

51ST ANNUAL SENIOR DESIGN CONFERENCE SCHEDULE*
THURSDAY, MAY 13, 2021

BIOENGINEERING SESSION 1

Encellin Therapeutic Implant Delivery System

2:15 – 2:50

John DePalo, James Peterman, Isabelle Vidamo

Advisors: Unyoung (Ashley) Kim, Verna Rodriguez

We are developing a minimally invasive insertion tool for Encellin to implant a therapeutic device for Type 1 diabetes. The insertion tool makes a subcutaneous space at a standardized depth after an initial incision in the forearm, then deposits a therapeutic device without compromising the device's integrity.

5-minute break

Non-Ribosomal In Vivo Protein Ligation

2:55 – 3:30

Sarah Desautel, Victorino Miguel, Kenneth Joseph

Advisor: Zhiwen (Jonathan) Zhang

Protein ligation is an integral yet inefficient process in the development of drugs and diagnostic assays. Our Senior Design project aims to improve upon current industry standards by creating a new protein ligation method that relies on a single enzyme, Sortase A, rather than tedious and error-prone in vitro techniques.

10-minute break

High Throughput and On-Chip Analysis of Engineered Extracellular Nano-Vesicles and Their Functional Characterizations

3:40 – 4:10

Brendan Johnson, Jiayi Zhang

Advisor: Bill Lu

Surface engineering of extracellular vesicles (EVs) holds great promises for targeted drug delivery, but EV heterogeneity imposes a significant challenge on engineering with transmembrane scaffolds. This project uses high throughput and on-chip analysis of individual engineered EVs to reveal various scaffolds' distinct abilities and their impacts on EV subpopulations.

10-minute break

X-Messenger Molecule

4:20 – 4:50

Julianna Bernardo, Jiacheng Tan

Advisor: Zhiwen (Jonathan) Zhang

Knowing the fact that antibiotic-resistant Gram-positive bacteria are emerging and effective therapeutics are lacking, we will focus our engineering efforts on discovering and developing potential anti-infective therapeutics against Sortase A's messenger molecule that will not impose the risk of further antibiotic resistance and yet can effectively eliminate the pathogenic bacteria.

BIOENGINEERING SESSION 2

Artificial Lumbar Spinal Disc Implant

2:15 – 2:50

Sara Layton, Nikhil Pai, Michael Rueckert

Advisors: Bill Lu, Maryam Mobed-Miremadi

We are designing an Artificial Lumbar Spinal Disc Implant to counter degenerative disc disease within patients as well as alleviate back pain. Our goal is to create a long lasting restorative disc with an emphasis on revise-ability for patients in the case of repeat surgeries.

5-Minute Break

Reliability of Pressure and Nozzle Firing in 3D Printed Microneedles for Microencapsulated Cell Extrusion

2:55 – 3:30

Lexi Enstrom, Sophie Quisling, Leana Vestal

Advisor: Maryam Mobed-Miremadi

Microneedles are minimally invasive, optimally painless, and offers treatment to an affected area. One goal of this device is to minimize patient pain by optimizing the flow rate of suspended microencapsulated cells through the microneedles. Secondly, we must verify the reliability of the microneedles to fire through thirteen nozzles repeatedly.

10-Minute Break

Skin Phantoms for Biowearable Testing

3:40 – 4:15

Brooke Fitzwilson, Ruby Karimjee, Jordan Spice

Advisors: Emre Araci, Prashanth Asuri

The biowearable device industry is in need of a model that can accurately mimic the properties of skin. Our project design includes a skin phantom and corresponding COMSOL simulation, which emulates the perspiration and impedance spectrum behavior of human skin.

5-Minute Break

G-MAP: Gastrointestinal Myoelectric Activity Phantom

4:20 – 4:55

Kei Castelberry, Sarah King, Edie O'Connor

Advisors: Prashanth Asuri, Shoba Krishnan

This project develops a phantom to accurately emulate the myoelectric activity of the human gastrointestinal system, meeting industry needs for a synthetic platform to test biowearable devices measuring the motility of the stomach, small intestine, and colon in early-stage testing of noninvasive electromyographic devices as an alternative to human testing.

