COLLEGE OF ENGINEERING

UNT

Senior Design Day
April 24, 2015
UNT Discovery Park

Program

Poster Presentations 9 AM- 11 AM

Discovery Park 1st & 2nd level hallways

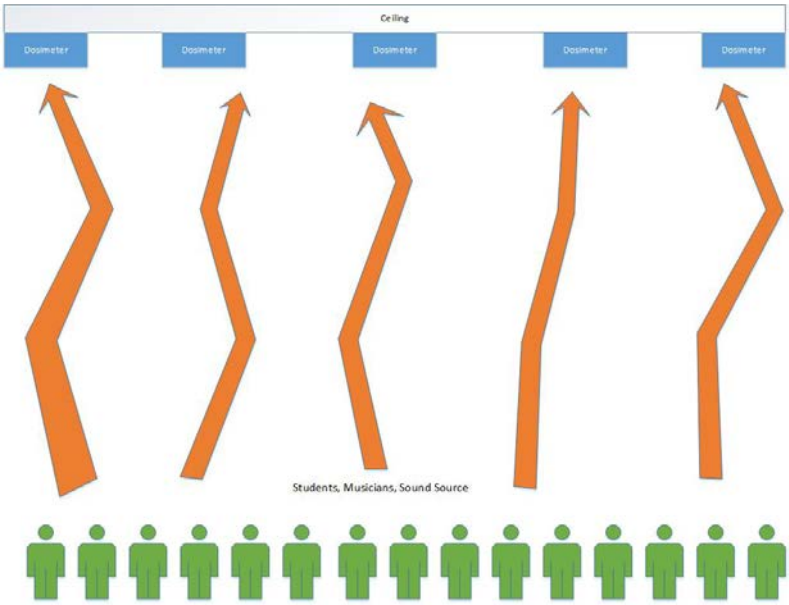
Project Presentations 11:30 AM- 5 PM

Computer Science and Engineering

Team Name: Team Jaws
Sponsor: Jim Buchanan
Department: Computer Science and Engineering

Team Members:
Julius Corsiga
Derek Forbes
Kevin James
John Borsch

TACOCAT an autonomous vehicle that can navigate between various points within Discovery Park. The vehicle should be able to navigate Discovery Park autonomously using only the destination point received from the user. It should be able to avoid stationary objects and people. If the system were fitted to a golf cart or equivalent size vehicle, that vehicle would be used to taxi users between these various destinations.



Team Name: Cobra Alpha 5
Sponsor: Kris Chesky
Program/Department: Computer Engineering

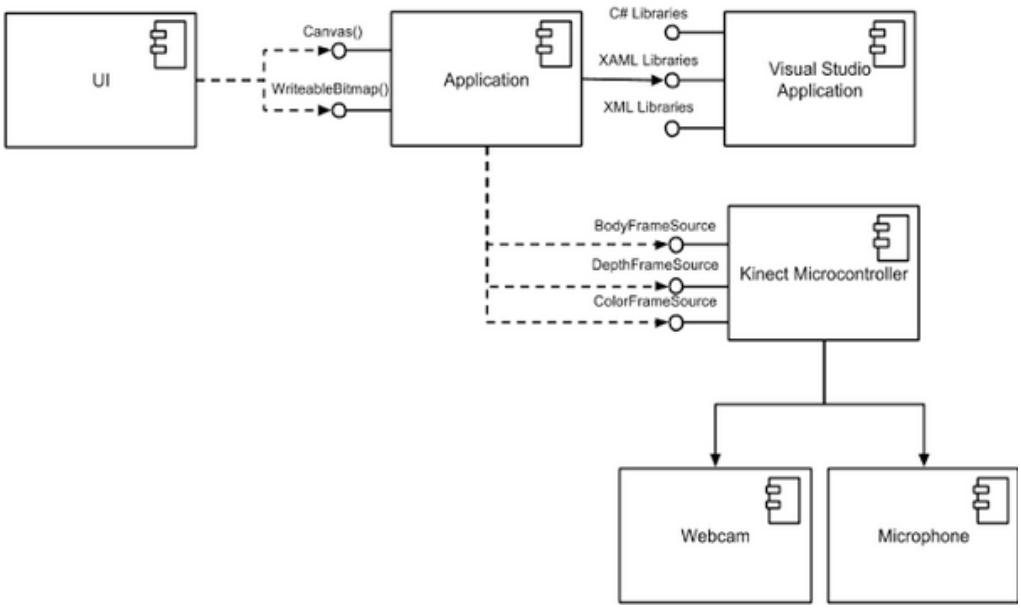
Team Members:
Pavan Aripakula
Blake Beavers
Evan Fritts
Andrew Koehler
Evan Rodrigues

Our project is to design and develop a network of dosimeters for use in The College of Music at The University of North Texas. This network of dosimeters will potentially replace the system currently in use by The College of Music. The dosimeter itself will measure the noise exposure in decibels (dB) within a room. The information will then be sent to a central database on the network for analysis. The faculty of the college will then be able to use this data to lessen the noise exposure that occurs during their classes.

Team Name: Team Royal
Sponsor: Thomas Parsons, Ph.D.
Program/Department: Computer Science and Engineering

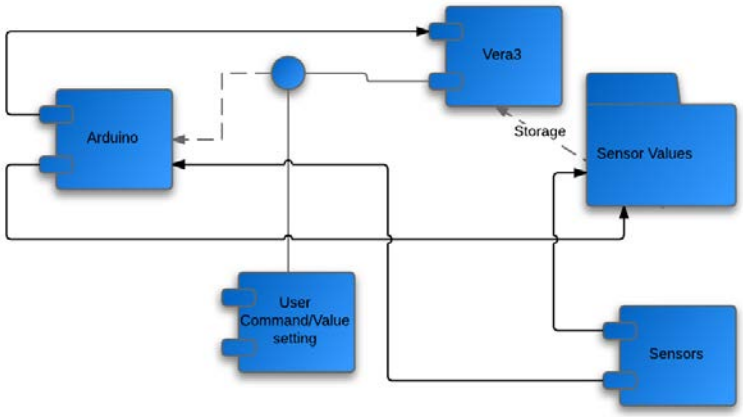
Team Members:
Noel Behailu
Gabrielle Cho
Heath Guthrie
Kayla Rose

Our group will be using the Microsoft Kinect to record gesture tracking into a database. The Kinect, along with our software, will detect the way people move from the waist upwards in order to be used for analysis in Dr. Parsons' lab. This project is meant to store users data, both personal information and gesture tracking, into a database that is easy to access and identify. Our main goal is to complete an application such that we record the gesture movement of the user, and save it into a directory. This information will provide critical details to Parsons' experiment when he's analyzing the behaviors of individuals in scenarios like a poker game.



Team Name: Division by Zero
Sponsor: Mitchell Altimus (Team Member)
Program/Department: Computer Engineering

Team Members:
Mitchell Altimus
Christopher Harris
Jeremy Gonzales
Adam Haselden



Our project is based on enhancing home automation using a software platform and a microcontroller connected to sensors. We will implement this on a swimming pool pump unit. Our system will be designed to work on a real time swimming pool with implementation on a prototype.

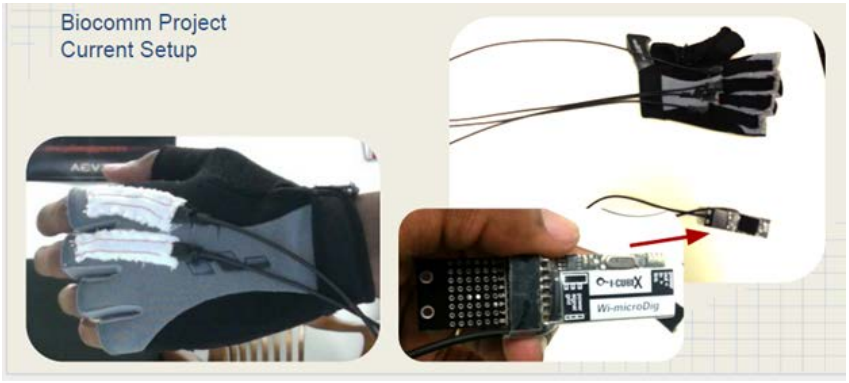
The vision we have in mind for our project is using sensors to gather information on a pool so that it can perform different operations to alert or automatically activate a system without the end user having to test or activate the system manually.

Our goal for this project is to interact with the Vera user interface platform to monitor the different sensors that will be constantly observing and detecting the changes of the pool. These sensors will include PH levels, chlorine levels, water volume, water pressure, temperature of the air outside, temperature of the air in the pump. Using these sensors to detect when these changes hit a certain level, we will either activate a system (such as turning the pump on or off), or we will send an alert to the user to let them know to check or activate the correct system.

Team Name: Firecode
Project: BioComm
Sponsor: Dr. Krishna Kavi

Program/Department: UNT Computer Engineering

Team Members:
Landry Nda
Tyler Watson
Ruby Lo
Jordan Salinas
Peter Awori



When soldiers/ law enforcement officers are in the field they typically find themselves in dangerous situations and need to operate undetected and, or with efficient communication. One idea to fulfill this is by using hand signals to communicate so that their voices don't give them away. The problem with using hand signals to communicate however is that personnel must remain within each other's line of sight. To alleviate this problem the company, Raytheon, has funded a project at UNT to build a system which will capture hand gestures and send them to a display device inside a soldier's visor. To accomplish this many individual parts are required: sensors, signal transmitters, and signal analysis hardware and software. Our team, FireCode, will work on improving the performance of the signal transmitter. Our goal is to allow many sensors to interface with a signal transmitter that will transmit digitized signals with as little latency as possible.

Construction Engineering Technology

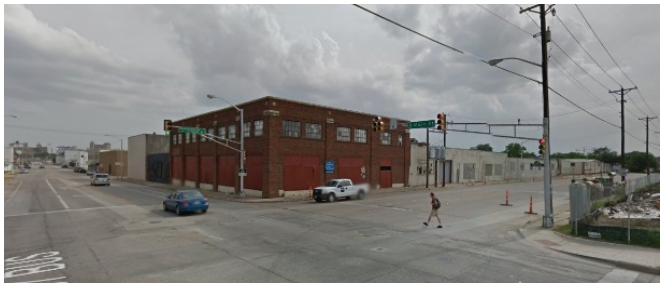
Team Name: Grey Matter Construction
Sponsor: University of North Texas Systems
Program/Department: Engineering Technology

Team Members:
Sam Hoggard
Adam Johnson
Andrew Gonzales

The new Rawlins dormitory will be a state of the art facility focused on housing freshmen from the Honors College. This building will allow the UNT Housing and Residential Life Department to offer a range of room sizes and public space options for the Honors College. Rawlins dormitory will be an 118,332 square foot 5-story building consisting of 250 student bedrooms with natural lighting throughout its entirety. Rawlins hall will house an estimated 500 students that will live in a close-knit, scholarly community in close proximity to most main locations on campus. Rawlins Hall's location allows it to be the centerpiece in the planned Gateway Walk that connects Apogee Stadium, the new bridge, and the Gateway Center to the rest of the campus. The design of the building, with closely spaced smaller bedrooms and common rooms at the ends of the halls as well as study areas will foster a scholarly atmosphere and allow the honors freshmen to thrive in the new college environment. Additional project scope will encompass site renovations and a courtyard near the south of the building to allow students to take a break from their studies, exercise, enjoy the outdoors, as well as travel through a beautiful and safe environment to other areas of campus.

Team Name: RAX Construction
Sponsor: KWA Construction
Program/Department: CNET

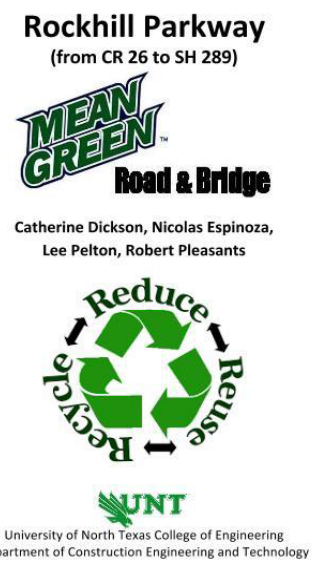
Team Members:
Randall McCullough
Andrew Strotz
Xun Li



RAX Construction is contracted to construct the multi-family residence named Highpoint in the city of Ft. Worth. The project is located in the Southwest Corner of South Main and Pennsylvania within the medical district of downtown Ft. Worth. The project will be constructed on the site of the old Ft. Worth Coke-a-Cola building. We will be performing demolition on the entire building except for the exterior façade. TIF funds were secured to ensure that the façade remains. This will be repurposed for the new structure that is to be built. The new building will consist of a 3 story parking structure, 1 underground level and 2 above ground levels. There will be 3 floors containing roughly 198,000 SF of rentable space divided amongst 227 rental units. We will also be responsible for constructing the public infrastructure to support the property.

