Hajim School of Engineering and Applied Sciences Presents

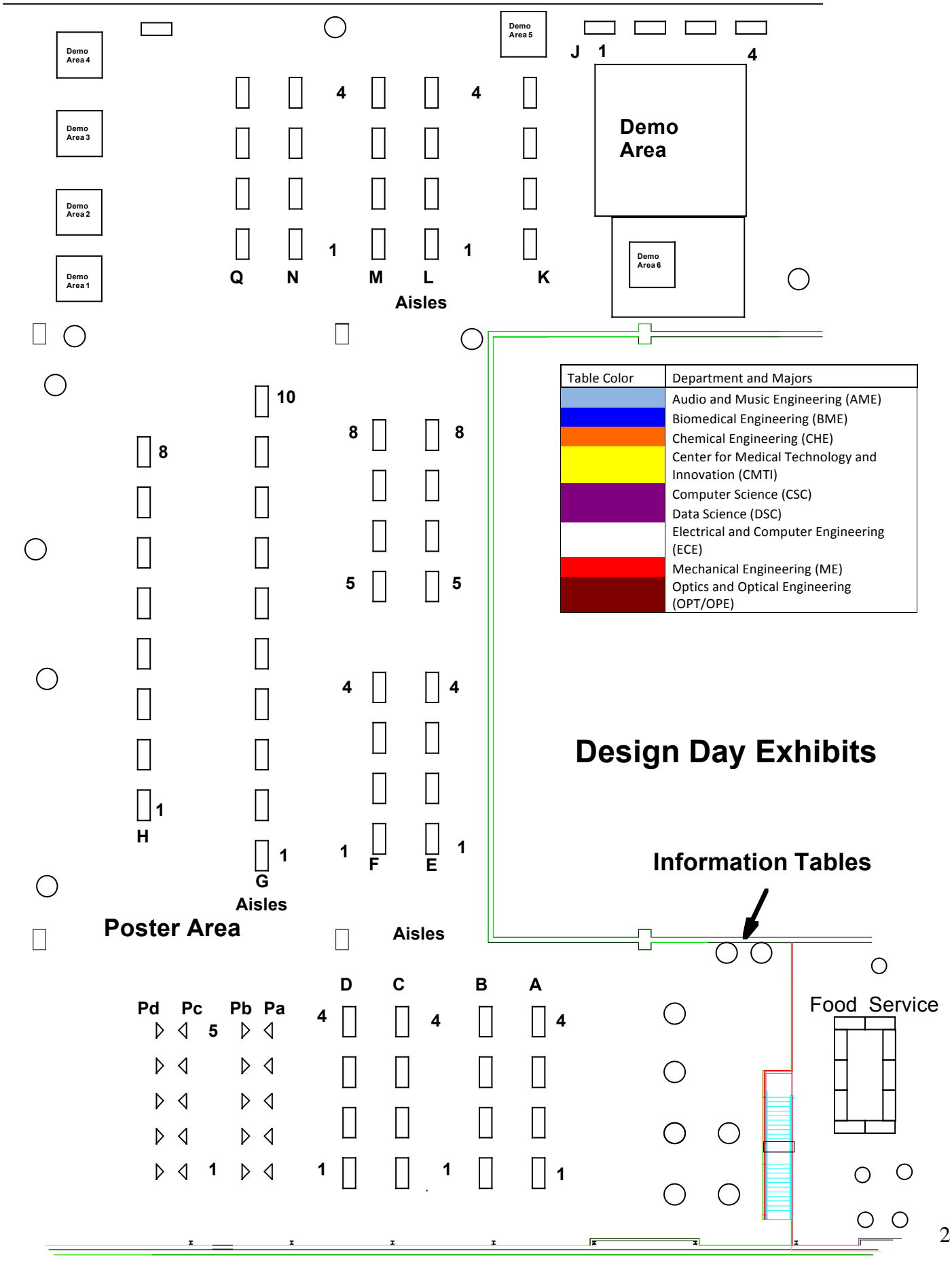
DESIGN DAY 2019

Thursday, May 2nd 2019
Goergen Athletic Center

Welcoming Remarks, Acknowledgements
Dottie Welch Award Presentation 1:30 pm

Design Exhibits Open 1:00 pm
Design Day Concludes 3:30 pm

DISPLAYING
DESIGNS ACROSS
THE
FULL SPECTRUM
OF
ENGINEERING
AND
APPLIED SCIENCE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Demo Area 3
Demo Area 2
Demo Area 1
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Table Color
Department and Majors
Audio and Music Engineering (AME)
Biomedical Engineering (BME)
Chemical Engineering (CHE)
Center for Medical Technology and Innovation (CMTI)
Computer Science (CSC)
Data Science (DSC)
Electrical and Computer Engineering (ECE)
Mechanical Engineering (ME)
Optics and Optical Engineering (OPT/OPE)
Design Day Exhibits
Information Tables
Food Service
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AME	Location	**Automatic Mixing: Multi-track Sound Space Depth Enhancer for Electronic Music**	
	B3	This project is an automatic mixing application optimized for electronic music with focus on enhancement on sound space depth. This application allows the user to input up to seven raw mono tracks. It then automatically applies effects including dynamic range compression, dimension expander (a modified chorus effect), reverb, panning and gain adjustment based on extracted features of the incoming tracks before outputting the processed files as a stereo mix. This application targets audio and video editors who need quick spatial mixing of music.	
		Team Members:	Haiqin Yin, Xuefan Hu, Yiting Zhang
		Supervisor(s):	Dr. Michael Heilemann, Dan Phinney

AME	Location	**Flat-Panel Loudspeaker Research and Implementation on OLED TV's**	
	H2	Utilizing flat-panel loudspeaker technology, our team attempted to replace the conventional speakers of an OLED TV with flat panel drivers to turn the screen of the TV into a speaker. Doing this effectively reduces the overall manufacturing cost and space required for the TV. This proof of concept can be extended to make any screen into a multimodal display that combines audio and visual information for a greater sense of media immersion.	
		Team Members:	Grant Kilmer, Ben Shafran, Brent Ikei, and Josh Miller
		Supervisor(s):	Dr. Michael Heilemann, Dr. Mark Bocko, and Daniel Phinney

AME	Location	**Hardware FM Synthesizer: Fade-6**	
	H7	Introducing the Fade-6, a fully featured 6-Operator Frequency Modulation Synthesizer designed to create unique and interesting sounds using an intuitive front panel. The Fade-6's audio engine is powered by the Analog Devices ADSP-SC589 while the interface controls are managed by the Microchip PIC32MZ2048. The Fade-6 also employs a newly developed Continuously Variable Algorithm Select to generate sonic combinations never before achievable through FM synthesis.	
		Team Members:	Rick Carl, Claire Wenner, Scott Bradley, James Fosburgh
		Supervisor(s):	Dr. Michael Heileman, Daniel Phinney

AME	Location	**SketchCassette: Tape Emulation for Creative Audio Processing**	
	C4	An audio plugin for use in digital audio workstations that seeks to recreate the lo-fi sounds and degradation of cassette tapes when they misbehave. Plugin includes simulation of wow and flutter, tape saturation, dropouts, spectral profiles, and more.	
		Team Members:	Ben Schmitz, Daniel Fine, Josh Hyde, Kyle Ohlschlager
		Supervisor(s):	Dr. Michael Heilemann, Daniel Phinney