10-Minute Break

Minimally Invasive 3D Printed Microneedles for Glucose Monitoring

5:05 – 5:40

Josephine Semaan, Amanda Yaung, Daniel Bermudez

Advisors: Unyoung (Ashley) Kim

With the purpose of making patient care for diabetics more affordable, accessible, and reliable, our project aims to create a minimally invasive glucose monitoring system through the use of 3D printed microneedles. This system would have extensive applications in helping improve patient care for diabetics.

BIOENGINEERING SESSION 3

Microfluidic Barcode Device for Human Movement Data Storage

2:15 – 2:50

Justin Culpepper, Gianna Gathman, Katie Neighbors

Advisor: Emre Araci

We have developed a computer model of a novel wearable microfluidic strain sensor to support human physical therapy. Our microfluidic pump design uses the skin strain produced by movement to create a fluidic pattern that resembles a barcode. This device will provide patients and clinicians information to bridge inter-appointment gaps.

5-Minute Break

**Identifying Breast Cancer in Screening Mammogram Using a Pre-trained Deep Learning Model
2:55– 3:30**

Travis Kay, Derrick Nguyen, Lashan Wijayawickrama

Advisor: Yuling Yan

Using an open source dataset and data from Santa Clara Valley Medical Center, we trained a convolutional neural network model to identify breast cancer in screening mammogram images.

10-Minute Break

MilkGuard: Predictive Modeling and Mobile App Development

3:40 – 4:10

Beau Hsia, Emma McCurry

Advisors: Unyoung (Ashley) Kim, Maryam Mobed-Miremadi

MilkGuard aims to produce a sensitive, low-cost, and environmentally friendly biosensor that can detect the presence of E. Coli in donated human breast milk. This year, we focus on building 1) a dynamic CAD model of our colorimetric assay and 2) a user-friendly mobile app that interfaces with our sensor.

10-minute Break

Classifying Brainwaves for Brain-Computer Interface Technology

4:20 – 4:50

Derrick Wang, Brendan Lawler

Advisor: Yuling Yan

The aim of this project is to develop and train a DL classifier for EEG datasets so that it is able to differentiate between specific passive and active movement signals with high accuracy.

15-Minute Break

Predictive Model for Design of a 3D Developmental Neurotoxicity Platform

5:05 – 5:40

Emma Barrett-Catton, Cameron Read, Murial Ross

Advisors: Prashanth Asuri, Maryam Mobed-Miremadi

A predictive model, based on literature review and statistical analysis, was developed to test developmental toxicity on early neuronal differentiation in three-dimensional cell culture. Such models may be useful for clinical and pharmaceutical research.

CIVIL, ENVIRONMENTAL, AND SUSTAINABLE ENGINEERING SESSION 1

Modular Steel Frame for Residential Use

2:15 – 2:50

Kevin Cheng, Noah Rapadas, Derek Eggertson

Advisor: Reynaud Serrette

Our senior design project is a steel frame structure that is able to be collapsed and easily assembled. These structures could be used for temporary disaster relief buildings, housing for people experiencing homelessness, and even multiple modules put together to create a single-story, single-family home.

5-Minute Break

Suburban Tiny Home Development

2:55 – 3:30

Paul Carr, Chris Wang, Colin Wood

Advisors: Laura Doyle, Edwin Maurer, Tonya Nilsson

To capitalize on increased workplace flexibility brought by COVID-19, we designed a tiny home development to give stay at home workers a more sustainable living option. Using a plot of land outside Seattle, we designed the structures of the tiny homes, the layout, and the water systems of the development.

10-Minute Break

Office and Warehouse Project

3:40 – 4:10

Marco Ardiya, Stanley Lemena

Advisor: Reynaud Serrette

This project involves building a warehouse/office building in partnership with PT Cipta Mulia Aditama, located in Bekasi, Indonesia. It will focus on commercial and community needs, concentrating more on commercial as the goal is to allow access for international companies, and to provide the resources the neighboring industries need.

CIVIL, ENVIRONMENTAL, AND SUSTAINABLE ENGINEERING SESSION 2

East Orosi Clean Water Initiative

2:15 – 2:50

Julia Carroll, Peter Naughton, Trey Novara

Advisor: Aria Amirbahman

East Orosi, California, has been devastated by nitrate contaminated groundwater as local legislation fails to act. This project explores multiple designs that provide permanent potable drinking water solutions for the 700 low-income community residents. Our results aim to be a prescriptive solution for similar nitrate contaminated communities across California.