Team Name: Mean Green Bridge & Road
Sponsor: Aaron Barry with Mario Sinacola & Sons
Program/Department: UNT Construction Engineering Technology

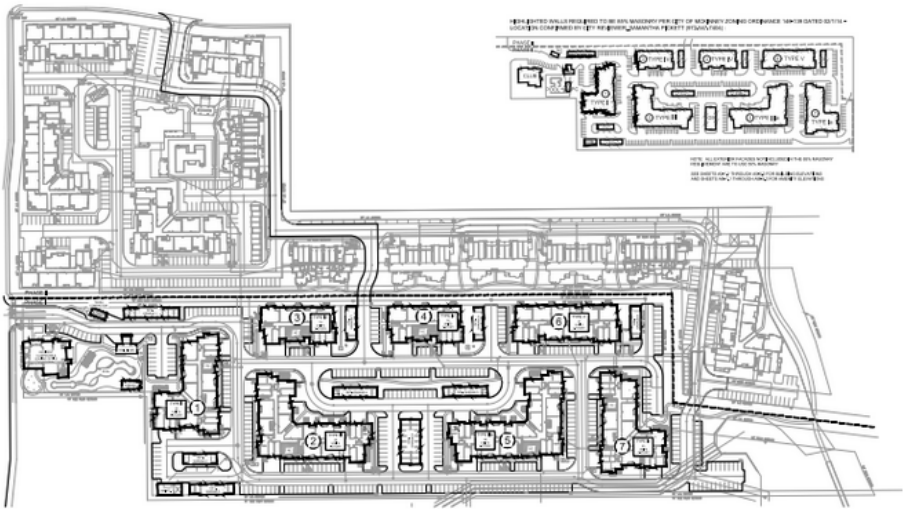
Team Members:
Catherine Dickson
Nicolas Espinoza
Lee Pelton
Robert Pleasants



Historically, a heavy highway civil construction contractor would complete the job within the allowed schedule and under budget to turn a profit, without much concern for impacts to the environment or building a sustainable road. Therefore, our senior design team has addressed society's movement to "going green" by transforming an existing heavy civil project in the City of Frisco to a "green" project. Our group modified certain methods of the construction process through value engineering research, verifying that most materials are recycled, and ensuring that there is a significantly less impact on the environment during the entire construction process. Our team used BIM coordination and clash detection to find potential delays in the schedule and establish clear right-of-way for our subcontractors to conduct their installations. Implementing these alternative solutions has created a unique challenge to complete this project within the proposed schedule and budget. As society moves toward making the environment a priority, our team is looking forward to reducing our carbon footprint for the benefit of future generations by redefining how heavy civil roadways are constructed. Our UNT senior design group has accomplished this through the project of Rockhill Parkway in Frisco, Texas.

Team Name: Lonestar Construction
Sponsor: TX Morrow Construction, Inc.
Program/Department: Construction Engineering Technology

Team Members:
Whitney Eaton
Hossein Heidari
Kevin Holden



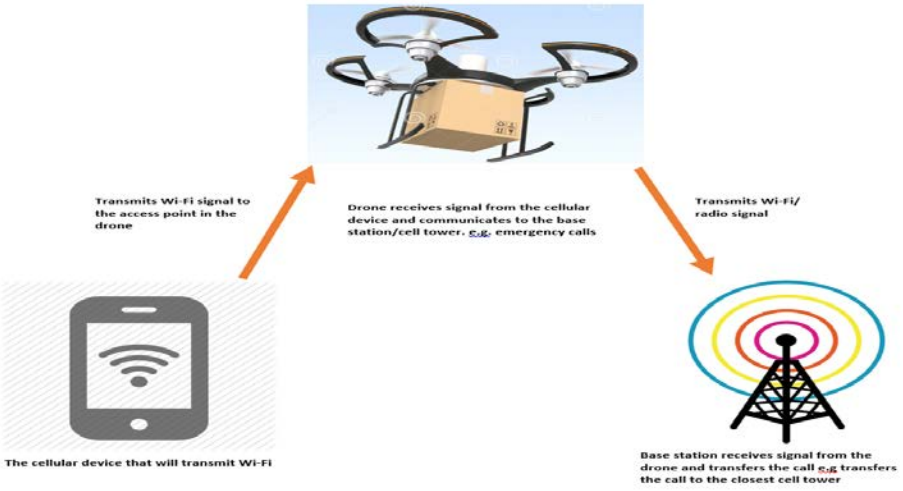
Lone Star Construction is proud to present to you the beautiful new apartment complex in McKinney, Texas -- the Venue at Craig Ranch. The Venue at Craig Ranch is a proposed 7 building apartment complex that will continue to enhance the community of McKinney Texas. This development will provide affordable living for people who either are looking to downsize or to eventually become homebuyers. Our apartment complex will provide beautiful surroundings as well as efficient living. We will provide a high standard of living for only $800-$1800 a month. Through this 16-month long project, we will be providing homes for over 270 different families in various demographics. Our 16 different floor plans provide for versatility to appeal to each family's needs.

As the city of McKinney grows, the Venues at Craig ranch will help to mitigate the need for places to live. After conducting the research and determining the cost to develop, build and sell on this site, Lone Star Construction views this apartment complex as a wonderful opportunity to continue to add beauty and affordability to the McKinney area.

Electrical Engineering

Team Name: Wi-Fi Access Point Communication System
Sponsor: Dr. Kamesh Namuduri
Program/Department: Electrical Engineering

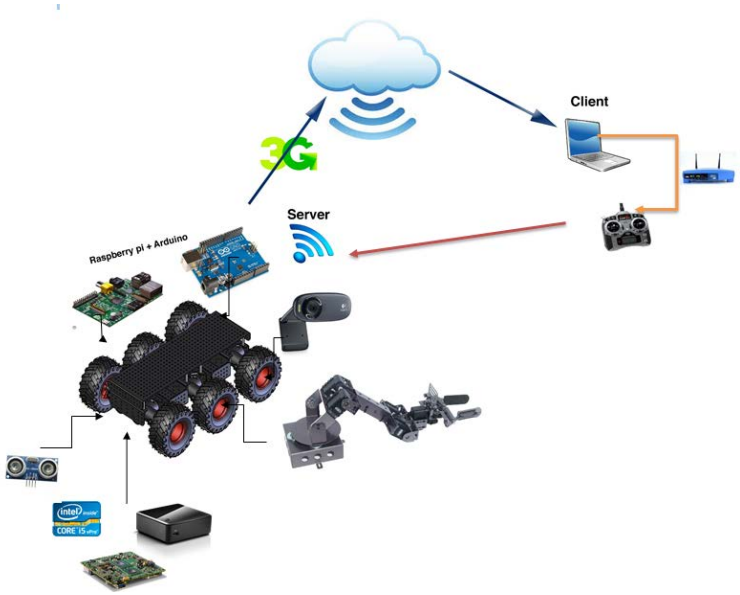
Team Members:
Amine Sadik
Christian Ogbonna
Sultan Alobaishi
Leticia Hernandez



Communication systems have become a very essential and indispensable part of everyday life. With the lack of cellular communication during natural disasters or cellular communication outages, it becomes difficult for the first responders to react quickly and save precious lives. Therefore, we have selected our senior design project to provide a mode of communication during natural disasters and other emergencies when cellular communication fails. This will be a low cost, readily deployable communication system which will help the affected people communicate with the first responders. The system will provide a Wi-Fi access point to make phone calls. We plan to use a drone to carry a broadband mobile router and fly and loiter over the affected zone. We will be doing some experiments with balloons carrying the router to figure out the optimal height for a good reception and the final stage will be implemented using aerial drones.

Team Name: VECTOR
Sponsor: Dr. Xinrong Li
Program/Department: Electrical Engineering

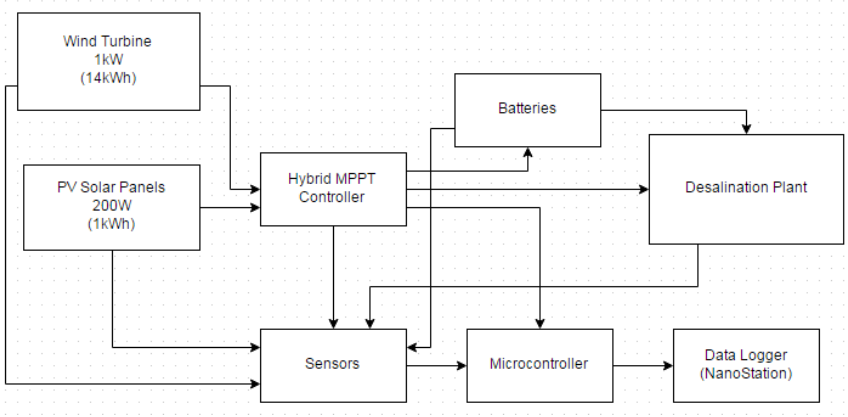
Team Members:
Max Majumder
Benjamin Garza
Brett Bishop



For our design, we are building a 6 wheel drive environmentally friendly rover. The rover is equipped with a data logger, digital video camera, speaker, microphone, and Wi-Fi access point with 3G capability. If time permits, we would like to add solar panels, computer vision, a robotic arm, and night vision. This will give users the ability to interact remotely from any internet capable computer in the world with the environment that the robot is currently in. This is can be easily achieved because the robot is modular and uses open source, making it easily adapatble to any purpose that the user needs.

Team name: Power Management System for Autonomous Sustainable Brackish Desalination System: Design of Hybrid MPPTC (Maximum Power Point Tracking Controller)
Sponsor: Dr. Miguel Acevedo
Program/Department: Electrical Engineering

Team Members:
Howard Calderon
Andrew Mcmenamy
Shane Turner



Our team will be developing the power management system for a sustainable brackish desalination plant that will be entered into the Desal Prize competition in April. This plant will use wind and solar power (with an optional gasoline generator) to provide fresh drinking/irrigation water for smallholder farming households. We will design a system that obtains data from the wind turbine, solar panels, MPPTC, and batteries using sensors connected to a microcontroller. This microcontroller will then combine the data with non-electrical measurements (pressure, salinity, etc.) and log the information into a database that will be transmitted wirelessly from a NanoStation for real-time analysis. This system will be used to monitor current and voltage from various parts of the plant, and compare them to the wind speed and solar radiation readings. This will allow us to monitor the efficiency of the wind turbine, solar panels, and most importantly the MPPTC. The long term goal of building a monitoring system for the desalination plant is to design a better MPPTC. By the end of the spring semester we will begin our own design, using the data collected to create a more efficient and cost effective MPPTC.

Team name: Air Shield
Sponsor: Dr. Kamesh Namuduri
Program/Department: Electrical Engineering

Team Members:
Tika Malla
Eric Nguyen
Shabuktagin Photon Khan
Juan Pineda-Aguirre

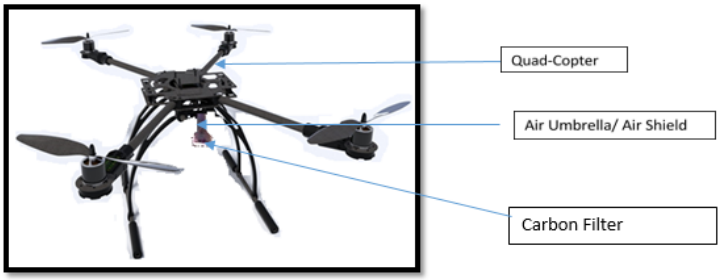
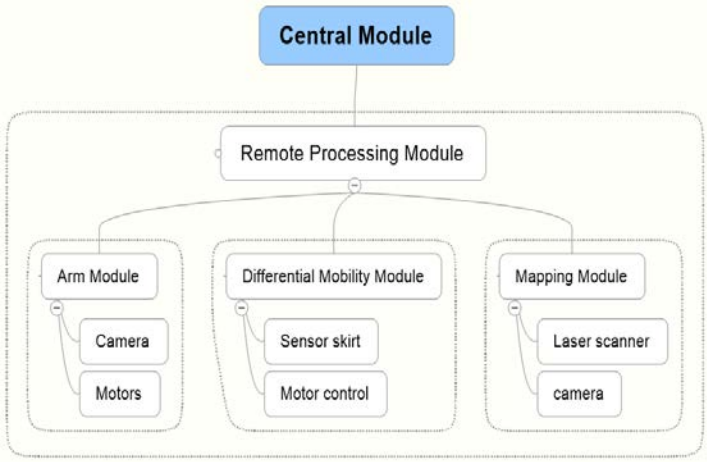


Figure: Quad-Copter with Air Shield

Imagine yourself stuck in a disaster, with no help to be found. Our project focuses on incidents that are caused by liquid or gaseous contaminants for example explosive or toxic gases or liquid. What if the especially equipped forces are not able to access the danger area or it might take a while for the human help to reach? That's when our UAV comes for rescue. For the purpose of this project we will use an unmanned aerial vehicle (UAV) together with an Air Shield. It can be sent to the disaster prone areas where it is difficult for human help to reach. We would like to use Quad-copter which has 4 rotors with more stability than the regular helicopters. In addition to all of these applications, the Air Shield would purify and quarantine a small area for rescue operation. It would filter the bio hazardous air particles like an air purifier. With the help of an Air Umbrella, the air is sucked up through the bottom of the handle and released through the top forcefully thus creating a vacuum that will clear out the air for the UAV, making it easier for it to navigate through the disaster area. Another great aspect of our UAV is, a helium balloon is connected on top of the UAV which will help it to stay in mid-air for a longer period of time.

Team Name: The Librarian
Sponsor: Dr. Kamesh Namuduri
Program: Electrical Engineering



Team Members:
Chris Talbott
Samual Wallace

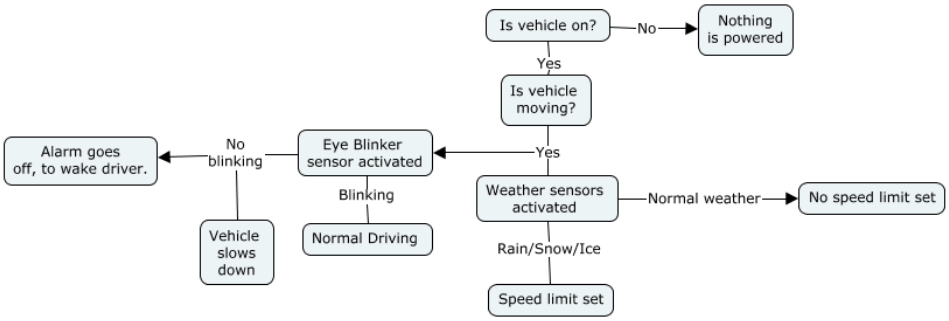
This project will build a modular robot made of a few individual robot modules that will perform a dedicated task. Each individual module will report back to a main module that will instruct the individuals to accomplish a tast as a single robot.

The task will be to find and retrive a book from the library using computer vision. The exact location of the book will not be known. The book will be found by the robot reading the call numbers and identifying the desired book based on its call number. The purpose of seperating the robot into different modules will be for expandablilty and customizability in the future.

