% of the water on Earth contains salt which is difficult to filter out. Current methods of purifying salt water require many hours of vaporizing contaminated water, with little yield.

Current Solutions
Classic, off-the-grid distillation uses greenhouse methods and over-the-fire boiling, which return little fresh water after numerous hours. Popular personal filtration systems, such as the Life Straw, cannot filter salt-water. Reverse Osmosis Filtration and Solar Panel Distillation are two methods that have been well-established on an industrial scale to remove salt from water, however small scale solutions for personal use are not yet prominent as they are costly and highly inefficient.

Team's Solution
Our product utilizes a compact system of heat pipes and a parabolic reflector to speed up the evaporation process by concentrating solar power and converting it to thermal energy. Steam is captured by the condensing system, leaving behind impurities and yielding fresh, drinkable water. Sol-Hydrator's minimalist design is ideal for outdoor enthusiasts, as well as for individuals who need an inexpensive and reliable water purification system.



Speed-O

Project Participants
Michael Avissato, William Mejia-Valles,
& Emanuel Solis-Flores

Instructor
Dr. Zhiyong Wang

Faculty Advisor
Dr. Mohammed Trabia

Problem Identified
There are currently no purely mechanical external attachments for a longboard in the market, to provide an extra means of propulsion. Longboard users will have an additional means of propelling forwards by utilizing their upper body instead of the legs. This will be an alternative method of riding a long board without the purchase of an electrical attachment.

Current Solutions
Currently electric longboards are the best solution to this problem. However, the cost for an electric longboard is substantially high compared to a regular longboard price. Another solution to this problem is the use of a longboard land paddle. The problem with this solution is the requirement of having to carry around an awkward and cumbersome item.

Team's Solution
Currently, there is no device out in the market like the one we are creating. Our solution proposes a mechanism that minimizes the amount of leg movement by applying a gear box system to the board, which is driven by applying a force from the users arm. The device is purely mechanical and requires very little to no maintenance, making it ideal for riders who want an extra means of propulsion without any hassle. This device shows it can be made at a low cost due to the overall simplicity of the design. The device also can be manufactured to fit multiple different longboards making it a perfect solution for people who already own a longboard.



The Super Splint

Project Participants
Johnathan Carmona, Lars Larson, & Chase Marrs

Instructor
Dr. Zhiyong Wang

Technical Advisor
Dr. Stephen Rice

Community Advisor
Dr. Anis Khair

Problem Identified
Plantar fasciitis is the inflammatory and degenerative disease of the plantar fascia which is caused by straining the plantar fascia. This repeated stress and strain over time causes micro tears in the fascia which leads to inflammation, irritation and the degeneration of the fascia. Nearly 1 in 10 Americans will suffer from plantar fasciitis in their lifetime and more than 2 million patients are treated in their lifetime due to plantar fasciitis.

Current Solutions
There are a wide range of treatments for plantar fasciitis, including surgery, corticosteroid injections, anti-inflammatory agents and splint. Stretching plantar fascia with a splint is the only efficient and effective management and treatment of early and early to middle duration plantar fasciitis. The current, non-surgical treatment of plantar fasciitis is a splint induced sustained stretch of the plantar fascia. Splints on the market right now have no control over the required amount of stretch that the plantar fascia needs to undergo to start the healing process. Other splints can also cause hyperesthesia, or irritation of the skin when wearing the splint for prolonged periods of time.

Team's Solution
The Super Splint is the first splint on the market dedicated to provide the patient with a sustained stretch of the plantar fascia that they have control over. The Super Splint is a safety enhanced splint, which provides sustained, adequate stretch of plantar fascia necessary for treatment of plantar fasciitis. The Super Splint is comfortable and does not produce skin hyper-aesthetic complications, and so question of noncompliance does not arise. The Super Splint supports the entire length of plantar fascia, from calcaneus bone at the back of foot to the metatarsal bones at the front of foot. The base of Super Splint is adjustable, allowing for a comfortable fit, over wide range of foot sizes. There is also provision for health care professionals to prescribe creation of varying dorsiflexion angle, an important requirement for management and treatment of plantar fasciitis. The easily detachable back, allows for safe, easy and unimpeded short distance mobility. The Super Splint also withstands a large variety of weights, with patient standing and in mobility. The Super Splint is will benefit patients of all ages, including those of ages 55-64, where incidence of Plantar Fasciitis is prevalent.