5-Minute Break

Water Treatment Solutions for Wildfire Impacted Watersheds

2:55 – 3:30

Michael Reyes, Jackson Shank, Mai Sinada, David Villani

Advisor: Aria Amirbahman

In watersheds affected by wildfires, contaminants are delivered to water treatment plants or supply reservoirs at extreme and unmanageable concentrations. Focusing on the City of St. Helena, our proposed solutions target the removal of sediments, increased nitrates, and fire retardant chemicals from runoff in order to assist treatment plants.

10-Minute Break

Seedling Irrigation Design for Valley Verde

3:40 – 4:15

Sarah Dao, Sally Ferguson, Hope Laborin

Advisor: Laura Doyle

This project is in partnership with Valley Verde, a non-profit organization that offers edible gardens to underserved communities. With increased stress on the organization and increasing demands due to COVID-19 and climate change, SCU civil engineers will design and implement a hydroponics irrigation system to optimize Valley Verde's water usage.

5-Minute Break

Potable Water for a Volcanic Community in Rural Guatemala

4:20– 4:55

Marieli Rubio, Jichan Seo, Connor Thomas

Advisors: Aria Amirbahman, Laura Doyle, Edwin Maurer

The intent of this project is to design a water treatment and distribution system that will provide potable water for a small volcanic community in Guatemala. It will remove the high levels of heavy metals and suspended solids to alleviate water-related illnesses in the area.

COMPUTER SCIENCE AND ENGINEERING SESSION 1

An-drew

2:15 – 2:45

Melanie Abercrombie, Jeffrey Huang

Advisor: Maya Ackerman

A Co-creative Drawing Application for Personalized Digital Expression

10-Minute Break

Alzheimer's Disease Diagnostic Support Tool

2:55 – 3:30

Chelsea Fernandes, Aiyushi Kumar, Shreya Venkatesh

Advisors: Ahmed Amer, Julia Scott

Our project aims to develop a web-based diagnostic-support tool that physicians can use in a clinical setting to increase the efficiency and accuracy of diagnosing Alzheimer's Disease. Our solution uses a machine learning model to classify patients into one of three possible stages of Alzheimer's Disease using multiple clinical parameters.

10-Minute Break

Music For Me

3:40 – 4:10

Zak Graber, William Henrion

Advisor: Maya Ackerman

A web application that allows users to play music alongside an AI in an intuitive way.

10-Minute Break

Spend Happier

4:20 – 4:55

Jack Guillet, Kyle Moore, Cole Steere

Advisor: Maya Ackerman

Spend Happier (spendhappier.live) is a web application that tracks the value of each purchase in addition to cost. It helps users to spend more money on the things they love and less on the things they don't.

10-Minute Break

CREATE: Creative Resources to Express Art Through Engagement

5:05 – 5:35

Katherine Sanchez, Ari Soriano

Advisor: Maya Ackerman

A platform of co-creative systems that users can engage with as a creative outlet or therapeutic resources. Systems include art, music, and dance options and are matched with users interests and evaluated based on mood assessments of the users before and after using each system.

COMPUTER SCIENCE AND ENGINEERING SESSION 2

HUSK: High-level Network Feature Utility for Security-based Kernel

2:15 – 2:45

Dillon Leigh, Shaunak Mashalkar

Advisors: Behnam Dezfouli, Yuhong Liu

Implementation of traffic feature generation within the Linux kernel's network stack, for use in userspace security applications

10-Minute Break

Enhanced Sensing Methods for UAV-based Disaster Recovery Applications

2:55 – 3:30

Connor Azzarello, Christopher Gerbino, Ruchir Mehta

Advisor: Behnam Dezfouli

Natural and human-caused disasters cripple, displace, and diminish civilian populations. This project aims to develop UAV technology that uses image analysis to identify the location of survivors. We will combine inexpensive hardware systems and novel image classification to improve the efficiency of humanitarian organizations and developing nations during disaster response.

10-Minute Break

Drone Mesh Wifi System for Disaster Scenarios

3:40 – 4:10

Cameron Burdsall, Mark Rizko

Advisor: Behnam Dezfouli

Our project is about creating a drone system that can deploy a wireless mesh network over a disaster area, allowing first responders to use internet-enabled devices and aid in the process of finding survivors by using advanced sensors and allow authorities to send out alerts to people in the area.