Team name: LPC (Life Protection Car)
Sponsor: Dr. Hyoungsoo Kim
Program/Department: Electrical Engineering

Team Members:
Carolina Herrera
Irving Rojas

In recent years the weather has become greatly unpredictable, especially in Texas. No matter what the weather is people are still going on the roads and driving at their own speeds. There already exist some safety systems in various cars, such as stability control or emergency brake assist. We intend on creating a safety brake system that will not allow drivers to drive beyond a certain speed limit during bad weather conditions. Our break system along with the already existing safety systems in cars today will create a much safer drive. An Arduino along with various sensors will be used to detect if there is rain, snow, or ice on the roads. If any of these are detected, a message will be sent to the engine or speedometer to slow down and not allow speeds greater than a safe speed limit that has been previously set. We also want to add an eye blinker sensor to detect when a driver is falling asleep at the wheel. If the driver is sleeping an alarm will sound loud and the vehicle will slow down. This type of safety has already been installed in cars today but the idea of our project is to create a safer drive with the combination of these safety systems. We intend of using a small DC motor powered car to test our project.

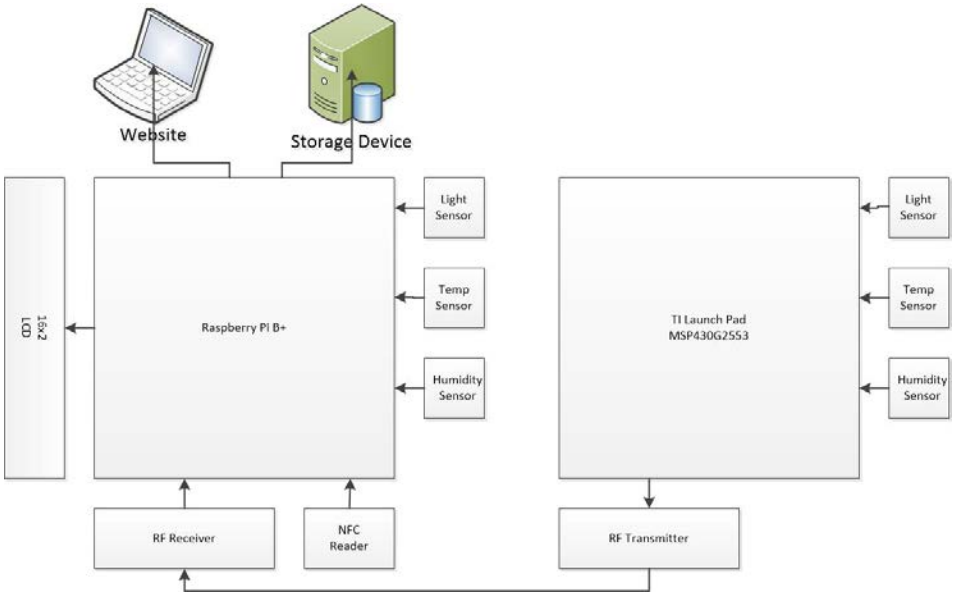


Team name: Esoteric
Sponsor: Dr. Parthasarathy Guturu
Program/Department: Electrical Engineering Department

Team Members:
Cameron Wright

I am designing a system that will display real time temperature, humidity and light values coming from both your home and outdoors. This information will be accessed through an interactive website as well as a LCD display showing the readings of the two separate areas. Through the website there also will be a live motion HD camera display. The cameras feed will be stored to an external location in order to have larger storage capability and additional security.

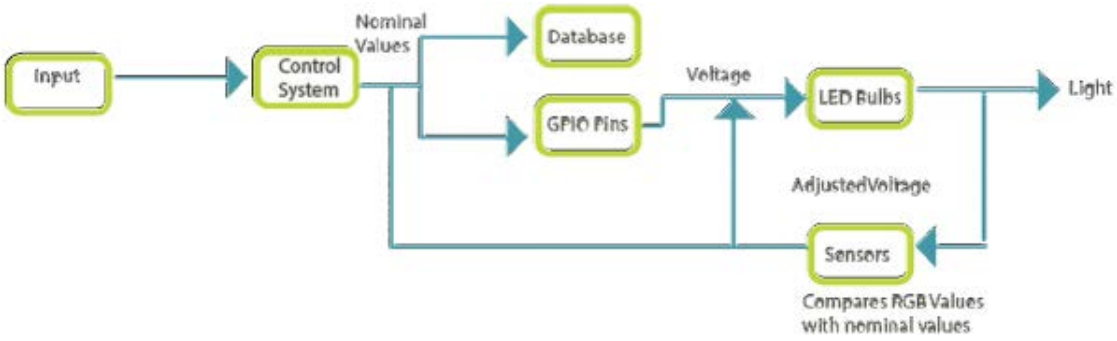
In addition to the camera I would like to add an NFC reader. NFC is set technologies that enable devices to establish radio communication with each other by touching them together or bringing them into proximity. This would allow a name to be associated with the detection of the motion camera. This would also be monitored on the website.



Looking at the current market, devices and systems that are capable of running all of these systems cost hundreds of dollars. Often times they also are not capable of running all of the same systems. The goal of this project is to implement a lower cost solution for a third of the cost. Additional features may also be added depending upon time restraints.

Team name: IlluminUNTis
Sponsor: Dr. Kamesh Namaduri
Program/Department: UNT Electrical Engineering

Team Members:
Alex Moore
Marina Nishimura



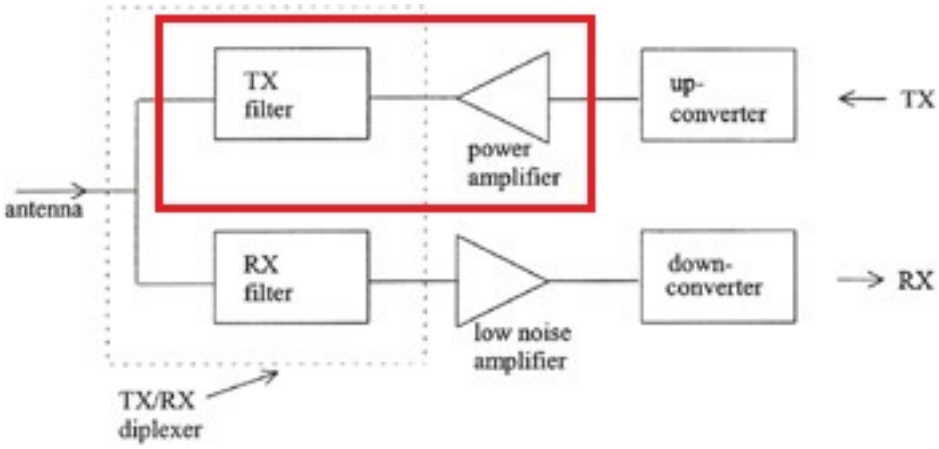
The system will help space flight crewmembers maintain physical health by automatically adjusting different combinations of RGB light levels on the craft to coordinate the circadian rhythms of each crewmember. Each member will be able to create and customize a personal profile and the light settings will adjust automatically to his/her defined preferences.

The user first inputs information into the system via the GUI. The information is both stored in a C++ database and sent to the GPIO pins of the Raspberry Pi. Finally, the signal is sent to the LED bulbs to create the correct color.

Last semester, the team successfully utilized a GUI accessed via a Sunfounder LCD screen to communicate with the GPIO pins on a Raspberry Pi, controlling the combination of red, green, and blue light being emitted by an RGB LED bulb.

This semester, the team intends to include a sensor in the system in order to compare actual light levels with the expected levels as defined by the user. The system will then be able to use the data to appropriately correct the light levels. Figure 1 shows a block diagram of the system.

Team name: RF Front end Sub-System for LET Signal
Sponsor: Dr. Hyoungsoo Kim
Program/Department: Electrical Engineering



Team Members:
Changjun Chen
Jun Gao

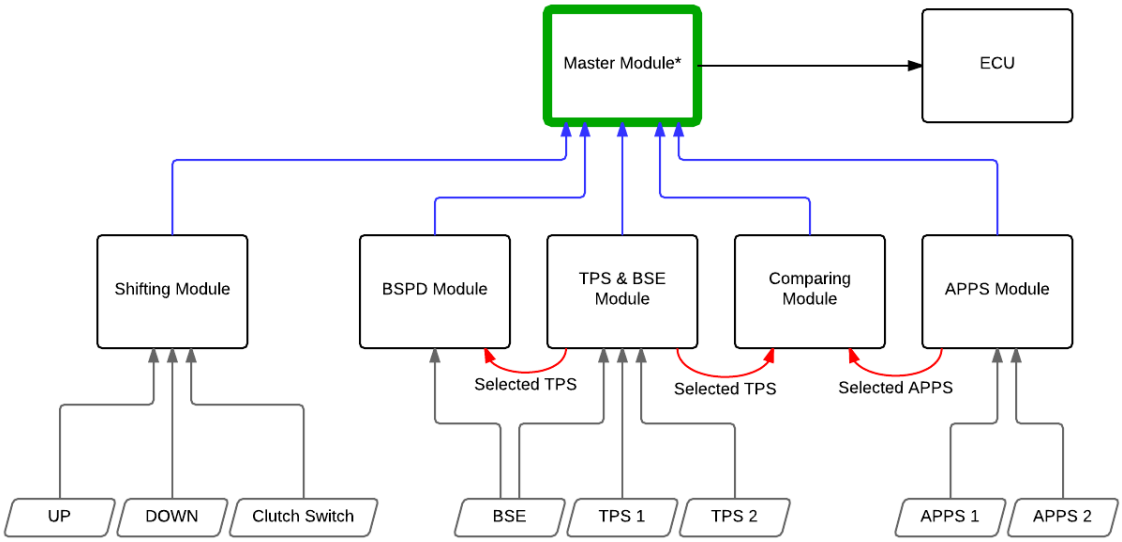
Our project is to design and fabricate an RF front end sub-system of a cellular base station for an 880MHz signal. 880MHz belongs to one band of LTE Standard (3GPP). Figure 1 shows the RF front end of a cellular base station. Our design is to focus on the filter and PA (marked in red). The RF front end sub-system contains an 880 MHz band-pass filter and a GaN transistor-based RF power amplifier (PA). We will use the micro-strip line to design a band-pass filter. The designed filter will pass the 880MHz LTE signal and it will block other frequency signals to reduce the out-of-band noise. The designed PA will amplify the 880MHz LTE signal, and it is designed to achieve a 10 W power output. By combining an RF filter with an RF power amplifier, these two components can be worked as a part of a front end of a cellular base station.

Team Name: Electrical Design Team for Society of Automotive Engineers
Sponsor: Society of Automotive Engineers for University of North Texas
Program/Department: Electrical Engineering Department

Team Members:
Kyle Clocker
Colby Crumrine
Ethan Knapp

Our team will be continuing development of the Electronic System Management (EASTMAN) system for this year's SAE formula car. Our development will include designs for all of the needed electrical components on the car (focusing on the Electronic Throttle Control and electrically controlled shifting), the wiring harness, custom diagnostic modules, and also tuning of the engine. Our custom diagnostic modules will be implemented on PIC32MX microcontrollers and make use of SPI for communication from a master-slave design. A brief description of the various subsystems follows.

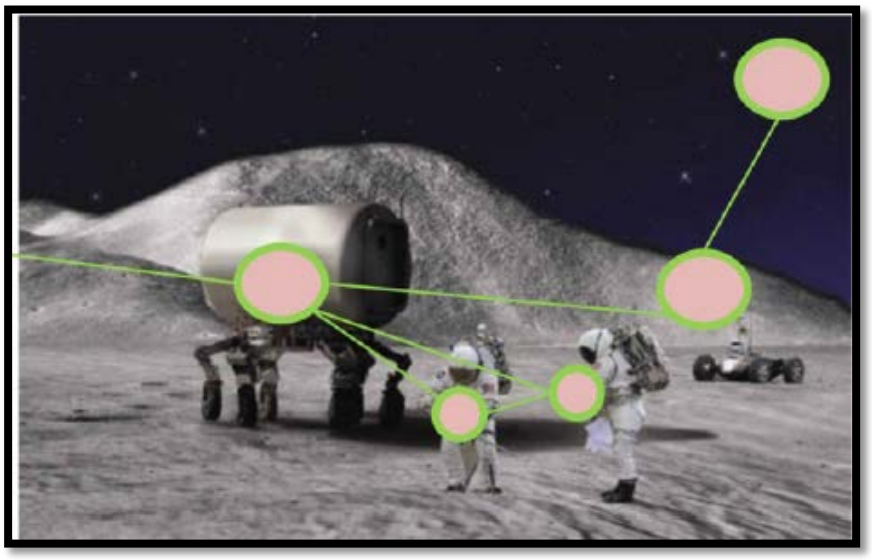
ECU: Electronic Control Unit (AEM EMS-4)
Master module communicates directly with ECU to maintain automotive function
BSPD: Brake-System Plausibility Device
Tests location of brake pedal in accordance with throttle position can shut down engine
TPS: Throttle Position Sensor
Tests physical position of throttle to ensure it is in agreement with the desired position
BSE: Brake Signal Encoder
Tests position of brake pedal and creates signal for processing
APPS: Accelerator Pedal Position Sensor
Tests position of accelerator pedal and creates signal for processing



Team Name: Rocket
Sponsor: NASA
Advisor: Dr. Kamesh Namuduri
Program/Department: Electrical Engineering

Team Members:
Alvarez Gerardo
Kidist Hailemariam
Li Huang
Shahan Hameed

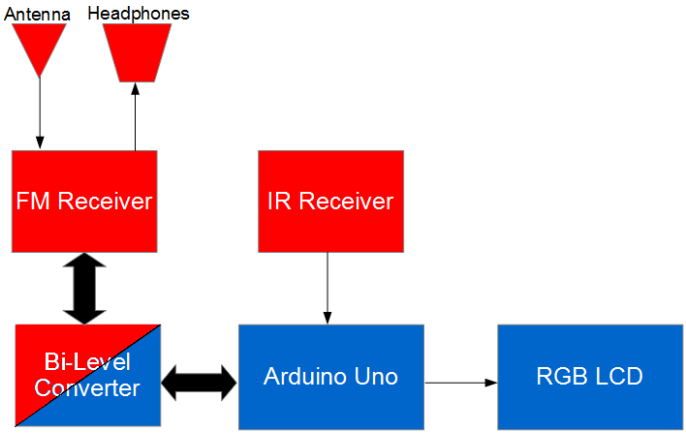
NASA faced problems when they tried to build a stable communication system between its different parts of the system. When astronauts work in the space, the requirements of signal are different from on the earth because there is no Wi-Fi-signal that pre-deployed in the space. Our goal is to build a robust, disruption-tolerant, ad-hoc mesh network for NASA's adventures into outer space. We will build a device that provides proximity communication links in the right locations or a system that should be able to communicate between the different parts of the NASA expedition in space without being disrupted. The problem arises when the body sends out a robot to collect information, and this robot gets lost because either it forgets its return path or its communication with the main brain of the system gets interrupted. We will solve this problem by including the main brain to send out beeps of RF waves at certain intervals of time or by setting up a certain perimeter before deploying the specimen collecting robots; in this perimeter it should be made sure that the communication network is tested before a robot is tested.