BME	Location	**AV Fistula**	
	D4	End-stage renal disease patients require a kidney transplant or dialysis treatment. Transplants are not always an option, so dialysis is the next course of action, requiring a vascular access point. The arteriovenous fistula (AVF) is the method for vascular access due to increasing blood flow via a surgical connection between an artery & vein in the forearm. Our model simulates high-velocity, pulsatile flow patterns at various levels of post-operative conditions for AVF's maturation process using materials & flow rates physiologically similar to those found in patients.	
		Team Members:	Manikanta Nori, Kimberly Richards, Conor Shanahan, Jiajin "Lincoln" Zhao
		Supervisor(s):	Dr. Stephen McAleavey
		Customer(s):	David Narrow and Andrew Lang, Sonavex

BME	Location	**Bladder Monitor Team**	
	G1	The goal for the Bladder Monitor Device team is to design a wearable device that willmeasure the fullness of the bladder and notify a nurse or caretaker when the bladder is reaching full capacity. This will be done by measuring the bioimpedance of the bladder. The purpose of this device is to decrease the amount of falls that take place due to people attempting to use the bathroom unassisted or bed wetting that also may occur. This device will be designed to be used in long term care facilities, post-surgical care, and by any person whose locomotion is hindered in any way.	
		Team Members:	Kharimat Lora Alatise, Alyssa Gardiner, Ahmed Selmi, Camila Garcia Wright,
		Supervisor(s):	Dr. Laurel Carney
		Customer(s):	Don Gibson, Vice President of Marketing, Curbell Medical

BME	Location	**EchoMount Team**	
	G7	Our device is amounting system that will hold an ultrasound transducer to monitor for blood clots after reconstructive surgery.	
		Team Members:	Shafieul Alam, Dominique James, Tiffany Nicholas, William MacCuaig,
		Supervisor(s):	Dr. Diane Dalecki
		Customer(s):	David Narrow, Chief Executive Officer, Sonavex

BME	Location	**Infant Carrying Device Team**	
	H3	An infant carrying system which allows a parent with accessibility concerns to safely transport their child while using a walker.	
		Team Members:	Samantha Myers, Rachael Pletz, Aisha Rivera, Haein Son
		Supervisor(s):	Dr. Danielle Benoit
		Customer(s):	Catherine Lewis Office of Undergraduate Admissions, University of Rochester

BME	Location	**KERG Biologics**	
	E2	The application of field blood diagnostic testing will give providers a greater ability to properly care for patients. Current detection of hyperkalemia relies solely on minor ECG abnormalities & patient symptoms. The portable, point of care blood potassium measurement device will allow diagnoses or reject hyperkalemia suspicions & overall improve the quality & thoroughness of care. Our aim is to develop a point of care potassium test that can display a blood potassium concentration from a small blood sample obtained via an IV catheter for use in field triage.	
		Team Members:	John Lisi, Rebecca Moffat, Erik Patak, Kavi Shankar
		Supervisor(s):	Dr. James McGrath
		Customer(s):	Dr. Jeremy Cushman, Departments of Emergency Medicine and Public Health Sciences, URMC

BME	Location	**Kidney Dialysis Interface Team**	
	D3	Our project aims to develop a bench-top interface device that automatically monitors solution flowing in an experiment to test new dialyzers and other dialysis products. The device will be part of a larger project to create a simulated patient testing model for researchers to evaluate new technologies.	
		Team Members:	Virgile Connor, Seung Hyun Kim, Victor Zhang
		Supervisor(s):	Dr. Dean Johnson
		Customer(s):	Fengyi Jiang from Fresenius Medical

BME	Location	**Ligament Tensioning**	
	E3	The primary objective of this project is to design a novel tensioning device that measures and holds a desired tension on an ACL graft during reconstructive surgery in order to improve patient outcomes (e.g.,reduced pain, reduced recovery period, no need for second intervention) and reduce the complexity and invasiveness of the current method.	
		Team Members:	Ryan Aspenleiter, William DeMaria, Chang Gui, Aaron Lowin, Sonam Topgyal
		Supervisor(s):	Dr. Catherine Kuo
		Customer(s):	Michael Nasuta, ConMed

BME	Location	**Nerve Phantom**	
	E7	Nerve block is a procedure using imaging to locate problematic nerves & administers a block to treat the pain. The sympathetic stellate ganglion is difficult to image using ultrasound due to the similar density of the surrounding tissue and depth within the body. The idea is to utilize the natural emitted signal from the stellate ganglion for accurate needle placement. Current nerve phantoms do not have electrophysiological properties needed for this idea. We will develop an electrophysiologically accurate phantom to be used by medical residents to learn this new technique.	
		Team Members:	Nick Drogo, Jamie King, Frances McAfee, Maura McCartney, Richard Simcic
		Supervisor(s):	Dr. Ross Maddox
		Customer(s):	Dr. Daryl Smith, M.D., Department of Anesthesiology, URMC

BME	Location	**OCM Colposcopy**	
	F1	Colposcopy procedures are used during the cervical cancer screening process. Our hope is to improve the sensitivity and specificity of a colposcopy procedure while reducing the potential cervical damage by integrating optical coherence microscopy (OCM) into a contact probe that can perform an optical biopsy of regions of interest on the cervix.	
		Team Members:	Victoria Breza, Yue Qi, Grace Weyand, Abby Williamson
		Supervisor(s):	Dr. Regine Choe
		Customer(s):	Dr. Rachel O'Connell, M.D., Obstetrics & Gynecology, URMC

BME	Location	**Pitch Perfect**	
	F6	Our team was tasked with designing a pre-sized implant that can be easily customized during surgery and a depth gauge that allows depth measurement from varying angles and provides better visualization of medialization depth through the laryngoplasty window in the thyroid cartilage. This new design will improve the precision of this surgery by minimizing surgical time, mitigating suboptimally-shaped, whih will ultimately improve the patient's voice and surgical outcome	
		Team Members:	Abril Aguirre, Gabriel Guisado, Chantelle Lim, Nathaniel Silvia
		Supervisor(s):	Dr. Anne Luebke
		Customer(s):	Dr. G. Todd Scheider, Department of Otolaryngology, URMC

BME	Location	**Project C-Collar**	
	Q1	Cervical collars are designed to immobilize and stabilize the axial skeleton during suspected spinal injury; however, the current design lacks these functions. The goal of Project C-Collar is to design a new cervical immobilization device that effectively splints the axial skeleton and is accessible to all medical healthcare providers, both in the field and in a hospital setting. The collar will ideally be quick to apply, easy to store in an ambulance or hospital, imaging compatible, adjustable to a variety of sizes, and low in cost.	
		Team Members:	Nancy Bansbach, Aleena Jamal, Emma Luke, Anna Olsen
		Supervisor(s):	Dr. Hani Awad
		Customer(s):	Michael Beintet, Department of Emergency Medicine, URMC

BME	Location	**Reliable Finger Stick Blood Samples**	
	N1	Create a device that can collect fingerstick capillary blood samples in a less variable manner so that capillary blood can be used for accurate point of care diagnostics.	
		Team Members:	Xiaoyi Cao, John Fernando Relucio, Dilshawn Gamage, Brett Tingley
		Supervisor(s):	Dr. Richard Waugh
		Customer(s):	Dr. Benjamin Miller, Department of Dermatology, URMC

BME	Location	**Sensing Biofilm Buildup on Intravenous Medical Equipment**	
	M2	Bacterial build up within catheters and IV lines are challenging due to easy transport of bacteria in a patient's bloodstream. Up to 400,000 individuals are diagnosed with bloodstream catheter infections yearly, costing between $300M and $2.3B in expenses. We are developing a disposable IV fluid sensor that detects biofilms in IV lines. Our device implements electrodes that emit changing resistance as biofilms collect on the surface. This prototype will demonstrate it is feasible to measure biofilm presence in an IV line while maintaining fluid flow rate & patient safety.	
		Team Members:	Joe Carrier, Molly Ferris, Miles Markey, Collin Richards
		Supervisor(s):	Dr. Ed Brown
		Customer(s):	Karen Fellows, Baxter Healthcare