10-Minute Break

Seamless Container Migration Between Edge and Cloud

4:20 – 4:55

Angeline Chen, Tamir Enkhjargal, Aditya Mohan, Jonathan Yezalaleul

Advisor: Behnam Dezfouli

The purpose of this project is to evaluate the performance of running container management systems on resource-constrained machines such as Raspberry Pi. Through the experiments, our group proposed methods to reduce the overhead of management and migration depending on the workload type.

COMPUTER SCIENCE AND ENGINEERING SESSION 3

StickARs: Effortlessly Apply a Fun Overlay to the Real World

2:15 – 2:50

Théo Arrouye, Jackson Centeno, Morgan Fleshren, Vasilis Odysseos

Advisor: Ahmed Amer

StickARs is an iOS app for the customization, placing, and viewing of stickers in augmented reality. StickARs provides a library of sticker templates for users to select from. Stickers can have different audiences (private/public/custom). Users can also follow tags, join groups, and add friends to customize their experience.

5-Minute Break

Real-Time Multi-Camera Traffic Analysis on a Single Intersection with IoT Devices

2:55 – 3:35

Justin Liu, Kent Ngo, Tyler Niiyama, Ethan Paek, Spencer Tsang, Jackson Tseng

Advisor: David Anastasiu

This project will attempt to solve two problems: tracking individual vehicles within an intersection, and counting vehicles based on the path they take through an intersection. By improving the efficiency of machine learning algorithms and utilization of cost-efficient IoT devices, it aims to improve and enhance real-time traffic analysis.

5-Minute Break

Siheyuan

3:40 – 4:10

Andrea Horvath, Isabel Wu

Advisor: Dan Lewis

Siheyuan is a VR learning experience that allows the user to gain a better understanding of the Chinese written language using visual storytelling and interactive drawing of Chinese characters.

10-Minute Break

Multi-Class Multi-Intersection IoT-Based Vehicle Counting

4:20 – 5:00

Donovan Allen, Maggie Dong, Jay Ladhad, Colin Rioux, Chris Tian

Advisor: David Anastasiu

Current machine learning algorithms for vehicle counting and tracking are not designed to run on IoT devices in real time. Our team proposes a decentralized method of multi-class vehicle counting and tracking through a system of IoT devices that communicate vehicle identification information in a multi-intersection environment.

5-Minute Break

Smart Pantry

5:05 – 5:40

Audrey Hou, Sukruth Krishnakumar, Jacob Lucke

Advisor: David Anastasiu

Our aim is to make managing groceries more convenient by maintaining data of what is in the user's pantry and by learning the user's buying and eating habits. We use a novel weight to computer vision mapping method to detect grocery usage and notify users when specific items are diminished.

COMPUTER SCIENCE AND ENGINEERING SESSION 4

IoT MarketOne

2:15 – 2:45

Michael Zarrabi

Advisor: Angela Musurlian

An e-commerce site that includes IOT products from producers.

10-Minute Break

Nicaragua Weather App

2:55 – 3:30

Alexa Grau, Justin Ling, Greta Seitz

Advisor: Angela Musurlian

A mobile weather application to be implemented in rural Nicaragua as a way to collect and distribute necessary weather information to the community which will influence agricultural practices.

10-Minute Break

Elevate Tutoring

3:40 – 4:10

Sparsh Chauhan

Advisor: Silvia Figueira

This project creates a web platform providing tracking, documentation, and metrics for staff and tutors to manage daily tasks, including calendar, shift visualization, leave requests and availability, messaging, and notification system, making the user's experience more efficient and powerful.

10-Minute Break

MARTHA: Offline Educational Tool for Cameroonian Refugees

4:20 – 4:55

Sarah Ahmed, Eason Liu, Marco Marenzi, Leila Scola

Advisor: Silvia Figueira

MARTHA is a mobile application that delivers educational resources offline in the form of PDF files and mp3 clips. The content ranges from vocational training to hygiene. A Raspberry Pi acts as the server and database to store data, host an ad hoc wireless network, and periodically retrieve updated content.

10-Minute Break

OneMe: Virtual Identity Creation and Verification, as a Service

5:05 – 5:35

James Grom

Advisor: Silvia Figueira

OneMe, a third-party web-service, provides virtual identity creation and verification - a virtual passport for users. OneMe issues an initial account, after a one-time stringent verification/authentication process, that requires a government ID. Subsequently, any virtual entity that requires a OneMe account ensures that its users aren't duplicated, impersonated, or misrepresented.