INTERDISCIPLINARY PROJECTS

SOLARjuice

Project Participants
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Daniel Pedrego, & Sadie Stutzman

Instructors
Dr. Zhiyong Wang
& Dr. Grzegorz Chmaj

Faculty Advisors
Dr. Robert Boehm
& Dr. Yahia Baghzouz

Problem Identified
A full charge on a cellular device or laptop has become essential to survival in current society; nearly all productivity, networking, socializing, etc. rely on the battery life of one's device. The scarcity of available power sources when on the go is familiar to most. SOLARjuice is a patio style umbrella that caters to the growing dependence on mobile electronics by providing a means of charging when away from a grid-powered source with the comfort of a shaded work station. Whether it is for a quick power boost or a long-term work session out of the sun, SOLARjuice will satisfy your needs.

Current Solutions
There is a product on the market by Zon Technology called Powersol. This product functions as an outdoor solar powered charging station that can only charge small devices, such as cell phones, by utilizing four narrow, evenly distributed lengths of solar panel.

Team's Solution
Unlike the competition, SOLARjuice has the capability of charging larger devices, such as laptops, as well as smaller handhelds while offering the comfort of a shaded workstation. This is made possible by featuring four DC and two AC outlets as opposed to Powersol's 3 DC outlets. Through implementing a manual tracking system, allowing a large singular panel to follow the path of the sun, SOLARjuice is able to produce and store sufficient power for the additional outlets. A spring plunger and a sprocket system are used to secure the panel at predetermined angles based on the optimal tilt for the specified time of day. Furthermore, our product will include the capability to amplify a Wi-Fi signal to provide a satisfactory and stress-free environment for the user. Lastly, SOLARjuice has been designed with practicality in mind, by maintaining a large canopy surrounding the panel, SOLARjuice provides the user with premium shading while meeting all electronic demands.



Toast.ER (Expertly Redesigned)

Project Participants
Nüman Allam, Antonio Salcido,
Brittany Simmons, Maxim Sosna,
& Austin Wood

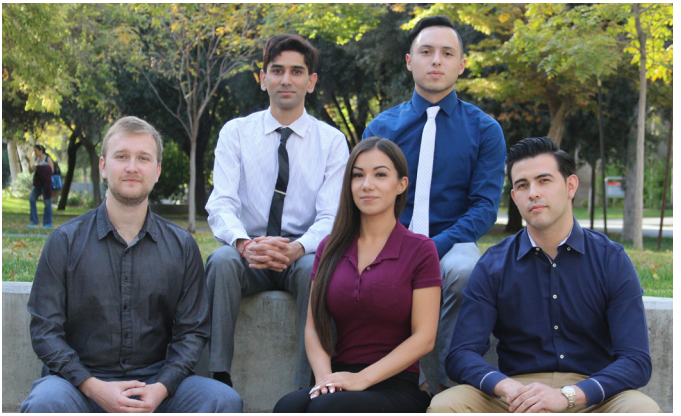
Instructor
Dr. Zhiyong Wang

Faculty Advisors
Dr. Robert Boehm
& Dr. Pushkin Kachroo

Problem Identified
Current toasters serve one purpose; toasting bread. This requires butter to be spread separately increasing the amount of cleanup which must be done and increasing the likelihood of human error when spreading butter. Currently, enjoying toast requires a process which proves to be more time consuming than consuming it takes, creating a negative time trade off.

Current Solutions
Currently no such product which can butter toast after toasting the bread exists. The current market solutions would be to buy a conventional toaster and a knife. The knife can apply the butter after toasting the bread using the toaster.

Team's Solution
The Toast.ER will make enjoying buttered toast quick and easy saving time on clean up. This will benefit any individual who enjoys buttered toast as a breakfast snack and will especially serve those who are on the go and often skip breakfast.



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