BME	Location	**Sinus Inspectors**	
	N3	A pre-screening device for Sinusitis that accurately indicates the probability that patients of different ages, sexes, and craniofacial anatomies have sinusitis in a way that is easily interpretable by primary care physicians or other medical professionals during an office visit. This device is a safer pre-screening method for sinusitis than CT scans, as it exposes patients to a negligible amount of ionizing radiation.	
		Team Members:	Alaa Bukhari, Robert Crews, Lucy Franzen, Amanda Hornick, Penelope Subervi,
		Supervisor(s):	Dr. Edmund Lalor
		Customer(s):	Dr. Jonathan Stone, Department of Neurosurgery, URMC

BME	Location	**THOR Designs Workforce Accessibility**	
	L1	THOR Designs, with aid from our supervisor Dr. Mark Buckley, is working with a local company in Rochester called Unistel to improve one of their assembly lines. Unistel prides themselves on employing people with a variety of disabilities, and the team that we are working with at Unistel produces dust caps for military and first responder radios made by Harris Corporation. Ryan Ortiz from Unistel has tasked THOR Designs with increasing the accessibility and efficiency of their dust cap assembly line while minimizing costs.	
		Team Members:	Rebekah Abrams, Hannah Goldring, Taryn Milnes, Olivia Uttamsingh
		Supervisor(s):	Dr. Mark Buckley
		Customer(s):	Ryan Ortiz, Unistel

CHE	Location	**An Investigation into Improving Fifth Frame Brewery's Dry Hopping Process**	
	Pa1	Fifth Frame, a local brewery, is interested in optimizing their dry hopping process to produce a strong aroma. The temperature, time, amount of hops, and number of dry hopping steps were examined in a series of experiments to identify if these variables affect aroma strength. Through comparisons of the affect of different dry hopping processes on expert's ratings of aroma strength and the use of a focus group, we concluded that temperature, amount of hops, and number of dry hopping steps may not be relevant in improving aroma while time may be important.	
		Team Members:	Sarah Alsawaf, Alex Delafontaine, Robert Gravellese, Theresa Minigell
		Supervisor(s):	Dr. Dave Foster, Dr. F Doug Kelley, CHE; Dan Clark, Jon Mervine, Fifth Frame Brewery

CHE	Location	**Assessment and Optimisation of Effluent Water Treatment, Guardian Glass, Geneva, NY**	
	G2	Our team worked with Guardian Glass to design a solution to their wastewater treatment process. By analyzing water samples, evaluating the current system, and replicating processes in-house, we were able to come up with mechanical and chemical solutions that were both economical and compliant with environmental standards.	
		Team Members:	Yoshimi Araki, Yixin Huang, Robbin Jang, Syed Muhammad Miqdad
		Supervisor(s):	Mark Juba, Adjunct CHE; Steve Paremske, Guardian Glass

CHE	Location	**Biochar Filtration for Drinkable Water**	
	Pb3	Activated carbon, untreated biochar, and magnetized biochar were investigated as a means of arsenic removal from drinking water for use in B9 Plastic's Better Water Maker. Magnetized biochar was more effective at arsenic adsorption than untreated biochar and activated carbon during batch experiments, with a maximum of 96% of arsenic removed from solution at equilibrium with a 1 ppm starting concentration. However, even the magnetized biochar was unable to remove more than 20% of arsenic during a gravity filtration experiment.	
		Team Members:	Amanda Forti, Alma Rocha, Madison Saliba, James Savino
		Supervisor(s):	Rachel Monfredo, Thor Olsen, CHE; Kathleen Draper, Ithaka Institute; Bob Bechtold, Harbec/B9 Plastic's Better Water Maker

CHE	Location	**Biochar for Pharmaceutical Waste Disposal in the U.S.**	
	G5	Our goal was to investigate the feasibility of using biochar (pyrolized organic matter), and cheap bags to replace the relatively costly Deterra activated carbon drug disposal system. We compared surface characteristics of our biosolids and hardwood biochars to those of the Deterra carbon, and analyzed the adsorption capability of each char for the drugs ibuprofen and guaifenesin. Materials testing was conducted to determine the tensile strength and puncture resistance of several bag alternatives compared to the Deterra bag.	
		Team Members:	Jackson Herman, Carly Staebell, Jolena Zhou
		Supervisor(s):	Rachel Monfredo, Thor Olsen, CHE; Kathleen Draper, Ithaka Institute

CHE	Location	**Biochar for Pharmaceutical Waste Disposal: International Application**	
	G8	Focusing on international applications, the efficacy of hardwood, wheat, and bamboo biochar as adsorbents to deactivate pharmaceuticals in distilled and river water was studied using HPLC and compared to the performance of activated carbon. Packaging solutions to contain the adsorbent were developed and tested for tensile strength and puncture resistance. It was determined based on quantitative results that further studies with the hardwood biochar are needed, but a packaging prototype was successfully developed at a cost of under $2.	
		Team Members:	Siri Chillara, Mattie Eckerstrom, Sarah Makuc, Jonathan Wei
		Supervisor(s):	Rachel Monfredo, Thor Olsen, CHE; Kathleen Draper, Ithaka Institute

CHE	Location	**Fifth Frame Brewing Company HLT Immersion Heater Project**	
	H4	Fifth Frame Brewing Company was experiencing issues with the immersion heaters used in their hot water tank as they kept breaking for unknown reasons. Several causes were hypothesized, but ultimately it was determined that the scale build-up on the heaters was causing the steel to overheat and become compromised, leading to heater failure. A number of possible solutions were posited, but the recommended one is to remove and clean the heaters on a biweekly basis to improve their efficiency and extend their lifetimes.	
		Team Members:	Nik Angyal, Chenxiao Guan, Luke Loecher, Kyle Schneider
		Supervisor(s):	Dr. F Doug Kelley, CHE; Dan Clark and Jon Mervine, Fifth Frame Brewery

CHE	Location	**Investigation of Vortex Depth in a Partially-Baffled Tank**	
	F4	Partially-baffled tanks are often used in industry for mixing that incorporates gas or light solids because baffles both facilitate good mixing within the fluid and allow for the creation of a vortex on the fluid surface. In the current study, vortex depth was investigated in a partially-baffled system as a function of a number of tank and fluid parameters. Factorial regression was then performed to create a predictive model for vortex depth.	
		Team Members:	William Funkenbusch, Luke Oluoch, Sabrina Westgate, Sean Wilson-Leslie
		Supervisor(s):	Dr. David Foster, CHE; Kevin Logsdon, Richard Kehn, SPXFlow

CHE	Location	**Optimization of an Evaporative Distillation System**	
	Pc2	Team Koeksister redesigned the purification process used by Molecular Glasses of Rochester to make OLED coatings. By creating an oscillating bulb to bulb distillation system, a kugelrohr, the system was improved to increase yield and decrease process time. The oscillation was achieved through the construction of a four-bar linkage crank-rocker mechanism controlled via open loop which allowed for adjustable nitrogen and vacuum lines. A closed loop pulse width modulation code controlled the heating elements.	
		Team Members:	Catherine Barton, Charles Chiang, Aaron Engel, Sarah Maldonado
		Supervisor(s):	Mark Juba, Adjunct CHE and COO, Molecular Glasses