COMPUTER SCIENCE AND ENGINEERING SESSION 5

Smart Grid Security Simulator (SGSS)

2:15 – 2:45

Christopher Woo

Advisor: Xiang Li

The web application, Smart Grid Security Simulator, is designed to make it easier for people, who intend to learn about smart grid security, to better visualize the failure of lines in a network due to various attacks through modification and testing of various networks and attacks.

10-Minute Break

TasteMate

2:55 – 3:30

Darren Codipilly, Brandon Quant, Horatio Xiao

Advisor: Xiang Li

With TasteMate, we aim to improve current recommendation systems by utilizing a link between the nutrition facts of a dish and different flavor profiles. Our goal is to create a personalized flavor based recipe recommendation system that uses a user's taste profile to provide the best matching food recipes.

10-Minute Break

Improved Graph Learning Performance with Hyperparameter Tuning

3:40 – 4:10

Drew Ligman

Advisor: Zhiqiang Tao

This project thus seeks to increase the effectiveness of Graph Machine Learning performance through hyperparameter optimization. We specifically analyze Graph Convolutional Networks as the model in question and use a BOHB approach to hyperparameter tuning.

10-Minute Break

Urban Planning Optimization via "Cities: Skylines"

4:20 – 4:55

Jack Cunningham, Carter Duncan, Alexander Kennedy, Andrew Wang

Advisor: Ying Liu

Used Reinforcement Learning techniques to train a game agent to play the city simulator "Cities: Skylines". The agent will learn certain patterns of playing and thus optimal strategies. This will result in a simulated city environment that is strategically laid out and more optimally designed than a human designed one.

10-Minute Break

Extracting Creative Procedural Knowledge from Web Design Tutorials

5:05 – 5:35

Federico Madden

Advisor: Zhiqiang Tao

A web app that uses a deep neural network to extract specific procedural steps (such as File > New or Layer > New Layer) from the plain text content of tutorials for graphic design software such as Photoshop.

COMPUTER SCIENCE AND ENGINEERING SESSION 6

Efficient Feature Collection for IoT Security Using DPDK

2:15 – 2:45

Kade Harmon, Jordan Murtiff

Advisor: Behnam Dezfouli, Yuhong Liu

Older intrusion detection systems often use a large number of CPU cycles and energy in order to conduct real time traffic analysis. Our project utilizes the Data Plane Development Kit in order to bypass the kernel for more thorough and efficient network feature collection and analysis for security purposes.

10-Minute Break

Correlating Diversity and Resistance to Misinformation in Social Media Groups

2:55 – 3:30

Jasper Ahn, I Chang, Orion Sun

Advisor: Yuhong Liu

This project's purpose is to measure different diversity metrics for Facebook groups and correlate the results with the amount of misinformation spread within the groups. Our results could give insight into how different aspects of group diversity influence the spread of misinformation and how to better combat false information.

10-Minute Break

Security of Android Bluetooth with Respect to Colocated Apps

3:40 – 4:10

Omar Garcia, Sean Kelker

Advisor: Yuhong Liu

Our project creates a malicious application targeting the connection between a smartphone running the Android OS and popular Bluetooth devices to attempt to steal the data those devices generate, to show the vulnerability has practical applications. We also change the Android source code to create a defense against this attack.

10-Minute Break

Infodemic: Understanding COVID-19 Public Sentiment Using Social Media Data

4:20 – 4:55

Christine Chye, Olivia Figueira, Yuka Hatori, Liying Liang

Advisor: Yuhong Liu

With the outbreak of the COVID-19 pandemic, an overabundance of information related to the virus was released through social media. To understand the public's response to public health messaging, we analyze the sentiment of social media data and whether it parallels the spread of COVID-19.

10-Minute Break

Lightweight Speed Protocol

5:05 – 5:35

Zachary Hardy

Advisor: Yuhong Liu

A network protocol that aims to be lightweight, fast, and secure. Written in C with IOT devices in mind.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 1

Machine Learning-Based Side-Channel Analysis on the Advanced Encryption Standard

2:15 – 2:45

Jack Edmonds, Tyler Moon

Advisor: Fatemeh (Sara) Tehranipoor

Information security is of utmost importance in our digital age. Because of this, awareness of any vulnerabilities that may exist in data encryption methods is vital. Our project's focus is on examining the potential security threat of machine learning-based side-channel attacks on the Advanced Encryption Standard implemented on a microcontroller.