Electrical Engineering Technology

Team Name: Arduino High-Definition Radio
Program/Department: Engineering Technology

Team Members:
Maxwell Carritt
Philip Chandler
David Powers

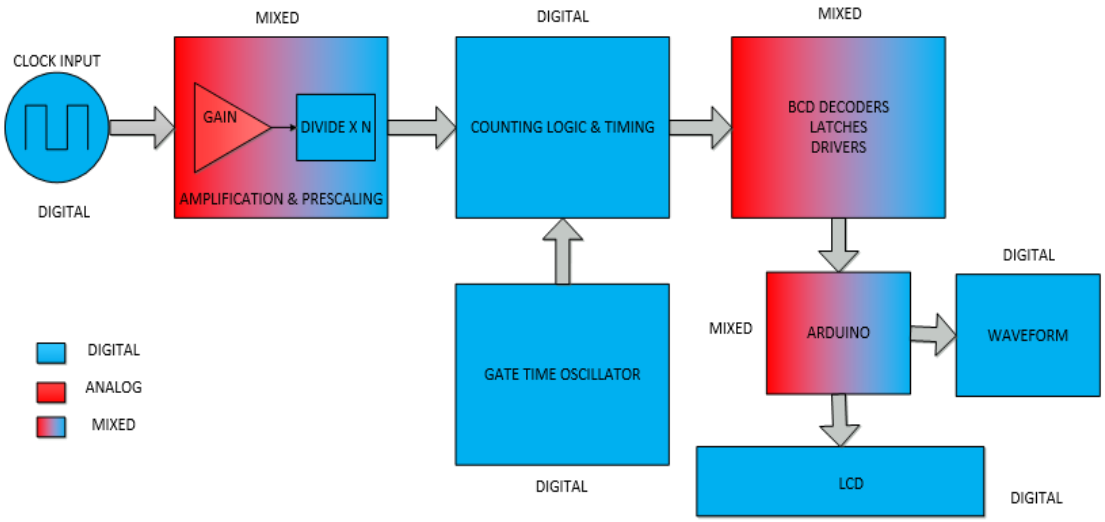


This project aims to design and prototype a stand-alone High Definition (HD) FM radio. It is based off of an existing design that utilizes an Arduino Uno to control the functions of the radio, and outputs the audio through headphones. (Craig A. Lindley, Nuts & Volts, February 2014, Page 38-45). In this project, the standard FM receiver is replaced with an HD receiver capable of FM, AM, and HD FM. The audio output will also be changed to a speaker driven by a compact tube amplifier. The code being ran by the Arduino Uno will be modified to utilize a function of the new receiver known as Radio Data System (RDS). This will take data embedded within the FM signal and output the information to the LCD screen. The code will also be modified to implement any new seeking or scanning functions that the new receiver contains.

Team Name: Retro Frequency Counter
Program/Department: Engineering Technology

Team Members:
Jessica Clary

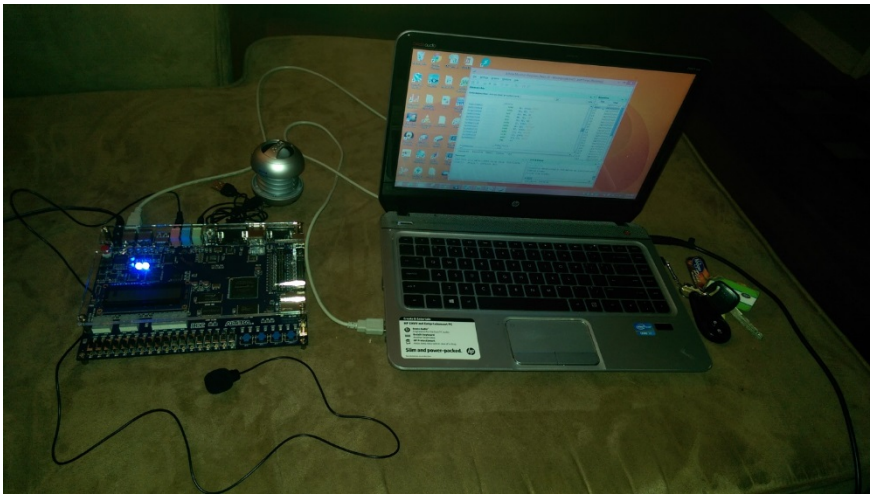
Broderick Parks



This project aims to design, retrofit and prototype a frequency counter. The original design operates by using a single logic chip frequency counter and minimal circuitry. The frequency counter designed in this project takes elements from the original design and improves upon them. The redesigned frequency counter will perform as a stand-alone universal counter using the capabilities of the 'B' version of the logic chips. Instead of only measuring frequency, it will function as a period counter, frequency ratio counter, time interval counter and totalizing counter. The design branches away from LED display and is upgraded to support an LCD configuration via an Arduino microcontroller. The original design has a resolution of up to 150 MHz while the improved design will have a targeted resolution of 10 MHz. The design will be powered with an internal power supply making it able to function 'stand-alone'. The design will be etched to a PCB and placed in an enclosure.

Team Name: Real-Time FPGA Audio Effects Generator
Program/Department: Engineering Technology

Team Members:
Andrew Harrison
Lenge Fiston
Ronald Paul

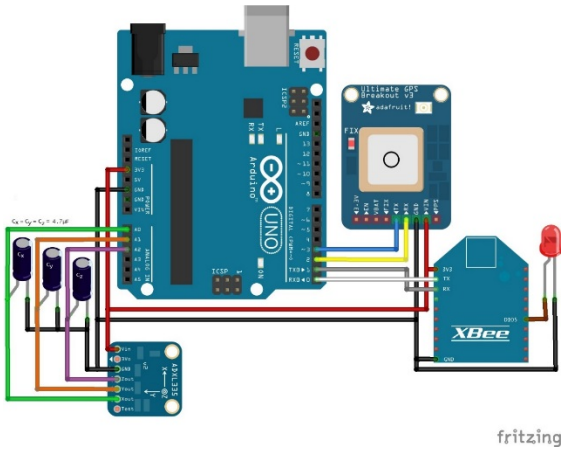


Audio sampling and effects are used in numerous applications that involve audio editing. Audio editing is used in music, sound effects, and in speech for movies, television, video games, voice recognition etc. This project will use an FPGA to demonstrate how real-time audio editing and effects can be performed by taking a voice recording which will be sampled and altered to give the desired effect. The platform chosen for this demonstration is the Altera DE2 board equipped with an onboard Cyclone IV Field Programmable Gate Array (FPGA). Mixed-language (VHDL, NIOS II assembly and embedded C) will be used to create a soft processor in the FPGA fabric and program all required interface elements.

Team Name: High-Data Rate, Low-Power Wireless Sensor Network for Structural Health Monitoring
Sponsor: National Science Foundation grant #1244129
Program/Department: Engineering Technology

Team Members:
Luis Flores

Ryan Hagood
David Shawn Kennedy



This project is a continuation of the research and prototype design of a wireless sensor node network (WSN) for monitoring structural health. An NSF grant, titled “A New Interdisciplinary Technology Education Strategy Using State of the art Wireless Sensor Network”, funds the project. The WSN, known as a structural integrity monitoring system (SIMS), transmits critical structure data through a series of nodes to a common base station for data acquisition. The data includes acceleration taken from accelerometers along with a very accurate time stamp via a temperature controlled real time clock (RTC). For the transmission of the data, SIMS uses the industry standard ZigBee protocol, to create a wireless mesh network. This mesh networking is crucial so all of the nodes are capable to talk to one other and transmit the other’s data if the node is out of range. To bring all of these instruments together as to create a node or a base station, a microcontroller is utilized to coordinate the data collection and transmission. Applications include but are not limited to bridge load analysis, building movement testing (high winds or heavy traffic) and post-earth quake monitoring.

Information Technology

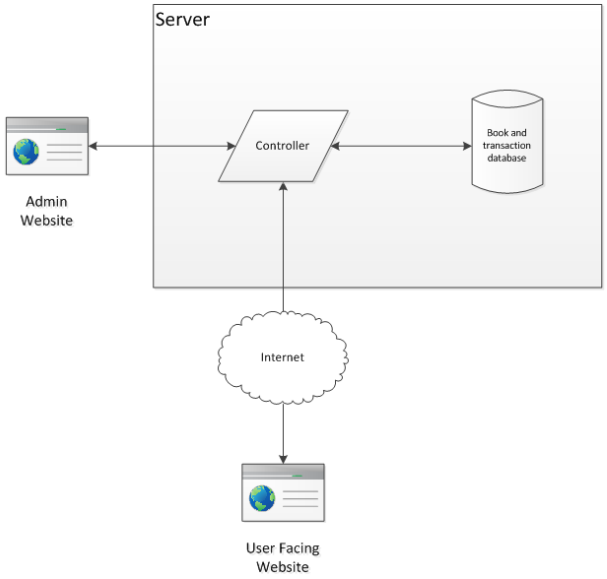
Team Name: DNL Solutions
Sponsor: University of North Texas CSE Department
Program/Department: Information Technology / Computer Science and Engineering

Team Members:
Nathan Thurmond
David Figge
Larry Ellis

DNL Solutions aims to recreate UNT’s Robotics Camp website in order to attract attention to the site and allow visitors to the site to register for the different camps offered throughout the summer. The site Redesign will support more functionality for the end user as well as provide a more robust back end for administrators managing the site. The website will provide information regarding the summer camps, make more of an effort to “sell” the summer camp, and keep track of/manage data related to running the RoboCamp site. Our goals are to draw an increase in enrollees, create a visually appealing website more in line with the UNT theme, and publicize the advantages of the learning experiences offered through the UNT Robotics camp.

Team Name: SQL Solutions
Sponsor: Daisy Gillam, David Keathly
Program/Department: Computer Science

Team Members:
Andrew Aurzada
Cjivona Hicks
Spencer Newell
Katerina Tiagunov



This team is presented with the task to introduce automation to the book processing in the CSE Textbook Library. SQL Solutions team will provide the librarians with a software package to manage the contents of their library. The software will have the ability to scan barcodes for book check-out and check in, allow librarians to track book usage, and add and remove books from the library's database. In addition to these inventory management tasks, the system should be able to send out automatic notifications to the users, in the case of overdue notices, reminders, or promotions.

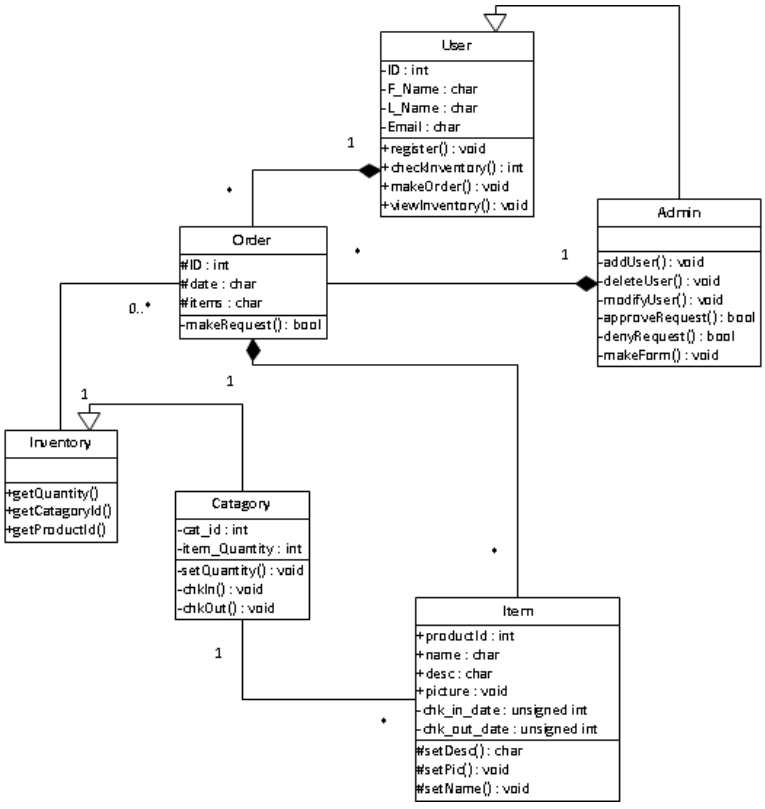
Team Name: Color Your Hat
Team Members: Sean Bell and Tyler Clements

Our goal is to create a comprehensive, interactive, learn-by-doing system to teach a user the ins and outs of computer exploitation. We will create a website to serve as a guide, as well as a knowledge-base resource for the necessary conceptual aspects of computer security. Throughout the instruction, wherever possible, we will provide opportunities to practice and explore the techniques and systems described in the lessons via downloadable Oracle VirtualBox images preconfigured to optimally demonstrate the core of the applicable material. We want to provide the user with a thorough and concrete foundation upon which the user can build and secure their own specialized, professional, and continually evolving expertise within the field of offensive computer security.