CHE	Location	**Portable Bubble Tower to be use in Golisano Children's Hospital**	
	E4	Team Biscotti worked with Golisano Children's Hospital to develop a mobile sensory station meant for play therapy in pediatric wards. The prototype developed was a bubble tower that used LEDs, an air pump, and an Arduino microcontroller to create a multi-sensory experience complete with rainbow illumination and soothing air bubbling through water. The incredibly fun project consisted heavily of product engineering practices, health and safety research, wiring and coding, and principles of machining and fabrication.	
		Team Members:	Tiwalade Dairo, Bradley Porceng, CJ Ruff, Benjamin Walker
		Supervisor(s):	Rachel Monfredo, CHE; Wendy Lane, Child Life, Golisano Children's Hospital

CHE	Location	**Stain Removal from Reflective Panels at Orafol Precision Technology Solutions, Rochester, NY**	
	F2	Over the past 5 years, Orafol America, manufacturer of highly reflective electroplated metal panels, has incurred serious production issues due to an unknown staining residue damaging these parts. While Orafol currently employs anodic electrocleaning, severe stains still ruined tools during hot, humid summer weeks. Team Gingerbread integrated a hot water pressure washing step into the cleaning procedure, saving the company over $100,000 annually.	
		Team Members:	Elie Cohen, Brendan Eder, Ekam Singh Gill, Hilary Luety
		Supervisor(s):	Dr. F Doug Kelley, Jeffry Leffler, CHE; Eric Janosko, Orafol America

CHE	Location	**Temperature Investigation and Characterization of Biochar for Agricultural Use**	
	G9	Temperature study and characterization of biochar according to International Biochar Initiative Standards. Four thermocouples were inserted into Acorn Biochar's retort at various places to record the running and cool down temperatures. Characterization included the use of therma gravimetric analysis, BET Surface Area, elemental analysis, pH, electrical conductivity, and partical size distribution.	
		Team Members:	Oluwatosin Awodiji, Sabrena Starr, Trevor Wolstencroft, Tianhao Yu
		Supervisor(s):	Dr. Marc Porosoff, Jeffrey Leffler, Dr. F Doug Kelley,CHE; Andrew Wells, Acorn Biochar

CHE	Location	**Tubular Reactor Systems for Academic Study**	
	F5	Currently, chemical engineering students have exposure to ideal reactors, non-ideal batch reactors, and non-ideal continuously stirred tank reactors (CSTRs). However, non-ideal tubular reactor systems were not a part of any undergraduate course. A system containing three tubular reactors - a standard tubular reactor, a static mixer reactor, and a packed bed reactor (PBR) - was built as an addition to the existing CSTR experiment in order to facilitate a greater understanding of reaction engineering.	
		Team Members:	Gilda Dedona, Olivia Kuebler, Adrian Marusic, Paul Steve
		Supervisor(s):	Dr. F. Doug Kelley, Thor Olsen, CHE

CHE	Location	**Xerox Filter Cloth Cleaning Project**	
	Pc5	Numerous treatment methods were investigated to clean and prevent blinding of a polypropylene cloth used to dry toner in the Xerox tonoer manufacturing process. Acetone showed promising results with potential for implementation in the process. All other methods had little to no effect.	
		Team Members:	Rayan Alaufey, Thomas Burke, Patrick Menzzasalma
		Supervisor(s):	Dr. F Doug Kelley, CHE; Alex Nee, Chris Wolfe, Steve Sable, Xerox Corp

CHE	Location	**Xerox Wastewater Treatment Optimization**	
	Pd3	Xerox's wastewater treatment process was optimized through coagulation chemistry principles. Temperature, pH, mixing, and coagulant dose were optimized in beaker and tank studies. Significant potential cost savings for our wastewater treatment process were demonstrated due to reduced chemical usage.	
		Team Members:	Team Mochi: Lukas Jenkins, Annie Moorhead, Kartik Subbanna, Jonathan White
		Supervisor(s):	Dr. F Doug Kelley, Dr. Mark Juba CHE; Alexander Nee, Steve Sable, Xerox Corp.

CMTI	Location	**Anoptix**	
	A1	Anoptix is developing a system to continuously monitor external mechanical compression to the eyes and orbits during prone-positioned surgeries. This device will notify the anesthesia provider of adverse pressures in order to elicit actions to alleviate these pressures and therefore decrease the likelihood of post-operative vision loss, a temporary or permanent loss of sight after prone-positioned surgeries.	
		Team Members:	Jennifer Fukagawa, Christian Keenan, Veronica Valencerina
		Supervisor(s):	Dr. Greg Gdowski, Dr. Amy Lerner, Martin Gira

CMTI	Location	**BIG Cardiovascular**	
	A2	A way to stabilize the post-operative bisected sternum in delayed closure cases to allow safe and successful patient movement while supporting cardiac recovery during open chest management.	
		Team Members:	Gavin Hambrose, Rebecca Macaluso, Ivy Mannoh
		Supervisor(s):	Dr. Greg Gdowski, Dr. Amy Lerner, Martin Gira

CMTI	Location	**Envisient**	
	A3	Our device addresses a way to clear obstruction of the surgical field during endoscopic sinus surgery in order to improve visualization and reduce intraoperative time.	
		Team Members:	Brenna Schnell, Anli Lin, Halie Hotchkiss
		Supervisor(s):	Dr. Greg Gdowski, Dr. Amy Lerner, Martin Gira

CMTI	Location	**Go-Flex**	
	A4	The GoFlex technology will promote dynamic dorsiflexion assistance and support of foot drop patients. In addition, the device will provide data analytic information to the user to show patient progress over a period of time visually.	
		Team Members:	Jane Fong, Kwasi Nimako, April Tsang
		Supervisor(s):	Dr. Greg Gdowski, Dr. Amy Lerner, Martin Gira

CMTI	Location	**Hemonamic**	
	B1	The hemonamic is a flow control device that provides dynamic regulation of blood flow to various parts of the body to reduce lower limb complications of patients on extracorporeal membrane oxygenation (ECMO).	
		Team Members:	Elana Chazen, Emily Gregy, Huy Nguyen
		Supervisor(s):	Dr. Greg Gdowski, Dr. Amy Lerner, Martin Gira

CMTI	Location	**IASO Surgical Solutions**	
	B2	OMOS is a surgical table accessory utilized in anterior cervical spine surgeries. OMOS provides a surgeon sterile control of patient positioning throughout procedures, allowing for increased visualization on x-ray images and decreased risk to the patient.	
		Team Members:	Ariana Cervantes, Devon Foggio, Alyssa Marzella
		Supervisor(s):	Dr. Greg Gdowski, Dr. Amy Lerner, Martin Gira

CSC	Location	**All Timescale Window Co-occurrence**	
	Pa2	Trace analysis is a common problem in system optimization and data analytics. We presented new efficient algorithms for window co-occurrence analysis, which is to find how likely two events will occur together in time windows of different lengths. The new solution requires a linear time preprocessing step, after which, it only takes logarithmic space and constant time to compute co-occurrence of a data pair in windows of any given length. One potential use of the new analysis is to reduce the asymptotic cost in affinity-based memory layout.	
		Team Members:	Yumeng Liu, Daniel Busaba
		Supervisor(s):	Dr. Chen Ding, Computer Science, UR