10-Minute Break

Telehealth Sensor Authentication Through Memory Chip Variability

2:55 – 3:30

Holden Gordon, Calvin Kimbro, Thomas Lyp

Advisor: Fatemeh (Sara) Tehranipoor

As the world of remote patient monitoring grows, so too does the threat of malicious third parties abusing remote sensor security vulnerabilities. Our project extracts hardware security primitives based on MLC Flash NAND memory chip's manufacturing process variations to build a unique identifier for telehealth sensor applications.

10-Minute Break

Attacking Logic Locked Circuits Using Reinforcement Learning

3:40 – 4:10

Jake Mellor, Allen Shelton

Advisor: Fatemeh (Sara) Tehranipoor

Evaluating reinforcement learning as a method to defeat modern logic locking techniques.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 2

Portable Radio Frequency Direction Finding Package

2:15 – 2:45

Austin Colon, Jacob Taub

Advisor: Kurt Schab

Design a compact, portable, multi-platform radio frequency (RF) direction finding (DF) system. The system will provide options for both real-time readouts and aggregated measurements for post-processing analytics by geotagging a line of bearing (LOB) and received signal strength (RSS) of target signals.

10-Minute Break

Powering IoT Sensors with RF Energy Harvesting

2:55 – 3:25

Kristi Nguyen, Austin Rothschild

Advisor: Kurt Schab

We aim to design a radio-frequency (RF) energy harvesting system to wirelessly power IoT sensors in an urban environment. An antenna and rectifier system interfaced with a power management circuit will effectively convert incoming RF energy into a form able to power a wireless sensor.

15-Minute Break

Wafer Handling Automation for Aligned CNTs (WHACC)

3:40-4:10

Eric Bressinger, Steven Pretlove

Advisor: Shoba Krishnan

Design a system for a carbon nanotube furnace that automates part of the process for inserting and removing the wafer. The project is made of two phases: automatically shutting the opening to the furnace and sliding the wafer plate into and out of the furnace.

10-Minute Break

Aquaponic Biofuel Nanogrid

4:20 – 4:50

Martin London

Advisor: Maryam Khanbaghi, Maryam Mobed-Miremadi

Self-sufficient aquaponic system viability is limited by inadequate power-balance associated with synergetic biofuel production and wastewater remediation. This project highlights control, net carbon-neutral flue-gas utilization; and minimized aquaponic power-use associated with growth of microalgae biofilm on novel materials with a unique airlift mixotrophic mechanism.

ELECTRICAL AND COMPUTER ENGINEERING SESSION 3

Automated Mixed-Dose Pill Dispenser with Image Verification

2:15 – 2:45

Rohan Bhatt, Nairu Garcia-Acevedo

Advisor: Andrew Wolfe

This project aims to reduce the human error in the dispersion of medication pills by automating the process in a cost effective manner with a robotic arm while improving mixed-dose verification with image classification.

10-Minute Break

Adaptive Deposition of Difficult Materials

2:55 – 3:30

Abel Daniel, Emily Holden, Gabriela Sanches de Carvalho Silva

Advisor: Andrew Wolfe

Our project uses images of a unique object (a cupcake) to adapt designs in a predetermined library in order to extrude those designs most accurately for that specific object's shape.

10-Minute Break

IoT Blinds Controller

3:40 – 4:10

Ryan Claggett, Sayuru Ranamukhaarachchi

Advisor: Andrew Wolfe

Since temperature maintenance is the largest consumer of energy in a household, our project identifies the temperature of the room and uses two different types of blinds systems to assist with maintaining a more stable temperature so that the need for heating and cooling will be reduced.

10-Minute Break

Sensor Pods

4:20 – 4:50

Stephi Boyer, Vivian Tu

Advisor: Andrew Wolfe

The project aims to develop a solar-powered sensor network using Bluetooth mesh for Aver Winery that would analyze water uniformity throughout the field. This would allow the owner to quickly and efficiently tend to the crops' needs.

INTERDISCIPLINARY SESSION 1

Mobile Nanogrid

2:15 – 2:50

Michael Batshon, Charles Ju, Benjamin Mahony, Daniel Mendoza

Advisors: Maryam Khanbaghi, Gaetano (Tony) Restivo

The Mobile Nanogrid is a mobile power solution that uses solar PV and battery storage to power small mobile loads such as phones, fans, and LEDs. This project is a proof-of-concept system that displays a working and viable mobile solar power solution.