Team name: Team RamRod
Sponsor: Jim Buchanan
Program/Department: Computer Science

Team Members:
Joseph Adams
Gerardo Picazo
David Inguanzo
Pa Sanna Ceesay
Reginald Randolph

Our vision and goals are to create an easy to use inventory system that will keep track of individuals that are borrowing, as well as the suggested period of time it will be on loan. In order to make the inventory system easy to use, we will be matching the UNT and department policies and identities. To help keep track of the loan time, we will create report pages and send automatic emails to the borrowers. Ultimately we will have a self-sustaining system that will keep track of all the inventory registered. It will check items out and back in with simple and minimal effort, while tracking the borrower and creating lending period reports automatically.

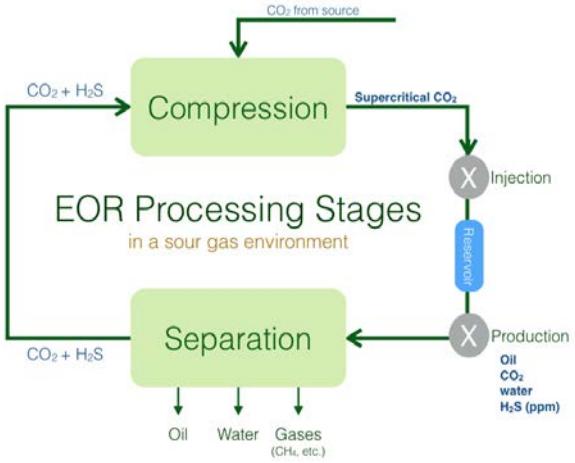


Materials Science and Engineering

Comparison of API X65 5L PSL 1 and PSL 2 carbon steel in a simulated aqueous sour gas environment

Sponsor: Cory Weinbel, Denbury Resources
Materials Science & Engineering - University of North Texas

Student: L. Tammy Tancharoensuksavai

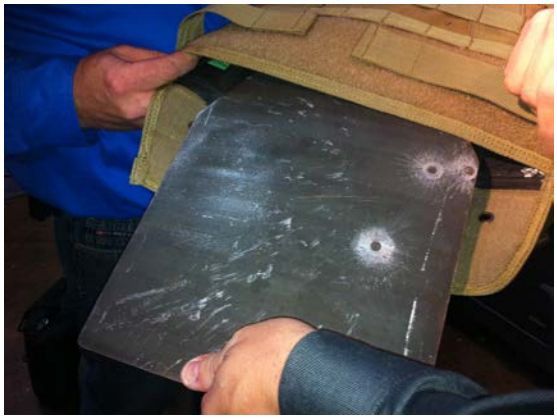


Hydrogen sulfide (H2S) plays a considerable role in the corrosion rate of steels within CO2 enhanced oil recovery. H2S attaches to carbon dioxide inside of natural formations and is known to greatly speed corrosion rates of metals in amounts as small as parts per million. Any amount of H2S carried in CO2 is referred to as “sour,” as opposed to “sweet” gas which relates to H2S- free gas. American Petroleum Institute developed a new type of standard for some carbon steels categorized as PSL 2 involving strict mechanical, processing and chemical conditions, as well as additional testing requirements specifically suited for sour gas processing. PSL 1 steel does not require these conditions. NACE document MR0175/ISO 15156 is currently the only regulating document for sour gas service but operating conditions and allowable H2S amounts are very loosely defined for some industry metals, others are not mentioned at all.

This project will employ a high pressure reactor to test welded coupons of API 5L X65 PSL 1 and PSL 2 in a simulated aqueous environment with CO2 combined with less than 100 ppm of hydrogen sulfide from supercritical to liquid and vapor state. This comparison study will investigate alloy composition and thermal processing microstructures around the weld seam for the use of PSL 2 steel for sour-CO2 enhanced oil recovery. Project goals include PSL 2 surpassing PSL 1 in sour gas conditions. Determining specific operational limits for line pipe will better enforce safety procedures and lead to an overall cost savings from avoiding any leaks or ruptures.

Team Name: Design and Optimization of Multi-Layer Ceramic Ballistic Plates
Department: Materials Science and Engineering

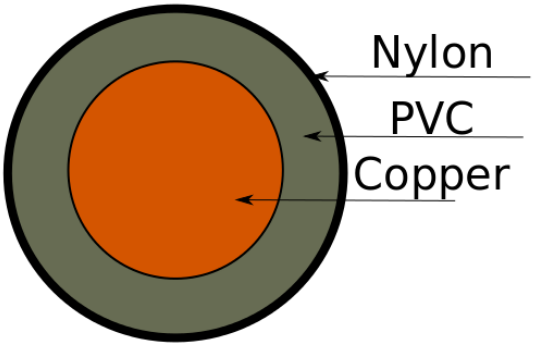
Team Members:
Jacob Scott
Dr. Rick Reidy



The goal of this project is to design and optimize a thin, light, and cheap ballistic plate that can be used in conjunction with a fiber only bullet resistant vest. The team will tape cast yttrium-stabilized zirconia (YSZ) into thin sheets. These thin sheets will be processed into different thicknesses through layering. The properties of these “green” tapes will be observed through different testing methods such as: scanning electron microscopy (SEM), x-ray diffraction (XRD), differential scanning calorimetry, etc. The tapes will then be sintered, with SEM and XRD repeated to find micro-cracks, and ensure the plate is completely in the tetragonal phase. The plates will be subjected to impact testing to determine if they meet the goal of stopping a single 200 joule impact force, which is equivalent to an impact from a .22 caliber bullet. The density of the plate will be compared to the theoretical density of YSZ with the goal of 95% theoretical density being obtained. A Vickers hardness value of 1250 is also desired.

Team Name: Coatings for 600V Metal Wires
Sponsor: Encore Wire Corporation
Department: Materials Science & Engineering

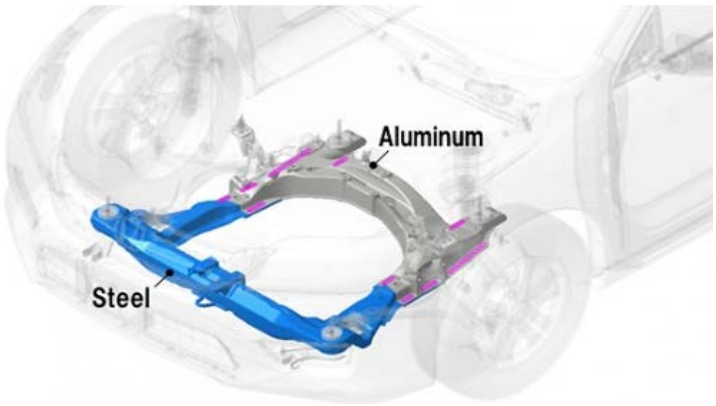
Team Members:
Zachary Hoyt



The objective of this project is to create a material, or component, that replaces the current nylon coating while adhering to several constrains such as lowering the overall cost of the system while improving or maintaining properties. These constraints have been desired and set by Encore Wire Corporation, which is the projects industrial contact. The material proposes is a novel polypropylene based composite reinforced with mineral fillers. This is a cost-effective alternative to the current nylon coating while refining certain properties. Saving money while improving mechanical, thermal, and chemical properties is a real goal which a national company would like addressed.

Team Name: Friction Stir Welding of Dissimilar Alloys
Sponsor: Center for Friction Stir Processing
Program/Department: Material Science and Engineering

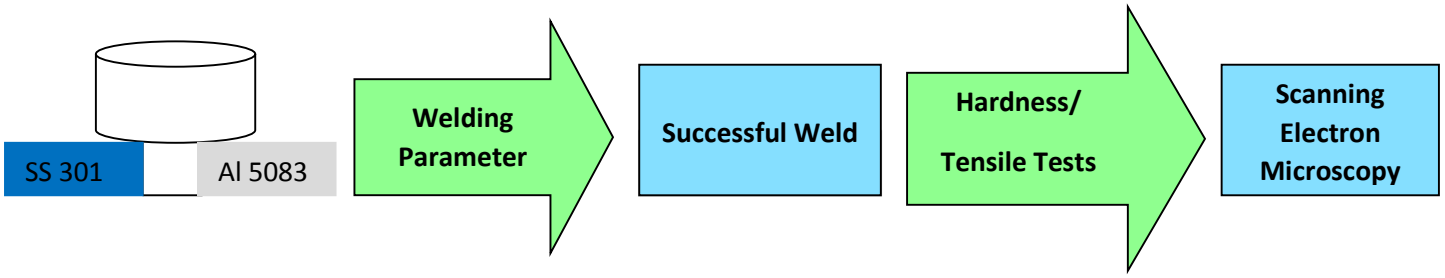
Team Members:
Aku Banini



Dissimilar material joints are needed to take advantage of individual material properties, and usually they are mechanically fastened because of the issues associated with conventional fusion welding. A relatively new method of joining materials is through Friction Stir Welding (FSW). This method is a solid state welding technique where no melting occurs, no toxic gasses are released making it environmentally friendly and it requires low energy compared to other joining techniques. Its application includes the automobile industry for fuel efficiency, aerospace industry and also ship industry.

A weld involving dissimilar materials with a large difference in melting point is difficult to achieve. Therefore the purpose of this project is to make a successful weld between two dissimilar alloys- Aluminum 5083 and Stainless Steel 301. This will be achieved through combinations of welding parameters. The mechanical properties of the successful weld will be tested and then further microstructural analysis will be performed.

The figure above is an image of a Honda Accord vehicle with a Friction Stir Welded Aluminimun and Steel subframe.



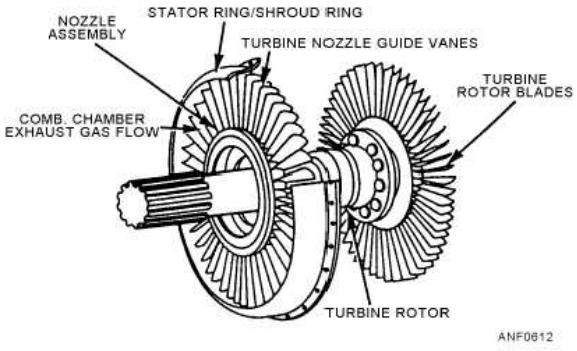
Functionally Graded Novel Beta Titanium Alloys for Orthopedic Implants via Additive Manufacturing
Department: UNT Materials Science and Engineering

Team Members:
Calvin Mikler
Chris Yannetta

Additive manufacturing processes such as laser engineered net shaping (LENS™), a near-net shape processing technology, has the potential for rapid manufacturing of functionally graded biomedical implants. With regard to titanium alloys, the use of LENS™ technology to process low modulus alloys, such as Ti-35Nb-15Zr (wt%) has been well established. Current research leads to the conclusion that the next generation of internal bone fixation plates will have to address the negative effects caused by stress shielding by decreasing the modulus with distance from the fracture. The plate studied in this paper has a low elastic modulus (or stiffness) at the ends, comparable to that of bone, and a higher elastic modulus in the center to isolate the fracture. This study focuses on the development of a novel LENS™ deposited, compositionally and functionally graded Ti-based metallic plate for potential bone fixation. The graduation has been achieved between a low modulus Ti-35Nb-15Zr (wt%) alloy and the higher modulus commercially pure Ti near the center of the plate. Site-specific mechanical and corrosion properties along the compositional gradient will be presented in this paper.

Team Name: Precipitation Control of ATIAllvac 718Plus Alloy for Engine Application
Sponsor: ATI Speciality
Program/Department: Material Science & Engineering

Team Members:
Michelle Gilbert
Brandon Jarvis
Apurva Patel



ATI 718Plus® alloy is a precipitation hardened nickle-base superalloy which displays a combination of high temperature properties and better fabric ability then Waspaloy and INCONEL® 718 alloy. ATI 718Plus® alloy is a good material to be used for gas turbine engine application and it is beneficial to save material cost as well. Currently, it is being used for static components such as turbine casing and rings, but one can also use in rotating components like compressor disk and turbine disk. In order to use this alloy for rotating components, we need to work one two tasks: One task is to control Delta precipitation and Second task is to evaluate processing techniques.

Team Name: Thermal Stability Studies on Structure and Tribological Properties of Diamondlike Carbon Nanocomposite (DLN) Films
Department: Materials Science & Engineering

Team Members:
John Stephens

Diamond-Like Carbon or Diamond-Like Nanocomposite films are often used as solid lubricants on engineering alloys to mitigate friction and wear while providing corrosion resistance. The aim of this project is to gain a better fundamental understanding of the thermally induced changes effects on the interrelationships between DLN film structure, composition and tribological (friction and wear) properties targeted for DLN film applications through increasing temperatures. Friction and wear tests will be conducted to measure the static (run-in) and dynamic (steady state) friction coefficients, and determine the wear rates after the tests. The

friction and wear tester, namely the pin-on-disk tribometer, will be used to test the DLN films under varying loads/contact stresses, sliding speeds/frequencies, and temperatures. A micro-Raman spectrometer will be used to determine friction- and wear-induced chemical/structural changes to the DLN films. A final report will be generated that contains the key findings and recommendations will be given for specific applications in a specified temperature range.