CSC	Location	**Augmenting Communication Between Hearing Parent and Deaf Child**	
	Pb5	We are working to design assistive technology that encourages cognitive and language learning opportunities between hearing parent and deaf child. Because deaf children of hearing parents rely heavily on visual communication for language acquisition, our system will provide augmented ASL instruction to the parent, while increasing parental awareness of the child's gaze attention. Thus, encouraging the parent to adapt visually sensitive communicative behaviors and promoting their child's language development.	
		Team Members:	Ashely Tenesaca, Ilene Kang
		Supervisor(s):	Zhen Bai

CSC	Location	**Hyperion**	
	G3	A research project that operates at the boundary between optical engineering, software development, and scientific visualization. Hyperion is in development to be a true 3D cross-platform mixed reality (MR) user experience (UX) for optical design computation and visualization. At this point in the project we are demoing on HoloLens, testing three dimension manipulations with gesture recognition against three dimensional manipulations with marker based tracking.	
		Team Members:	Alana Zakroczemski, Sydney Dlhopolsky, Heriniaina Fenotoky Rajaoberison, Tyler Phillips, Sifan Ye, Junhan Duan, Nicole Naselaris
		Supervisor(s):	Dr. Jannick Rolland, Dr. Zhen Bai, Daniel Nikolov

CSC	Location	**SkateBot**	
	Q2	Semester long project for CSC 230. The goal was to manufacture and program a robot to skate on both wheels and blades. This design project included various methods of fabrication, soldering, assembling, programming and concepting.	
		Team Members:	Dan Aronson, Eric Feirouz, Alex Copperman, Tony Pane, Alex Copperman, Sam Tetef, Casey Ball, Azmayeen Rhythm, Sharfuz Shifat, Mingyuan Shan
		Supervisor(s):	Dr. Randal Nelson

CSC	Location	**Tangible User Interface to Teach Machine Learning to K12 Students**	
	C1	In current higher education standards across the US, STEM subjects -- in particular, computer science -- are often emphasized in importance, yet rarely implemented into education. Machine learning, in particular, is rarely systematically in secondary education. We investigate the usage of tangible and traditional user interfaces to teach ML to K12 students. By using Chernoff faces as a primary visualization tool, we hope to teacher students K-Means Clustering in high school.	
		Team Members:	Ding, Zhaoxiong; Wan, Xiaoyu; Ye, Zaiqiao
		Supervisor(s):	Dr. Zehn Bai

DSC	Location	**Falling prediction in aging caner population**	
	Pb1	Falls are one of the leading causes of injuries in the aging people; 30% aging people over 65 years old are victim of falls; 10% of falls lead to serious damagel Under the guidance of polypharmacy team, we realized falling is a popular topic in medical area, and is not well studied among aging cancer population Previous studies revealed potential correlations between falling and cognitive function, mental state, motor function, cancer type, social function, etc.	
		Team Members:	Sixu Meng, Boyu Liu, Junchao Shen, Zhikang Jiang
		Supervisor(s):	Dr. Ajay Anand
		Customer(s):	URMC Polypharmacy TEAM

DSC	Location	**Laser Failure Prediction**	
	Pd1	In the digital age, monitoring laser health and predicting laser failure in advance help prevent unexpected downtime and high shipping costs for replacement. Using measured laser parameters, we applied machine learning techniques to predict laser failure time and laser survival probability at any point in time. From the results, we identified laser current as the primary indicator of laser health and proposed a monitoring methodology.	
		Team Members:	Xingyu Wang, Charlene Lau, Xiang Li, Ansheng Xu
		Supervisor(s):	Dr. Ajay Anand
		Customer(s):	A semi-conductor company

DSC	Location	**Vnomics**	
	Pd5	Inspired by the military applications of vehicle fuel usage optimization, Vnomics focuses on an IOT and cloud software service that optimizes commercial trucking economy by providing data-driven real-time feedback to drivers and applicable insights to the business. This project is using sensor data(throttle position, wheel speed and engine speed) to determine number of gears and associated gear ratios (slope of engine speed/wheel speed). The result can be used to improve the accuracy and speed of installation by automatically identifying number and slope of gears.	
		Team Members:	Jiayin Han, Chuangyu Lou, Zetian Xiao, Yutong(Kelly) He
		Supervisor(s):	Dr. Ajay Anand

ECE	Location	**Autonomous Drone Lander**	
	J1	Custom built drone which can autonomously land on a pad using vision tracking software	
		Team Members:	Tommy Espinal, Alex Fenger, Ryan Matthews, Shaquille Powell, Erich Spaker
		Supervisor(s):	Dr. Jack Mottley, Daniel Phinney

ECE	Location	**Gesture Controlled Quadcopter**	
	K4	The Gesture Controlled Quadcopter is our take on creating a more intuitive controller for a quadcopter. It allows users who are beginners or experts in flying, an easier way to control its velocity and direction. By taking advantage of an Inertial Measurement Unit, the quadcopter can mimic your movements when you tilt the controller forward, backward or side to side. One application of our design is for users to easily transport a package back and forth, from point A to point B.	
		Team Members:	Bryce Ikeda, Milan Fatschel, Max Weissman, Omer Latif, David Gang
		Supervisor(s):	Dr. Jack Mottley, Daniel Phinney

ECE	Location	**Impulsive Sound Detection and Localization**	
	K1	Impulsive sound detection and localization using time difference of arrival over a mesh network.	
		Team Members:	Nicholas Long, Kelly Cheung, Tasneem Khan, Javon Walker
		Supervisor(s):	Dr. Jack Mottley, Daniel Phinney
		Customer(s):	Keith Kripp, Harris Corporation

ECE	Location	**Laser Tag System**	
	C2	We engineered a Laser Tag System. The Raspberry Pi Zero W encodes information, such as player ID and shot sequence number, into each laser beam. The Universal Asynchronous Receiver-Transmitter communication protocol (UART) forms the basis for our encoding scheme while solar panels act as large surface area receivers. After a bean has hit its mark, the decoded information is relayed via WiFi to a centralized server which organizes matches and keeps track of player statistics.	
		Team Members:	Aaron Faulkenberry, Reem Mislati, Kasper Moczulski
		Supervisor(s):	Dr. Jack Mottley, Daniel Phinney

ECE	Location	**Piezoelectric Energy Harvesting**	
	G4	Energy harvesting from mechanical stress using flexible piezoelectric elements. The energy is stored and then used in low-power applications.	
		Team Members:	Yahouza Sabo, Alexandria Crofoot, and Mohammed Lahiq
		Supervisor(s):	Dr. Jack Mottley and Daniel Phinny

ECE	Location	**Pinger Locator**	
	D2	When a plane goes down in the ocean, the black box has a device on it that makes a ping once a second for 30 days. In order to hear that ping, you need to be within 1km of it. However, because the ocean is so deep, it is necessary to deploy ships or robots to search large swaths of ocean to locate planes, which is expensive and inefficient. We created an air deployed device that would sink down to the sea floor and if they heard the distinctive sound, they would drop a weight and float to the surface to send out a radio call to triangulate the plane's location.	
		Team Members:	Jacob Lowenherz, Jin Zhang, Brian Ju, Zachary Byron, Ning Wang
		Supervisor(s):	Dr. Jack Mottley , Dan Phinney, UR: Dr. Colin Funai, Harris RF.