5-Minute Break

Adaptive Robotic Chassis (ARC): RoboCrop, A Smart Agricultural Robot Toolset

2:55 – 3:35

Steven Bucher, Brooke Broszus, Alejandro Gutierrez, Krissy Ikeda, Ariana Low

Advisor: Christopher Kitts

RoboCrop is a payload system that will be added to an existing agricultural rover, to address the issue of labor shortage in agriculture. This device will be designed in a modular way to support a multitude of agricultural tasks while specifically focusing on pruning strawberry flowers.

5-Minute Break

Marine Robot Deployment and Control System

3:40 – 4:15

Nicky Castillo, Nick Ellis, Trent Kelsall, Matthew Kiyama

Advisor: Christopher Kitts

We modernize an underwater robot with enhanced navigation capabilities and a new ship-based launch and recovery system, adding on-board sensors, reconfiguring the thruster layout, and adding new control and operations software. We are also designing a new ship-side crane system to launch and recover the robot from a support boat.

5-Minute Break

Shearwater

4:20 – 5:00

Duncan Clark, Justin Cole, Zachary Karat, Canavan Neeson, Aidan Nickels

Advisors: Vlad Ivashyn, Christopher Kitts

A UAV that utilizes ground effect for the purpose of marine research. The craft's experimental airframe allows it to be used as an aerial vehicle, land on water and perform tasks underwater, although these aspects of the project are not part of the scope of our senior design project.

5-Minute Break

Modular Oceanic Autonomous Underwater Vehicle (AUV) for Novel Actuation (MOANA)

5:05 – 5:50

John Elstad, Sean Even, Bryan Gilbertson, Matthew Holmes, Andrew Kambe, Gregor Limstrom, Robert Percell

Advisors: Christopher Kitts, Godfrey Mungal

A UAV that utilizes ground effect for the purpose of marine research. The craft's experimental airframe allows it to be used as an aerial vehicle, land on water and perform tasks underwater, although these aspects of the project are not part of the scope of our senior design project.

INTERDISCIPLINARY SESSION 2

Machine Learning Based Model for the Detection of Brain Aneurysms from MR Angiography

2:15 – 2:50

Katherine Becknell, Claire Bushnell, Rachel Fitzsimmons, Emily Sumner

Advisors: David Anastasiu, Yuling Yan

This project aims to process MRA images to detect the presence and identify the location of brain aneurysms through the use of a convolutional neural network based machine learning algorithm.

5-Minute Break

Santa Clara Community Garden Composting Device

2:55 – 3:30

Nicholas Buccino, Bradley, Lostak, Kyle Uyehara, Jay Weber

Advisor: Jessica Kuczenski

In order to improve the efficiency and volume of organic waste being composted at the Santa Clara Community Garden, our team has developed an effective and sustainable solution to simplify the garden's current composting problems. Furthermore, we would like to use this device to promote the benefits of environmental sustainability.

10-Minute Break

Jamming Attack Workaround Study

3:40 – 4:10

Soren Madsen, Jack Schoen

Advisors: Behnam Dezfouli, Andrew Wolfe

JAWS is a detection and recovery system designed to prevent against deauthentication attacks in real-time by monitoring WiFi network traffic.

10-Minute Break

Dynamic Solar Shading System

4:20 – 4:55

Walker Battey, Alexander Kravstov

Advisor: Jessica Kuczenski

A mechanism for Kids on Campus playground to reduce dangerous UV-light exposure on children's skin and maximize space will be placed on a newly built pergola structure and should reduce maintenance cost to virtually nothing. The fully-automated, solar-powered system will provide an educational aspect due to its sustainability.

10-Minute Break

Crossroad – Avoid Crowd Intelligence

5:05 – 5:40

Yuzheng Wu, Haochen Zhang, Xukun Zhang

Advisors: Ying Liu, Andrew Wolfe

Crossroad targets to solve the problem of long waiting times due to the overflow of the crowd. The project combines pre-installed facilities' cameras with programmed sensors to monitor the engagement of crowds while using machine learning algorithms to analyze the data. The system provides live information about consumer capacity.