Team Name: Varied Length-Scale Porous Metallic Structures
Sponsor: Dr. Samir Aouadi and Dr. Marcus Young
Program/Department: Material Science and Engineering

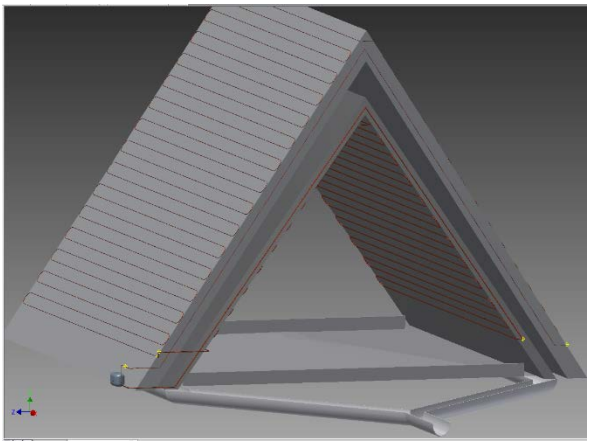
Team Members:
Reid Bitten

Open cell porous metallic structures exhibit unique physical and mechanical properties such as high strength, high impact resistance, lightweight, and excellent heat transfer, which make them ideal candidates for many engineering applications. In this project, macro-and micro-scale porous structures are created by casting alloys into different preforms. These macro- and micro-scale porous structures are then modified by chemical routes such as hydro-thermal electrochemical deposition to create nano-scale features. These foams with and without nano-scale features are mechanically tested and compared.

Mechanical and Energy Engineering

Team Name: Big Rock Oil
Sponsor: Victor Lopez, President of the Big Rock Oil Company
Department: Mechanical and Energy Engineering

Team Members:
Billy Davis
Joseph Medrano
Benjamin Erickson



Our senior design team, with the assistance of Big Rock Oil, is seeking to design and construct an atmospheric water generator which will help supplement the water supplies of small scale farms. Of particular interest to the sponsor are the water needs of ranchers in the North Texas area.

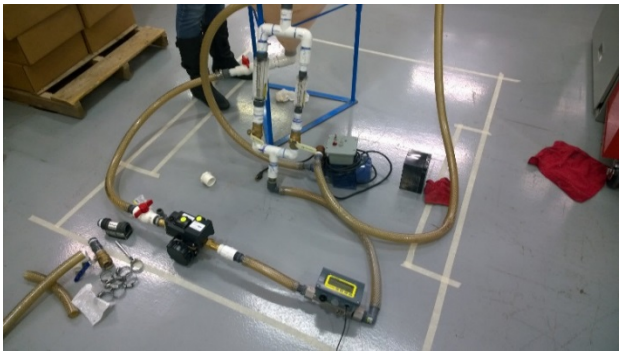
The objectives for this project are to provide an additional source of clean water in a design which is innovative and cost effective. We hope to develop an efficient machine that is simple to operate as well as maintain.

The water generator we plan to develop will extract water from the ambient humid air via condensation. This condensed water shall be collected in a reservoir which can then be pumped out for use as needed. This water will need to be clean enough so it may be used for animals as well as irrigation. The amount of water that can be collected largely depends on the scale of the unit, our prototype will be a proof of concept design and will only be around the size of a desktop unit with the ability to be scaled up as necessary.

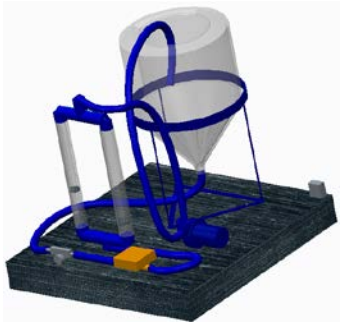
Team Name: Team Capstone
Sponsor: Capstone Metering, Inc.
Program/Department: Mechanical and Energy Engineering

Team Members:
Aaran Barnes

Russel Elliott
Crystal Gilstrap
Mike Mielcarek



Capstone Metering, Inc. is a DFW based company seeking a team to design a mobile testing device for water meters and has agreed to provide all necessary funding. This project is significant because the current method of checking a water meter's accuracy on location involves measuring the meter attached to a house. This method, unfortunately, does not account for whether the meter is inaccurate or a leak source is present in the house without additional testing off site. This project will innovatively satisfy this need by creating a mobile and closed-system testing device which will provide onsite data to qualify a water meter's accuracy by the American Water Works Association (AWWA) standards. This project also presents a unique challenge because there are a variety of ways to construct the mobile testing unit to create the most efficient system, and there are multiple aspects to consider. Examples of these aspects includes the proper function of the testing device, overall weight of the device, and cost to manufacture. Instead of having to extract the device and return to the production factory for additional testing, a mobile testing device will be used to cut time and expenses while accomplishing the same goal.



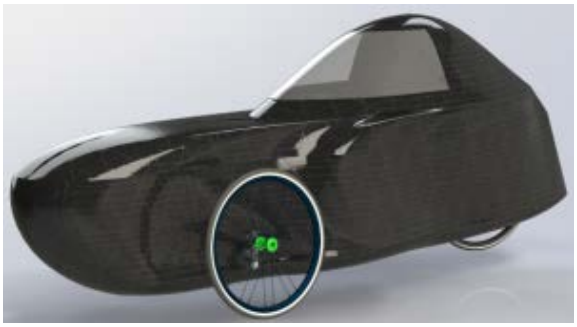
Team name: SAE Drivetrain Team
Sponsors: SGA, Fastenal, Solid Works, Mechanix Wear, Taylor Race Engineering, RBC Bearings, Red Bull, SKF, Timken, Royal Purple, Monster Tool Company, Design Engineering Inc., Wheatridge Manufacturing, Odyssey Manufacturing, Marshall Machining, Crosslink Powder Coating, United Copper Industries, BRM, Peterbilt, Brembo Brakes, RC Engineering, and Diamond Cycles
Program/Department: Mechanical and Energy Engineering

Team Members:
Ariel Jackson
Robert Jones
Trent McInturff
Travis Rigsby

For the 2014-2015 year, the Formula SAE drivetrain team will improve upon the previous year's design while at least maintaining weight and keeping to a high standard of reliability. Targeted areas for the re-design initiative include the cooling system, intake plenum, exhaust, and fuel tank. The capacity of the cooling system, which includes the radiator and cooling fan, has been increased by the use of careful calculations programmed through MATLAB. Vast improvements have been made to the intake plenum through research and flow simulation. This part will be outsourced to a company specializing in 3D printing in order to keep weight down. Increasingly strict noise regulations have warranted a re-design of the exhaust; particularly the muffler. A modular exhaust system is being manufactured in-house to fulfill these requirements. Additionally, the fuel tank is being re-shaped in order to prevent the fuel starvation problems that plagued the previous team.

Team name: ASME Human Powered Vehicle
Sponsor: ASME

Program/Department: Mechanical and Energy Engineering

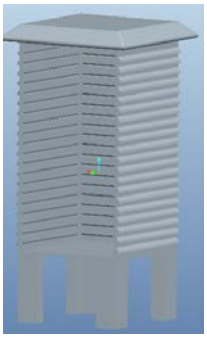


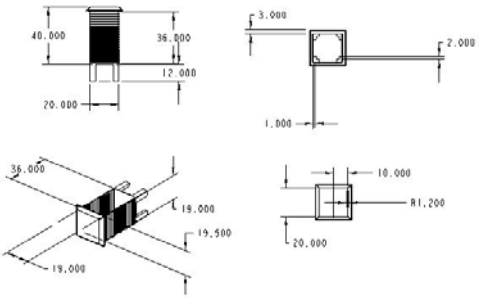
Team Members:
David Bounds
Xavier Carr
Nadiyah El-Amin
Michael Hartzler
Sara McNutt

While using sound engineering principles, the objective of the team is to develop a fast, efficient, sustainable, and practical human-powered vehicle (HPV), in order to compete in the Human Powered Vehicle Challenge (HPVC) hosted by the American Society of Mechanical Engineers (ASME). This international competition is judged by an overall points total resulting from four events, which are Design, Speed, Innovation, and Endurance. This HPV utilizes a tadpole-style recumbent tricycle design, placing the rider in a reclined position, with two wheels in the front and a single wheel in the rear of the vehicle. The HPV utilizes a skeletal frame constructed of 4130 chromoly steel tubing to serve as the primary load bearing structure and employs a carbon fiber based aerodynamic fairing.

Team Name: The Mean Green Energy Efficient Building Simulation
Sponsor: Trane
Program/Department: Mechanical and Energy

Team Members:
Yovani Hernandez
Alejandro Hernandez
Zachary Lowe





The project objective is to create an energy efficient HVAC system. The HVAC system will have to provide cooling or heating conditions to a smaller replica of the energy lab. The group has calculated the loads that will be satisfied with our heating and cooling system. The group will be modifying a previous senior design project provided by Michael Shakelford. The original design is a chiller that will need a pump thermostat and outer cover (to protect from the weather conditions). The chiller will also be a hybrid model with will be power by solar and ac current.

Team name: Music Box
Sponsor: Franky Gonzalez
Program/Department: Mechanical and Energy Engineering

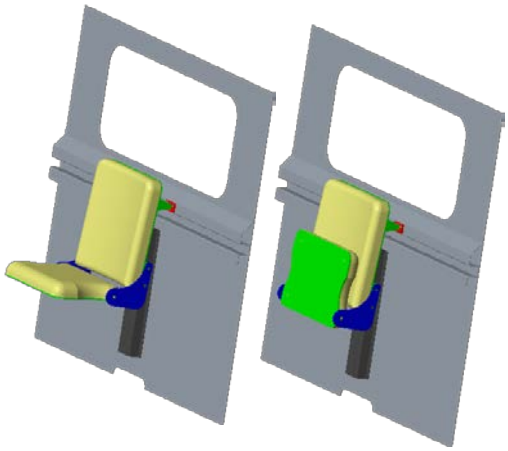
<u>Team Members:</u>
Austin Taylor
Thomas J. Estrada

Our need is to create a functioning prop for the short play *Waltz Around The Picnic Table* written by Franky Gonzalez. The music box needs to play a waltz, be hand cranked, be completely mechanical, be able to be heard in a small theatrical space amidst an on stage dialogue, and the tempo of the song must vary relatively with the speed it is being cranked. The actor using the box must be able to stand with it for an extended period of time and ideally he would be able to walk around on stage while playing the music box. The sponsor has requested a few added aspects to be added if there is time and money. He would like the music box to have interchangeable cylinders so

that songs can be changed, he would like to able to change the octave the box plays in and would like for the music box to play the song backward if cranked backwards.

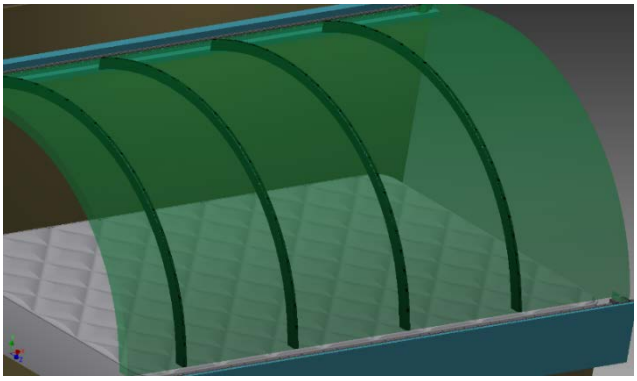
Team Name: Team Ghost Pepper
Sponsor: Peterbilt Motors Company
Program/Department: Mechanical and Energy Engineering

Team Members:
Christian Elliott
Chad Goucher
Khemachart Kheawsang
Alan Zuefeldt



This project involves the designing of a middle seat for day cab trucks. This seat will be able to fold up and down depending on the need. Our design must not interfere with other systems within the cab. (e.g. transmission lever, movement of air-ride seats) Currently, the only option for three-rider seating is a bench seat. The fold-away seat is an intermediate option between a bench seat and a single passenger seat. Compared to the current bench seat, this foldable seat allows extra usable space when a third passenger is not riding. The initial design was intended to mount to the rear wall. The seat itself was structurally sound, but the forces experienced by the seat would deform the structure it would be attached to. The design is currently being reworked to also mount to the cab floor in order to better distribute the loading.

Team Name: Isolated AC System
Sponsor: Peterbilt
Program/Department: MEEN



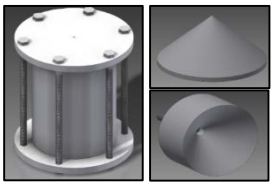
Team Members:
Taylor Bontz
Josiah Bujanda
Christopher Hubbard
Adam Mengestab
Edgar Vazquez

Our main objective is to create a canopy system for entrapping air inside of an enclosure around the bed inside the cab of a truck with the intentions of reducing energy usage by allowing the users to cool a smaller area as opposed to the entire truck cab when they have to sleep on the road. We will do this by creating an effective, nearly air-tight seal around the user using an insulated plastic canopy in order to reduce the amount of area that would have to be cooled while the truck driver sleeps. Then utilize a portable cooling system to bring cool air into the attached canopy. Finally, implementing a user interface to adjust cooling temperature while also maintaining energy efficiency to reduce waste.

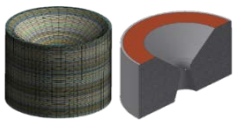
Team Name: Raytheon Rocket Nozzle Optimization
Sponsor: Raytheon Space & Airborne Systems
Program/Department: Mechanical & Energy Engineering

Team Members:
Michael Stoddard
Christopher Vorgert
Eric Anyanwu

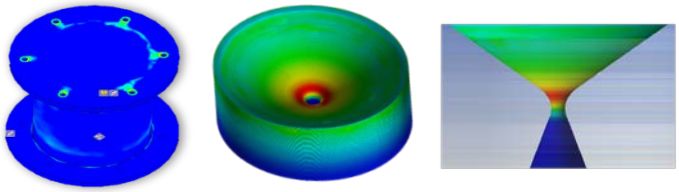
The primary goal of this project is to evaluate the effect of a layered composite shingle angle of a thermo-resistant rocket nozzle. Our team will attempt to predict the optimum angle by generating a simulation that replicates a static firing testing setup. Next, our team will characterize the mechanical properties of the specialty composite material developed by Raytheon Space and Airborne systems using ASTM standard testing. Our team will design and fabricate a mold to make the composite and manufacture a select number of nozzles with differing shingle angles to be sent off to the Air Force Research Laboratory (AFRL) for static firing testing. The results will be correlated back to our team to evaluate the accuracy of the simulation and possibly serve as a valuable tool for future design efforts.