ECE	Location	**RF Energy-Harvesting System**	
	G10	Fabrication and analysis of an energy system harvesting ambient radio frequencies of the electromagnetic spectrum to produce a steady DC voltage capable of powering low-power electronics application (i.e. small Thermo-Hygrometer). The system consists of a passive dual-band antenna, a matching network, and a rectifier circuit to transform the AC power to DC voltage.	
		Team Members:	Arfan Sewaket, Fahad Alturkistani
		Supervisor(s):	Dr. Jack Mottley

ECE	Location	**Silent Practice Mute**	
	Pa3	This project implements a system which reads a signal from the bell of a trumpet and provides the player with an audio feedback that mimics certain musical conditions while limiting the volume of the instrument itself. Electronics housed within the mute unit condition the audio signal to add audio effects and counter the acoustic effects of the mute itself, such that the player can practice as though no mute is being used. This practice tool could also be expanded to provide integration with a sound system.	
		Team Members:	Kartik Kishore, Claudia Weaver, Ian Lawson, Isaac Roberts
		Supervisor(s):	Dr. Jack Mottley

ECE	Location	**WiFi Enabled Video Lock**	
	E1	This WiFi Enabled Video Lock allows the user to monitor the property with real-time streaming video. It can be opened by the key and the RFID fob, and can also be locked/unlocked remotely from PC and phone. The user will be notified by SMS or email (user's choice) when a visitor drops by.	
		Team Members:	Wenxuan Cheng, Zhaodong Wang, Tianyu Shou, Jiangfeng Lu, Lihao Yang
		Supervisor(s):	Dr. Jack G. Mottley

ME	Location	**Biochar Retort Extraction Device**	
	H5	Biochar is a form of organic charcoal that is created when organic matter undergoes pyrolysis; a thermal decomposition process, that involves heating at high temperatures (~600 ℃) in the absence of oxygen. While running, any contact between biochar and oxygen in the air will result in combustion and destroy the biochar. Andrew Wells the project's sponsor has constructed a continuous retort where biomass enters and exits simultaneously. The team was tasked with creating an extraction mechanism that cools and collects biochar without letting air into the pyrolysis chamber.	
		Team Members:	Melissa Gomez, Jack Jordan, Leo Liu, Haley Wohlever
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Andrew Wells

ME	Location	**Drill-Powered Cart Team 2**	
	Q4	Many may think of a cordless electric drill as just a tool used to drill holes and screws. Surprisingly though, these drills pack a large amount of power into a very small package. So much power, in fact, that it was hypothesized one drill can power a go kart with a human driver around a track for an extended period of time. To test this, the team has built a kart primarily made of wood and powered by a standard electric drill. The kart will be raced around against a competing team.	
		Team Members:	Brett Rabenou, Harleigh Kaczegowicz, Saurabh Jain, Mario Gutierrez
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane

ME	Location	**Drill-Powered Cart Team 1**	
	Q3	Fossil fuel powered vehicles are detrimental to the environment and the supply of these fuels will eventually run out. In the past decade, electric-powered vehicles have shown success as an alternative. Our team has built a cart primarily made of wood and powered by a standard electric drill. Both e_car teams will compete against each other to see which team can provide transportation in a more energy-effective way. The team that travels a farther distance within an hour will win the competition.	
		Team Members:	Hunter Bowden, Aaron Brown, Evan Miller, Yikun Zhang
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane

ME	Location	**Golisano Children's Hospital Model**	
	E5	Golisano Children's Hospital provides all-around patient care from surgeries to safe spaces for recovery. The team developed a playhouse model of the hospital with a patient room, operating room, playroom, and screening room to give patients a toy to engage with while learning more about the hospital. To enable high use from children and an easy clean structure, the team designed the playhouse out of high-density polyethylene and also furnished it with 3D printed designs to create lifelike furniture and equipment seen in the hospital.	
		Team Members:	Nancy Bansbach, River Burgess, Lilly Gonzalez, Antonio Hernandez, Lindsey Medalla
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Wendy Lane

ME	Location	**Honda - Intake and Exhaust System Development**	
	E8	We designed intake and exhaust systems for the 2019 Acura MDX which meet performance and design requirements provided by Honda. The intake and exhaust systems in a car allow air to enter and exit the engine. When designing these systems, we added features to reduce low-frequency noise from the engine propagating through the system, as well as high-frequency noise from the flow of air. After optimizing our design, we manufactured it and tested it at Honda.	
		Team Members:	Shira Katz, Benjamin Martell, Jonathon Schubert, Desmond Wentling
		Supervisor(s):	Dr. Christopher Muir
		Customer(s):	Steve Eich, Senior Engineer, Honda

ME	Location	**Human Powered Vehicle Challenge**	
	J4	Human powered vehicles (HPVs) are aerodynamic vehicles, driven solely by human power, that use concepts from traditional bicycles to serve as unique means of land transportation. Starting in January, the team designed, built, and tested a vehicle to compete in ASME's annual HPV Challenge. The project explores the engineering design of such a vehicle, the challenge of subsystem integration, and the management of a large team on a tight timeline. As only the second team from UR to go to ASME HPVC, the team placed 14th out of 43 teams overall and 6th in the design event.	
		Team Members:	Jack Billings, Mira Bodek, Mohammed Alzahrani, Obed Badillo Moreno, Nicholas Lawlor, Jordy Mendez, Timothy Schuler, Zhenkun (Mickey) Wen
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	ASME Human Powered Vehicle Challenge

ME	Location	**Kinetic Ball Machine for the Library**	
	H1	The Rochester Public Library has an area designated for children that is full of different displays for entertainment. Our team was given the task of creating a ball machine to run behind a glass wall. This machine aims to entertain Library guests, and inspire children to start their own engineering projects. The machine features two different paths that users can select from the control panel, sending the balls through different themes, including a rocket, castle, dinosaur and more!	
		Team Members:	Seth Schaffer, Catherine Mawn-Mahlau, Matthew Sperr, Hunter Phinney, Benjamin Hoog
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane, Tonia Burton
		Customer(s):	Rochester Public Library Patrons

ME	Location	**Magnetic Levitation Track for Inertial Confinement Fusion Testing at the LLE**	
	H8	The Laboratory for Laser Energetics (LLE) at the University of Rochester is a world-renowned research facility that investigates the interaction of intense radiation with matter. As a design project, The LLE requested a contactless track to remove the cover of the target during nuclear fusion testing. To help the LLE achieve their energy yield goal, the vibration generated by the track must be mitigated. As a solution, our team developed a magnetic rail system that allows the cover to levitate at room temperature.	
		Team Members:	Quinn Decker, Kaven Marte, Margaret Slate, Marial De Lucia Lara Gutierrez.
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Jeffrey Ulreich, Research Engineer, Laboratory for Laser Energetics.

ME	Location	**Memorial Art Gallery**	
	F3	Most paintings are inaccessible for people who are blind or visually impaired. The most common accessibility method offered is a verbal description. This method limits the opportunity for blind and visually impaired patrons to make their own artistic interpretations. For this project, two tactile versions of Hoffman's Ruby Gold were made. The first is made of CNC cut wood and the second is made using metal cut outs of different temperatures. This combination allows the user to form their own artistic interpretation of the piece through tactile experience.	
		Team Members:	Alice Freese, Christopher Seely, Cole Sonnett
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Susan Daiss and Andrew Cappetta, Memorial Art Gallery

ME	Location	**Mobile Interactive Sensory Wall**	
	Pa5	The Mary Cariola Children's Center works with children with disabilities to educate them and help them learn life skills. A common tool used to help the students learn certain skills is a sensory wall. Our mobile sensory wall is used to help some of the Mary Cariola students who are in wheelchairs have better access to their learning environment. Lights, buttons, noises, and interchangeable textures are mounted on our sensory wall to allow the students to explore and learn independently.	
		Team Members:	Tish Begum, Kyle Pullyblank, Ana Vaquera, Stephaun Ward
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Mary Cariola Children's Center Students and Teaching Staff