MECHANICAL ENGINEERING SESSION 1

Hydrofoil Propulsion Optimization

2:15 – 2:50

Zachary Flood, Nicholas Potter, Wesley Sava, Trentan Walker

Advisor: Godfrey Mungal

Taking a motorized Hydrofoil Board's propulsion system and optimizing and redesigning the propeller and duct design to increase hydrodynamic efficiency and battery life.

5-Minute Break

Wildfire Prevention and Suppression System

2:55 – 3:30

Johnny Dimas-Flores, Ansh Jetly, Antonio Lorenzo

Advisor: Godfrey Mungal

Abstract pending.

10-Minute Break

Frugal Urban Greenhouse

3:40 – 4:15

Connor Pearson, Alexandra Rivera, Emma Rosicky, Liam Swanson

Advisor: Godfrey Mungal

Our goal is to improve ValleyVerde's existing greenhouse design by lowering the overall cost while increasing efficiency (how much water and space this greenhouse uses relative to the deliverable produce). We are focused on the overall design (shape, configuration, and material selection), but also are designing a moisture regulation system.

5-Minute Break

Portable Bicycle-Powered Refrigeration

4:20 – 5:00

David Gilbert, Zach Gotvald, Kerri-Ann Kamei, Lindsay McConville, Brooke Watson, Brian Woo-Shem

Advisor: Hohyun Lee

Our human-powered refrigeration system enables the transport of vaccines on a bicycle to regions with unreliable electricity and minimal infrastructure. The system uses thermoelectric cooling and pedal-powered electric generation for travel in off-grid, rugged terrain. It adapts to different bicycles and can be programmed to maintain different temperatures.

5-Minute Break

The Drier Dryer

5:05 – 5:40

Daniel Anderson, Justin Lee, Thomas Morey, Josh Sunada

Advisor: Hohyun Lee

Increase the efficiency of a dryer by removing moisture from the incoming air. This should minimize the air's relative humidity and maximize the amount of water it can remove from clothes, thereby reducing the dryer's operating time and increasing its efficiency.

MECHANICAL ENGINEERING SESSION 2

Elastic Tail Propulsion at Low Re

2:15 – 2:50

Rafaela Barros-Barreto, Jennifer Miranti, Yoel Park, Elijah Vidal

Advisor: On Shun Pak

Swimming at the microscopic scale (a low Reynolds number environment) encounters stringent constraints due to the dominance of viscous over inertial forces. We design and develop a dynamically similar, macroscopic low Re swimmer that exploits flexibility to generate propulsion via fluid-structure interactions.

5-Minute Break

Bi-directional Kerr Lens Mode Locked Ti-Sapphire Laser

2:55 – 3:30

Ricky Arnold, Stratos Koutroulis, Dylan Meyer

Advisors: Drazen Fabris, Bachana Lomsadze

The objective is to provide the Physics Department with a precision laser for the use of optical imaging. Using the Kerr-lens mode locking behavior, the laser will be able to acquire more accurate wavelength identification, and can acquire the data in a vastly accelerated time frame.

10-Minute Break

Ninja-300 Luggage Rack

3:40 – 4:15

Ethan Gatchalian, Mikel Hirigoyen, Eric Tsuchiya

Advisor: Vlad Ivashyn

Our goal is to design a strong, modular bike rack for the Kawasaki Ninja-300 Motorcycle. There are no true modular racks on the market right now, and the majority of what is there cannot hold all that much weight. We aim to fill this need.

5-Minute Break

Soft Robotic Locomotion via Mechanical Metamaterials: Application in Pipe Inspections

4:20 – 5:00

John Barr, Andrew Boyle, Matthew Goodfellow, Nicholas Rogers, Caroline Stephens

Advisors: On Shun Pak, Michael Taylor

This project investigates the capabilities of auxetic and conventional metamaterials as a tool for pipe inspections, utilizing their opposing reactions to a controlled displacement. Our work serves as a proof of concept aiming to validate the use of metamaterials as an effective means of locomotion in an enclosed conduit.

5-Minute Break

GRVLR Rock Crusher

5:05 – 5:40

Samuel Broyles, James Forman, Karla Raigoza, Hailee Silva

Advisor: Gaetano (Tony) Restivo

The GRVLR team seeks to design a manual rock crusher that is more safe, efficient, cost effective, and ergonomic than hammering river rocks into gravel. Partnered with a non-profit abroad, our goal is to lessen the physical and economic burden of impoverished Nepalese women who make their living crushing rocks.

**Project abstracts are subject to change.*