Mold Design



Final



Simulation Analysis

Team Name: Scuba L.E.A.P.
Sponsor: Cecil Simpson (private citizen)
Program/Department: Mechanical and Energy Engineering

Team Members:
Andrew Dean
Nathan Ley
Louis Judge
Evan Judice

Our project objective is to create a propulsion system to aid scuba divers who may have limited use of their lower extremeties. Currently, there are diver propulsion units on the market, but these require two hands, do not have variable low speeds, and are very expensive. Our goal is to create a system that works easily with one hand, provides lower body support (if needed), is varible speed controlled, is reliable at depth and is reasonably affordable.

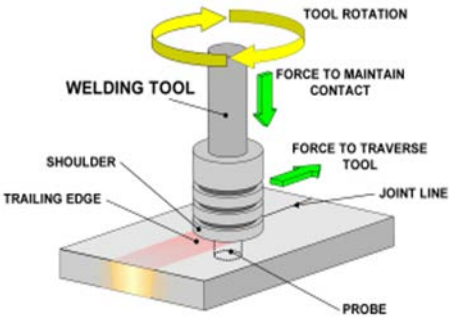
Our propulsion design consists of a trolling motor contained in a custom water/pressure tight housing which also includes a re-chargeable battery and associated wiring (see Figure 1 for an exploded view). This unit will attach to the dive tank and be controlled by a one-handed remote that runs from the housing to a wrist strap worn by the diver. On the rear will be a custom 3-D printed nozzle to direct the thrust and provide safety and stability.

To provide lower body support, we have knee and hip braces that have been pre-adjusted for a comfortable, yet streamlined posture.

The only thing on the market similar to this is a thruster. These only operate at high speeds and are at least $3000. Our project will be much morch functional than a thruster, and our budget goal is $1000, making it an ideal solution.

Team name: Friction Stir Welding of Dissimilar Materials
Sponsor: UNT
Program/Department: Mechanical & Energy Engineering/Material Science & Engineering Departments

Team Members:
Mohammed Aljoaib
Hassan Alwesaibi

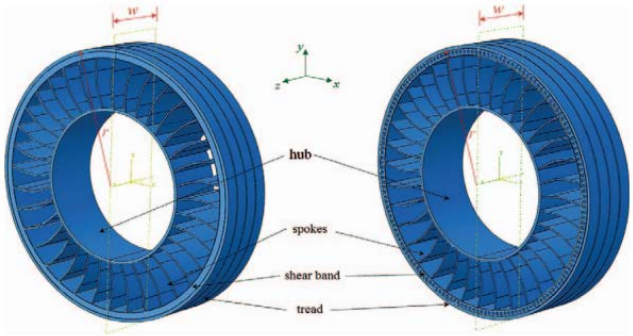


Friction Stir Welding (FSW) is a solid state joining process that creates extremely high quality, and high strength joints with low distortion. FSW is considered to be a very recent technology that has been invented in 1991 by The Welding Institute (TWI) based in

Cambridge shire, UK. Friction Stir Welding is a widely used solid state joining process for soft materials, especially Aluminum Alloys. Also, it is responsible for welding Aluminum Alloys with other materials, such as Steel, Copper, Magnesium, Titanium, etc. This type of welding is unique since it has many advantages and benefits that surpass other welding technologies. For example, FSW doesn't operate on fuel nor does it produce any harmful pollutants, which makes it friendly to the environment. Moreover, because it creates a low heat and a minimal heat zone, it can manage to produce an insignificant distortion level on the joined materials. This cutting edge technology is broadly used in almost every industry. The goal of this project is to redesign the tool, which is responsible for welding two materials in order to produce joint of dissimilar materials, and to weld Steel and Aluminum at a maximum efficiency with improved strength.

Team Name: Evaluation of Vehicle Performance of Non- Pneumatic Tires
Sponsor: Dr. Jaehyung Ju
Program/Department: Mechanical and Energy Engineering

Team members:
Sonam Sherpa
Amir Poudel
Soksan Sor



The purpose of this project is to design a non-pneumatic tires and evaluate on the basis of performance on different criteria such as traction, load capacity, high speed operation and rolling resistant. The project involves on detail study of pneumatic tire such as Understanding Concepts of Vehicle Dynamics and analysis through Car Simulator to develop a non-pneumatic tire with better capabilities, performance and durability.

The proposed prototype is a design of an airless tire which is able to function as a traditional pneumatic tire. This project includes design and evaluation of the wheel's components such as combination and array, thickness, curvature and material properties of spokes and base of a tire. The designed prototype should have higher strength for higher load capacity and increased elastic deformation. The design should be able to reduce rolling resistance and vibration to increase performance.

Non-pneumatic tire is a popular and growing future technology that will replace traditional tires which have some drawbacks such as a puncture of the tire and low performance on uneven and rough surfaces. The use of non pneumatic tires can increase performance of a vehicle in rough and hard terrain and prevent accidents due to blowouts.

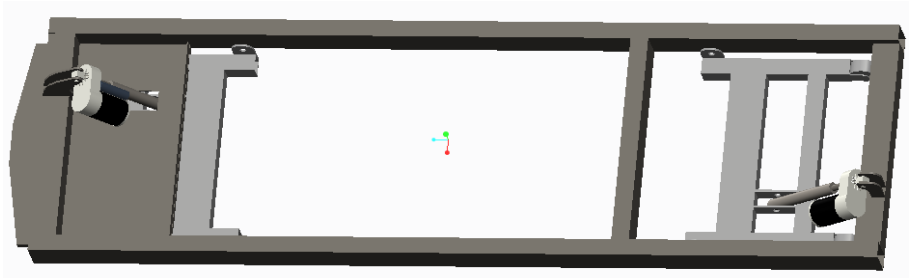
Team name: MG Ti Engineers
Sponsor: Dr. Rajiv Mishra
Program/Department: Center for Friction Stir Processing (CFSP) / Materials

Team Members:
Michael Frank
Alex Gallegos
Kaongou Temedjong

Our team focuses on the opportunity available for the use of a stronger Ti 6246 alloy in biomedical applications. University of North Texas's research in Friction Stir Processing (FSP) has proven that this specific alloy contains properties capable of making it a potential candidate for the construction of these prosthetic components. With current prosthetic pylons, increasing the rated sustainable load requires the increase of material and thus the increase of overall weight of the prosthesis. If the weight is increased, the prosthesis provides an uncomfortable gait for the amputee and thus is not a viable solution for the amputee. Development of a prosthetic pylon that is designed to withstand larger loads, while maintaining a viable component weight, and distribute these loads before the socket, to aid in reducing contact stresses, could provide a critical solution to these problems. The project concept suggests that with a method of designing for ease of manufacturability and friction stir processing of the Ti-6246, the pylon strength and the desired stress distribution can be obtained.

Team Name: Modification of a Treadmill
Sponsor: Dr. Brian McFarlin/UNT Kinesiology Department
Program/Department: Mechanical and Energy Engineering

Team Members:
Dana Chesley
Rachel Mahlow
Hallie McDonald

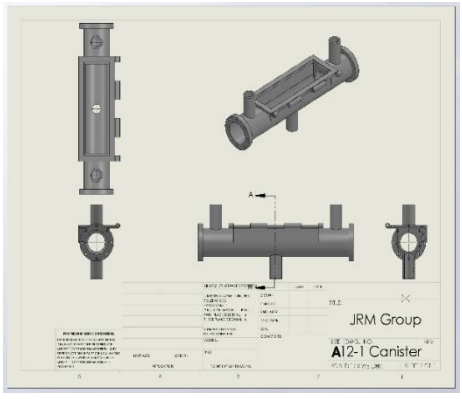


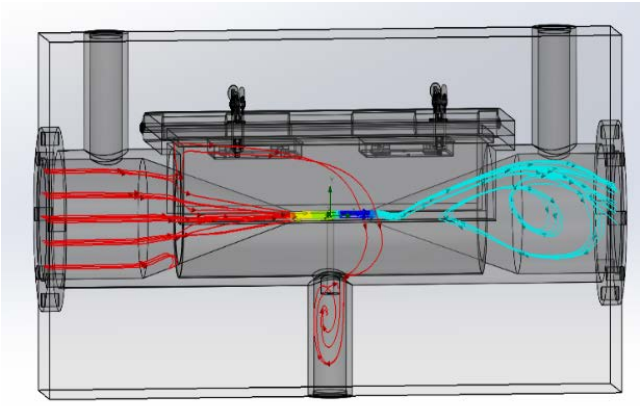
The objective of this project is to modify an existing treadmill that will run at a speed of 7-10 miles per hour, both in forwards and reverse, and run at up to a 15% incline and decline. This treadmill will have a Leeson reversible motor in place of the existing electric motor. A switch will be connected to the motor and to the control panel so that the runner can easily switch from forwards to reverse. We will use the small lifting frame with wheels and the linear actuator from another identical treadmill to create the decline. We will extend the frame of the treadmill past the back of the belt and attach the actuator and the lifting frame to the back of the treadmill frame, essentially creating a design similar to the existing design in the front for the incline.

Team Name: S.E.E Venturi System
Sponsor: West Texas Fabrication- Mr. Jim Fletcher
Program/Department: Department of Mechanical and Energy Engineering

Team Members:
Marco De Lira
Raul Canales
Joe Solis

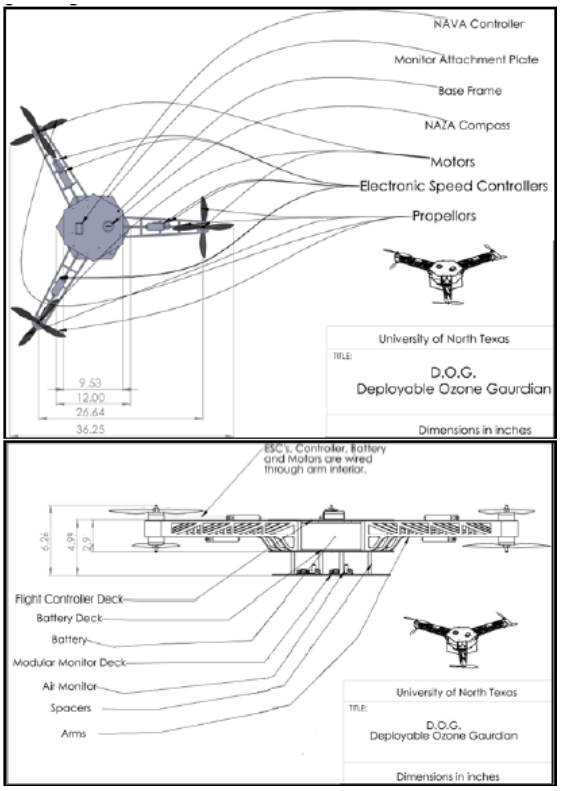
J.R.M. Partnership will be creating a reducing venturi system that will enable the client to make quick changes of the flow of an intermediate substance depending on the demands of the customer. A primary task will be developing such a design taking into consideration all the critical loads, stresses and flow geometry calculations of the device under a multitude of loads. It will be the team's objective to create a full scaled CAD design and run test simulations of the device using both Solidworks & ANSYS-CFD software. The next phase will be for a 3-D print of the device which will be shown to the client as well as faculty. If the design prototype in hand is approved by the client a company will be sought after for the molding or extrusion of the device. The customers constraints include the following but is not limited to: withstand a maximum volume flow rate of 210 gal/min, efficient mobility and operated easily by two men, create enough vacuum pressure to pull in a third party fluid at the customers requested rate, and reduce the time to exchange inserts to less than 30 minutes.





Team name: Deployable Ozone Guardian
Sponsor: Dr. Kuruvilla John
Program/Department: MEEN

Team Members:
Andrew Hull
Kassra Mahjoubi
Brittani Powers
Raul Soberanes



The intention of the D.O.G. (Deployable Ozone Guardian) project is to construct a robust, modular unmanned aerial vehicle, which can monitor air quality at static locations.

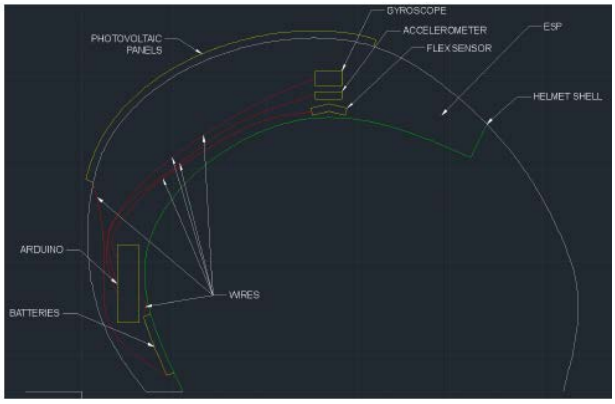
It will implement gas and particle detectors to take pollutant measurements in units of parts per billion at altitudes between 10 and 40 meters. The D.O.G. will run on rechargeable batteries that will maximize flight time to provide more accurate air quality readings.

Our frame is a multi-rotor UAV with 12" diameter rotors for an efficient lift design. The Components will be placed in the center of the multi-copter in a tiered holding unit to maximize balance. This will also incorporate a Modular platform for attaching and housing multiple air monitors, so that the equipment can be easily upgraded as technology improves. It will be easily controllable from the ground using an advanced flight controller with a high range transmitter.

Industrial companies can use this platform to monitor that pollutant release and verify it is within the legal limits, or environmental organizations and government task forces like the EPA could use it for air pollution monitoring in larger cities.