ME	Location	**Prosthesis for New Syria**	
	F7	Around 40,000 Syrian refugees living in Lebanon require upper limb prostheses. However, most current transradial prostheses are expensive, not easily accessible, and/or not easily customizable. Our group was tasked with developing a solution to this problem by utilizing 3D printing technology. The printed prosthetic parts are combined with a muscle sensor to obtain muscle signals from the patient's residual limb, which in turn actuate flexion in the device's fingers. To demonstrate the prosthesis's efficacy, we will be picking up a pen, a piece of paper, and an egg.	
		Team Members:	Sean Benjamin, Sammy Haq, Crystal Kim, Suman Kumar, Alicia Lau
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Ibrahim Mohammad, Omar Soufan

ME	Location	**Softball Helmet Testing**	
	N4	There are few low profile and affordable ways to analyze the effectiveness of a softball catchers helmet in minimizing head trauma. This design offers an affordable, safe, and precise way to test various helmets under conditions that replicate an in game scenario. Under these controlled conditions, acceleration measurements are recorded in order to quantify the effectiveness of the tested helmets.	
		Team Members:	Daniel Aronson, Eric Feirouz, Sam Miller, Rachael Pletz
		Supervisor(s):	Professor Slane and Professor Muir

ME	Location	**Terrain Scanning Tethered LiDAR Robot**	
	K3	This design projects aim is to design and build a tethered system capable of traversing across unexplored terrain and obtain data that can be used for creating a topological map using a LiDAR. The archeological dig team of Professor Christopher DeCorse from Syracuse University will use this product to non invasively scan areas around a fort in Ghana and identify digging spots for their research.	
		Team Members:	Andrew Gutierrez, Apoorva Khadilkar, Muhammad Hadi, Onur Bagoren
		Supervisor(s):	Dr. Christopher Muir, Dr. Thomas Howard
		Customer(s):	Christopher DeCorse and his research team

ME	Location	**The General Electric Team: Optimization of MDS Orbit Testing Procedure**	
	M3	General Electric's MDS Orbit is an industrial router used for a variety of wireless communication functions. The router is highly customizable and can be modified to meet the requirements and specifications of GE's customers, which is why various components of the device need to be tested individually before shipment. Hence, this senior design team was tasked with building a mechanism that would be able to test various components of the Orbit in a precise, timely, and cost-effective manner.	
		Team Members:	Martin Barocas, Deok-Hoon Jeong, Mike McDermott, & Khusbu Modi
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Timothy Milliman, Steven Battisti, Justin Grigonis, & William Seppler

ME	Location	**Thick Origami**	
	N2	When objects are launched into orbit, there are many restrictions on loading geometry due to the limited space in the rocket's fairing. Harris Corporation has asked a team at the University of Rochester to design a deployable backplane and mirror for a telescope that is compact for launch and fits in the SpaceX Falcon 9 Rocket. The telescope consists of a system of hexagonal mirrors and is too large to fit in the rocket at its operating dimensions. As a result, the team took advantage of the techniques of "Thick Origami" to allow the rigid backplane structure to fold up into a compactly stowed system that then unfolds into a functioning system.	
		Team Members:	Perla Aguilar, Stephen Glinski, Rebeca Toro Garza, Jason Lopez, Ramon Nieves
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane, PhD
		Customer(s):	Harris Corporation

ME	Location	**Trainer**	
	M4	This project involves developing a safety system for a roller bicycle trainer. A roller bicycle trainer is a system that allows for a bicyclist to ride a bicycle freely as if it was actually moving on pavement. However, these systems are very difficult to balance. In order to ride safely on the roller bicycle trainer, bicyclists need to consistently keep perfect form on the bicycle. Many bicyclists have difficulty riding on the rollers especially when starting and stopping. The system designed is a wireframe that will surround the bicyclist and bicycle. This system will assist the bicyclist in starting and stopping, and prevent the bicyclist from falling off the rollers.	
		Team Members:	Aiden Finch, Kevin Ho, Conor Masterson, Nipu Berger
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Michael Kaplan

ME	Location	**Universal Aerospace Window Metrology Mount**	
	M1	Collins Aerospace in Danbury, CT does not have a single system to hold circular, ovate, and polygonal aerospace windows during metrology. The team created a "one size fits all" mount that holds windows of varying geometries and fits onto the existing metrology bench. Requirements and specifications were geared towards ensuring precise motion and preventing optical surface obstruction. With help from Optical Strategy and Analysis Engineer Dennis Briggs the team designed, manufactured, and tested a universal mount.	
		Team Members:	Matthew Capovani, Christopher Koo, Noah Leibowitz, and Anthony Yan
		Supervisor(s):	Dr. Christopher Muir, Dr. Laura Slane
		Customer(s):	Dennis Briggs, Optical Strategy and Analysis Engineer, ISR/Danbury, Collins Aerospace

OPT/ OPE	Location	**Angle-resolved Excitation and Imaging System for Studying Polariton Dispersion**	
	Pa4	A senior thesis project that aims to design and build an experimental setup for studying exciton-polariton generated in micro-cavity by 2D material. The setup should be able to excite the material at one angle at a time and send the photon luminance image to both the spectrometer and the CCD.	
		Team Members:	Li Zhang
		Supervisor(s):	Dr. Nick Vamivakas

OPT/ OPE	Location	**Chip-Scale Lithium Niobate Waveguide for Entangled Photon Pairs**	
	Pb4	This project aims to generate entangled photon pairs by lithium niobate waveguides with great strong second-order nonlinearity through optical parametric generation processes such as second harmonic generation and spontaneous parametric down conversion.	
		Team Members:	Huiyan Li
		Supervisor(s):	Dr. Qiang Lin

OPT/ OPE	Location	**Focused Plenoptic Imaging**	
	Pc1	We created a plenoptic imaging system for quality control of computer chips. It is based on focused plenoptic imaging, where a microlens array is placed in front of a sensor such that multiple (equal to the number of microlenses) focused images form on the sensor. These images are then stitched together using software to arrive at a complete image. This increases the depth of field by about 3 times compared to conventional imaging, while only reducing the resolution by about 10%. It is therefore useful for imaging objects with some depth, such as certain PCBs.	
		Team Members:	Jason Tiemer, Jason Ewanow, Kristoffer Olsen
		Supervisor(s):	Dr. James R. Fienup
		Customer(s):	Dr. Ian Wallhead, Russ Hudyma, Julian Goldstein, Navitar

OPT/ OPE	Location	**High Resolution Transmission Spheres for Fizeau Interferometry**	
	H6	Customers using interferometers want to measure optical parts with increased lateral resolution. Better measurements allow for enhanced use of sub-aperture deterministic polishing, such as diamond turning. To do this, interferometer sensor resolution has increased a great deal, so much so that the lenses in the interferometers now limit system performance. Our goal was to improve the performance of the key lens element within the interferometer known as the transmission sphere. This element simultaneously illuminates the part under test and images that part onto the sensor.	
		Team Members:	Samara Levy, Conrad Holzemer, Ankur Desai
		Supervisor(s):	Dr. Jannick Rolland
		Customer(s):	Zygo Corporation

OPT/ OPE	Location	**IRSPEC Photo-Detector Focusing Mount**	
	E6	This monochromator relay is an essential piece of hardware that will allow for easily relaying the monochromator output onto a customer supplied InfraRed Associates, Inc InSb detector. Wavelength bands from 1600 nm - 2800 nm, with the possible capability of up to 6000 nm, will be relayed through the system with high efficiency and signal to noise. The goal of this project is to design a high efficiency relay that can be easily and quickly aligned that meets all product requirements.	
		Team Members:	Kyle Daub, Dylan Borruso, Matthew Orenstein
		Supervisor(s):	Dr. Jim Zavislan
		Customer(s):	Dr. Todd Krauss, Chemistry Department Chair and Sean O'Neill, PhD Student

OPT/ OPE	Location	**Measurement Method for Characterizing Asthma-Triggering Particles**	
	B4	We developed a test bench to determine the sizes of Asthma-triggering particles by measuring the scattered light distribution. Our goal was to investigate what measurements were possible for a range of particle sizes, and then run trials to characterize real-world biological samples that could trigger Asthma.	
		Team Members:	Jaren Ashcraft, Zach Westerbeke, Shiyu Ma
		Supervisor(s):	Dr. Thomas G. Brown
		Customer(s):	Altair Health, Dr. Brandon Zimmerman

OPT/ OPE	Location	**NIR Surgery Training System**	
	F8	Research at the University of Rochester's Medical Center has allowed surgeons to rehearse patient specific surgeries through the use of 3D printed organs. This Optical Engineering design project attempts to replace harmful x-rays with safe near-infrared light, while attempting to recreate as closely as possible the working environment surgeons would expect in the operating room. The image submitted is only the vertical part of the project, the base is still being manufactured.	
		Team Members:	Adrian Cort, Yu Hui Du, Kassra Eshraghi
		Supervisor(s):	Dr. Greg Schmidt
		Customer(s):	Dr. Ahmed Ghazi

OPT/ OPE	Location	**Optical Coating Lifetime Prediction Model**	
	C3	The SMASH/ORION sensors are lithography alignment sensors used by ASML in their semiconductor assembly machines and are responsible for measuring the alignment of the wafers in between assembly processes. These sensors are complicated modules that cannot be checked or serviced once installed in the lithography machines. The goal of this project is to design a predictive algorithm to determine when the optical coatings inside the sensors are likely to fail under given parameters, so ASML can get a better understanding of when their sensors will need replacing.	
		Team Members:	Nikita Makarov, Amanda Mietus, James Rutledge, & Jingkai Zhang
		Supervisor(s):	Dr. Gary Wicks
		Customer(s):	Dr. Tao Chen, ASML

OPT/ OPE	Location	**OPTICS SUITCASE**	
	D1	Updates to the Optics Suitcase: 1. Desigining a new projector system. 2. Desigining a bio-optical activity involving colorblindness.	
		Team Members:	Tristan Yates, Daniel Le, and Guoxin Li
		Supervisor(s):	Dr. Andrew Berger
		Customer(s):	Dr. Jessica DeGroote Nelson Optimax, Dr. Tanya Kosc, LLE

OPT/ OPE	Location	**Photon Acceleration in a Flying Focus**	
	Pb2	A high-intensity laser pulse propagating through a medium triggers an ionization front that can accelerate and frequency-upshift the photons of a secondary pulse. Traditionally, the upshift has been limited by the accelerated photons outpacing the ionization front or the ionizing pulse refracting from the plasma. Here we apply the flying focus—a moving focal point resulting from a chirped laser pulse focused by a chromatic lens—to overcome these limitations. Simulations demonstrate the upshift of an ultrashort optical pulse to the extreme ultraviolet.	
		Team Members:	Andrew Howard
		Supervisor(s):	Dr. John Palastro, Dr. Jake Bromage, LLE

OPT/ OPE	Location	**Quantum Key Distribution System**	
	Pd4	Creating a trade study for a time and phase binned BB-84 protocol QKD system for the Harris Corporation. We are analyzing the bitrate of the system and how it is effected by the bin sizes which are being minimized via non-linear optical phenomena.	
		Team Members:	Kyle Guzek, Xiaoduo Wen, Jack Myers
		Supervisor(s):	Dr. Svetlana G. Lukishova
		Customer(s):	Dr. Victor Bucklew, Harris Corporation

OPT/ OPE	Location	**Rochester Museum & Science Center Interactive Exhibit**	
	G6	Our customer requested that we design and build a prototype for an exhibit that they would like to include in a future exhibit honoring Rochester Women. We were tasked with creating an optics-based exhibit prototype honoring a female scientist who was from or completed her work in Rochester. We selected Dr. Donna Strickland, 2018 Nobel Prize in Physic recipient for her work in Chirped Pulse Amplification her at Rochester. We hope to make the fundamentals of her work accessible to a wider audience and to exemplify the results of her dedication to the exploration of science.	
		Team Members:	Ryan Walton, Benjamin Larson, Dingzhe Zheng
		Supervisor(s):	Dr. Wayne Knox
		Customer(s):	Dr. Calvin Uzelmeier

OPT/ OPE	Location	**Sensitive ODMR-Controlled Thermometry Using NV Centers in Nanostructures**	
	Pd2	This work explores the potential of using nitrogen-vacancy (NV) centers implanted in CdS nanoribbons as fluorescent indicators of the local temperatures throughout the nanostructure. This nanothermometry technique will utilize the emitted fluorescence from the sample's NV centers, which is controlled via an ODMR experimental setup. In addition to exploring CdS, a piece of nanodiamond will be used to verify the validity of our ODMR setup and will serve as a guide to optimize our system.	
		Team Members:	Evan Villafranca
		Supervisor(s):	Dr. Nick Vamivakas

OPT/ OPE	Location	**Silicon Nitride Polarization Beam Splitter Rotator**	
	Pc3	Silicon photonics offers a compact and cost-efficient solution to the growing demand for energy efficient, scalable, and wide bandwidth communication devices. However, on-chip devices are often limited by polarization dependent crosstalk and loss. To combat this, we designed a silicon nitride polarization beam splitting rotator using a SU-8 photoresist top cladding, a mode converter, and an asymmetric directional coupler to convert any input polarization into an output TE polarization.	
		Team Members:	Raymond Yu
		Supervisor(s):	Dr. Jaime Cardenas

OPT/ OPE	Location	**Ultra Large Format Camera Lens for Street Photography**	
	Pc4	Our group had the task of designing a lens system to be used for street photography for our customer, artist and photographer Richard Learoyd. The system requirements were a large depth of field and high resolution on 50" by 70" silver halide film. The lens system must also have a 1550 mm focal length, a maximum aperture of f/20, and be apochromatic. Additionally, the lens must be able to accommodate vertical movement of 300 mm. The design must minimize cost and be small in size to allow it to be transported as carry-on baggage during the customer's travels.	
		Team Members:	Max Bruggeman, Cristian Flores, Nicole Naselaris, Jake Rosvold
		Supervisor(s):	Dr. Julie Bentley
		Customer(s):	Richard Learoyd

OPT/ OPE	Location L3	**Prototyping a Virtual Skylight for Hyperloop**	
		Our group was tasked with creating a Virtual Skylight for the futuristic train, Hyperloop. This design project will be inplemented in the Hyperloop to prevent nausea and motion sickness in passengers. It will also provide a simulation of solar illumination in the Hyperloop capsule. Using a combination of LED panels, a colored aperture layer, and a microlens array, we were able to produce a synthetic image of the sun with a blue "sky" background.	
		Team Members:	Dylan Beckman, Katherine Donnelly, Ciara Hingston, Colleen Stone
		Supervisor(s):	Dr. Greg Schmidt, Dr. Jennifer Kruschwitz
		Customer(s):	Dr. Duncan Moore

CSC	Location Poster	**Daniel Busaba**	
		All Timescale Window Co-occurrence	
		Team Members:	Lucinda Liu
		Supervisor(s):	Chen Ding