Team Name: NHTSV ESV Competition
Sponsor: Dr. Yu
Program/Department: MEEN

Team Members:
Travis Beamon
Holly Gage
Celena Lipscomb
Leannah Nichols



We propose the design of a new motorcycle helmet that is integrated with crash detection and airbag systems, aiming to decrease motorcyclist fatalities. Our design will include a tri-axial gyroscope to monitor the orientation of the helmet, an accelerometer to detect sudden changes in velocity, a flex sensor and momentary switch to arm the system, and a microcontroller to manage the sensors and airbag deployment system. These components will be powered by photovoltaic cells, which will also charge a battery. A crash detection algorithm determined through research and experimentation of common motorcycle crash scenarios will be developed and used to deploy the airbag. The crash detection algorithm will also prevent false alarms such as the normal drop of helmet onto ground.

Team Name: Cellular Phone Functional Testing Device (CPFTD)
Sponsor: Genco
Department: Mechanical and Energy Engineering

Team Members:
Kevin Berry
Idris Ali
Osaretin Usiagu
Shahan Hameed
Omar Montemayor

Genco is the second largest third party logistics provider in North America. They are currently responsible for refurbishing broken phones for AT&T. These phones are tested for functionality before being returned in the market. Currently, human technicians perform functional tests. Technicians interact with the phone as typical users to access such features as Wi-Fi connectivity, cameras, speakers, charging ability, microphone, headset jack, etc. This process is time consuming, expensive, and unreliable for it depends on human judgments. Our goal is to automate this process so that it is more efficient and reproducible.

The assembly of our proposed design consists of the following components; the robotic arm, the shelf to hold the phone, sensors, and computer. The robot arm will interact with the phone and be the "human" interaction needed in the testing. The shelf is a fixture that will hold the phone off the ground and connected to a charger while testing is in progress. Sensors will detect the screen and relay information to the computer. The computer will receive information from the sensors and display the results on a screen, in an easy to read format, and on the LED indicators to denote passed or failed test.

Below if the picture of the robotic arm used, all the sensors will be attached to the arm after completion of tests. This assembly as well as the shelf will then be mounted at specified locations on aboard to conduct the tests.

Team name: Formula SAE – Suspension Team
Sponsors: SGA, Monster Tool Company, Odyssey Aerospace Components, Wheat Ridge Manufacturing, Bell Helicopter, Mark Nicholas, Fastenal, Peterbilt, Solidworks, RBC Bearings, SKF Bearings, Brembo Brakes, Brush Research Manufacturing, SAMPE, Red Bull, AEM, Miltera, QA1, Cycle Center of Denton, Online Metals, CRD Manufacturing, and Diamond Cycles
Program/Department: Mechanical and Energy Engineering

Team Members:
Jonathan Bowman
Tyler Newbold
Julian Quintero
Alec Wells

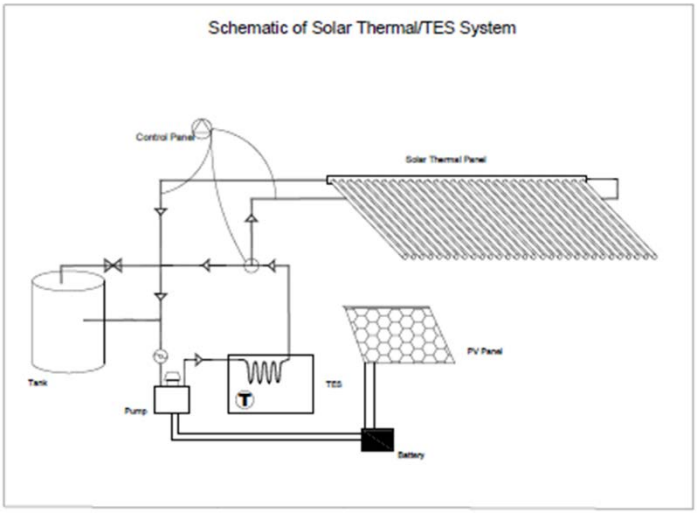
As part of the 2014/15 Formula SAE racing team, the suspension group has the responsibility to design the suspension of the racecar before the 2015 competition. The main goals of the suspension team will be to improve the cornering stability and maneuverability of the racecar based on the performance of 2013/14 Formula SAE racecar. Other secondary goals for the suspension team will be to reduce the weight of the racecar and lower the center of gravity.

To improve the maneuverability of the Formula SAE racecar, the suspension team will focus on increasing the steering. The total steering angle achieved by the 2013/14 Formula SAE team was very low and poised many performance limitations. The cornering stability of the 2013/14 racecar was also identified as a point of weakness. The suspension team will attempt to increase the maximum cornering speed from 30 mph to 45 mph by improving the amount of tire surface contact.

The front hub spindles of the racecar suspension will be redesigned to implement a live spindle system. This will reduce the number of parts and thus reduce the overall weight of the suspension, which is one of the secondary goals. Another secondary goal will be to lower the overall center of gravity of the racecar. In order to lower the center of gravity of the car, the shock absorbers of both the front and rear suspension will be repositioned to the bottom of the chassis.

Team name: Thermal Expansion Storage
Sponsor: Dr. Mun

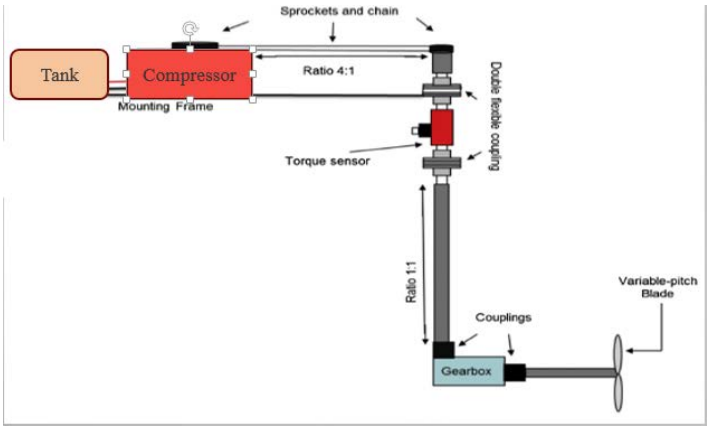
Team Members:
Don Magedara
David Paul Palmer
Ricardo Hevia



Our project is to build a Thermal Expansion Storage Unit to heat the water in a zero energy house. We had to design three different systems to accomplish this project. First was the thermal system. This converts and transports the energy that was retrieved from the sun. Next is the Power System which converts sunlight into electrical energy. This allows for the movement of fluid to transfer the energy which is in the form of heat. The final system is the Thermal Energy Storage Unit. This is where we use all the information we learned in the last four years to design the best system to retrieve and hold the energy, which is in the form of heat. We will also have to not only use the knowledge but we will have to build the structure to hold the solar panel and the material that is used to retain the heat. In the end we will have a system that takes the suns radiation and converts it to heat then transports it to the TES and is stored until it is need at a later time.

Team Name: Team Hydra
Sponsor: Center for Friction Stir Processing at UNT
Program/Department: Mechanical and Energy

Team Members:
Jacob Acosta
Michael Billups
Michael "John" Luke



In our project, we are working on developing a hydrokinetic energy system (HKES) that stores the energy generated in the form of compressed air. Hydrokinetic energy systems are still relatively new technology and is not yet competitive with conventional electrical energy methods. Typically when energy is generated, it needs to be used immediately. Converting energy into the form of compressed air can potentially allow for energy to be stored and used when needed. Our project will focus on the feasibility of storing energy generated from the HKES in the form of compressed air. It will also look into the cost analysis for any potential customers, transportation and other things associated with the compressed air energy storage.

Mechanical Engineering Technology

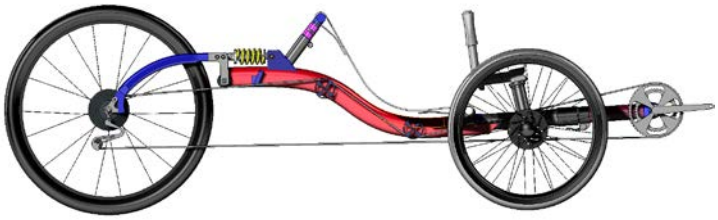
Team Name: FSAE Chassis Team
Sponsors: UNT Student Government Association (SGA), Monster Tool Company, Odyssey Aerospace Components, Wheat Ridge Manufacturing, Bell Helicopter, Mark Nicholas, Fastenal, Peterbilt, Solidworks, RBC Bearings, SKF Bearings, Brembo Brakes, Brush Research Manufacturing, SAMPE, Red Bull, AEM, QA1, Cycle Center of Denton, Online Metals, CRD Manufacturing, and Diamond Cycles
Program/Department: MEET/Engineering Technology

Team Members:
Matthew Hatton
Cedric Mbazoloumoue
Kellen Myers
Cody Wages
Tyler Zepp

The Formula SAE (FSAE) Chassis team is part of the University of North Texas' Society of Automotive Engineers (SAE) organization. The team was in charge of designing and building components for the 2015 Formula racecar including: chassis, differential mounts, engine mounts and ergonomics (gas/brake pedal assembly, firewall, floor, and seat). Due to the fact that the Chassis team is the only Engineering Technology (ETEC) team, the team was also tasked with building any other components needed for the car that required using of ETEC shop equipment. Some of these components included bearing housings, frame slugs, tire rods, pull rods, etc… The goal for this year's team was to improve upon 2014 Formula SAE racecar design in areas of weight reduction, driver comfort, and overall style. A full-scale model of the chassis and its components were designed and tested in Solidworks computer-aided design (CAD) software. In addition to the virtual simulations, the racecar was physical tested and inspected to ensure all rules and regulations were met with the ability to withstand the stresses placed on the car during competition.

Team: 2
Program /Department: MEET Engineering Technology

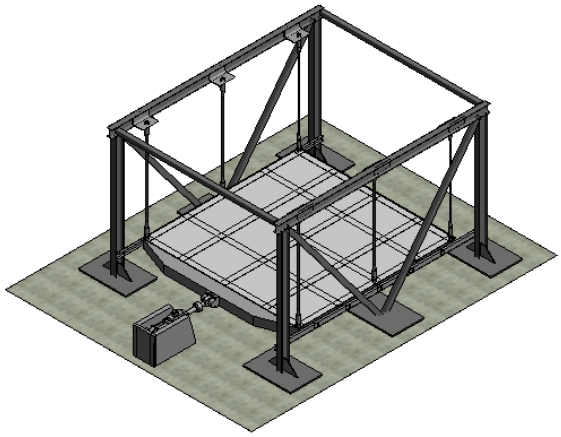
Team Members:
Abram Galindo
Juan Gonzalez
Ricardo Gonzalez
Komi Nyonyotsi



The American Society for Mechanical Engineers (ASME) annually holds national competitions for engineering teams. One of these annual competitions is the Human Powered Vehicle Challenge (HPVC) which tasks teams to build a light-weight vehicle that can be human powered, typically in the form of a bicycle variant. This project is a variant of a tricycle design in that it is a recumbent tricycle with a "tadpole" configuration (two wheels in the front, one wheel in the back) that will be considered for competition as well as recreational use. To achieve this goal, the frame will utilize carbon fiber technology and standard bicycle components for ease of manufacturing, Shimano 105, 11 speed road group drive set to offer smooth and progressive shifting between gears, a Rollover Protective System (RPS) that can be removable and replaced with an adjustable seat mesh for ergonomics and comfort, rear suspension strong enough to handle most road conditions, and finally Ackermann Steering which will allow for a smooth ride.

Team Name: UNT By Design
Sponsor: Dr. Yu; Research Grant & UNT Department of Engineering Technology
Program/Department: MEET/Engineering Technology

Team Members:
Kyle Minter
Shelby Konrad
Steven Massey
Tom Kalisky

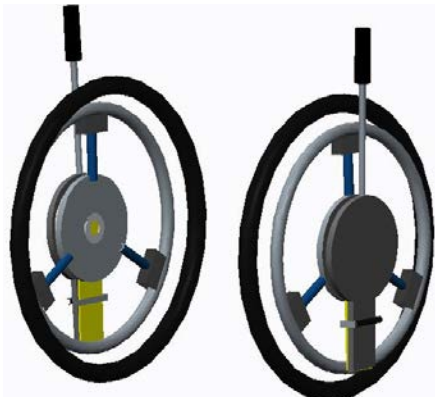


Our project was to design and build an earthquake simulation shake table. A shake table is primarily used to test structural models or building components to examine their seismic performance. Analyzing the seismic performance is important to ensure the building will be safe should an earthquake occur. Our earthquake simulation shake table will be used for research and for demonstrations to show the effects of an earthquake on scaled building models. Our shake table will allow students to generate data that would be difficult to obtain without a simulation.

While there are currently earthquake simulation shake tables in use, we have developed a design that reduces friction on the table. The reduction of friction allows a 20 GPM hydraulic pump to be used to shake the table while still obtaining a force that accurately simulates an earthquake. The friction reduction in our design is due to the use of cables for suspension of the table. Our shake table will also be convenient for use due to the ease of disassembly for transportation and storage.

Team Name: Paddle Powered Wheel Chair Attachment
Sponsors: Wallace Johnston and Mitty Plummer
Program/Department: MEET / Engineering Technology

Team Members:
Derek Denton
Katie Gamache
Chaz Ward



The purpose of the Paddle powered wheel chair is to provide operating relief for wheelchair users. The targeted audience for the product are wheelchair users with minimal hand strength such as carpel tunnel. This lever system acts as an extension to the arm; it allows for easy gripping, braking and maneuverability. The natural motion of the push paddle lever is similar to rowing a boat (having an inward and down motion).

The team developed the friction ratchet mechanism and push rim attachment. One feature of the design is the weighted bottom which prevents the lever from moving when the friction ratchet mechanism is not engaged. The use of clamps and springs on the push rim attachment allows for an efficient and reliable insulation option.

Mobility is an essential component of an individual's quality of life. This push paddle wheelchair project has the potential of improving the daily routine of people with a variety of mobility impairments. The product provides increased performance, low costs, minimal maintenance and reliability for the consumer. The push paddle wheelchair project's easy grip push rowing motion could be the relief many wheelchair users need to gain their independence back.