UNIVERSITY OF CALIFORNIA
MERCED

SCHOOL
OF
ENGINEERING

ENGINEERING DESIGN EXPO

Friday, May 17, 2019 | 11 a.m.

GYMNASIUM
JOSEPH E. GALLO RECREATION & WELLNESS CENTER
UNIVERSITY OF CALIFORNIA MERCED
5200 N. Lake Road | Merced, CA 95343

CELEBRATE STUDENT INNOVATION AT UC MERCED!

INNOVATE TO GROW
UNIVERSITY OF CALIFORNIA MERCED

EVENT LOCATOR MAP

North Bowl 2 Parking Lot

P GUESTS, SPONSORS AND JUDGES PARKING
SHUTTLE SERVICE PROVIDED FROM NORTH BOWL 2 LOT

7:30 a.m.
Registration Opens

1 SOCIAL SCIENCES AND MANAGEMENT (SSM) AND STUDENT SERVICES BUILDING (SSB) BREEZEWAY | BREAKFAST PROVIDED

9 a.m.
Student Presentations

2 **CAPSTONE INNOVATION DESIGN CLINIC (IDC)**
CLASSROOM AND OFFICE BUILDING (COB1) ROOMS 102, 105, 113, 116, 120, 263, 265, 267
SSB ROOM 160

3 **ENGINEERING SERVICE LEARNING (EngSL)**
CLASSROOM AND OFFICE BUILDING 2 (COB2) ROOMS 130, 140

4 **MOBILE APP CHALLENGE (MAC)**
STUDENT ACTIVITIES AND ATHLETICS CENTER (SAAC) ROOMS 209, 211, 217, 219

11:00 a.m.
Engineering Design Expo

5 JOSEPH E. GALLO RECREATION AND WELLNESS CENTER (GYM)
SHUTTLE SERVICE PROVIDED TO AND FROM GYM | LUNCH PROVIDED

1:00 p.m.
Final Presentations

2 **CAPSTONE INNOVATION DESIGN CLINIC (IDC)**
TRACK 1: COB1 ROOM 102
TRACK 2: COB1 ROOM 105
TRACK 3: COB1 ROOM 120

3 **ENGINEERING SERVICE LEARNING (EngSL)**
COB1 ROOM 116

4 **MOBILE APP CHALLENGE (MAC)**
COB2 ROOM 130

2:30 p.m.
Final Award Ceremony

6 COB1 ROOM 102

3:15 p.m.
Reception

7 SOCIAL JUSTICE PLAZA | COB1 AND COB2 BREEZEWAY

4:00 p.m.
Conclusion

SHUTTLE SERVICE PROVIDED TO NORTH BOWL 2 LOT

MARK MATSUMOTO
DEAN, SCHOOL OF ENGINEERING

WELCOME FROM THE DEAN

WELCOME TO THE SCHOOL OF ENGINEERING INNOVATE TO GROW (I2G) DESIGN EXPO!

Innovate to Grow (I2G) started as an idea outlined on the back of a napkin, and is now a highlight for the School of Engineering and one of UC Merced's biggest events.

I2G is a showcase for collaborations between students, faculty, staff and our community and industry partners in which novel designs and technologies are developed that have benefits to the region, the state and the world.

These projects also provide new economic opportunities. Several startup companies formed from previous I2G designs and teams are sponsoring projects that are being presented today.

Through I2G we not only show off our students' work, but also let our benefactors and community see how their support and investments in the School of Engineering and UC Merced are paying off.

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THE THREE SIGNATURE UNDERGRADUATE EXPERIENTIAL DESIGN PROGRAMS SHOWCASED IN THIS EVENT ARE:

- **THE INNOVATION AND DESIGN CLINIC** – the capstone class for many of our senior engineering majors
- **ENGINEERING SERVICE LEARNING** – our program focused on serving non-profit organizations in our community
- **THE MOBILE APPLICATION CHALLENGE** – aimed at solving open problems and/or developing innovative services through mobile applications

Each program offers students the opportunity to work on team-based design projects to meet practical, real-world objectives.

For many of these young rising stars — including many first-generation students — this experience is their first exposure to the realities of engineering as a career, and what awaits them as they leave UC Merced. The partnerships developed through the Engineering Service Learning, Mobile App Challenge, and the Innovation Design Clinic are invaluable. They provide experiential learning with a focus toward innovation, entrepreneurship and collaboration, which are the hallmarks of the education at UC Merced and the School of Engineering.

We greatly appreciate the outstanding support we receive from our community partners — companies and organizations from within the San Joaquin Valley, throughout California, and now the world. They not only bring the challenges forward, they also generously support the students by providing insights and mentorship as the projects progress.

We are proud to have this opportunity to feature our students' projects. We are happy you are here to see the fruits of the efforts by the School of Engineering students, faculty, and partners, and how we are working to improve our community and society.

I invite you to participate as a mentor, sponsor or judge at one of our future events by contacting our staff at innovatetogrow@ucmerced.edu or 209-228-4411.

Mark Matsumoto

DEAN, SCHOOL OF ENGINEERING

STUDENT PRESENTATIONS SCHEDULE

CAPSTONE INNOVATION DESIGN CLINIC PROJECTS

Lake Yosemite Track

	GROUP A | COB1 102	GROUP B | COB1 105	GROUP C | COB1 120
9:00	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**
9:05	**BAY AREA RAPID TRANSIT (BART)** TRACK OBSTRUCTION DETECTION (14)	**E. & J. GALLO WINERY** SAFE HOSE KEY (25)	**NASA JET PROPULSION LABORATORIES** JPL – RECOVERY OF STARLITE TECHNOLOGY (4)
9:35	**BAY AREA RAPID TRANSIT (BART)** TRACKING INSPECTION APPARATUS (15)	**E. & J. GALLO WINERY** SINGLE HEAD CAPPER ADAPTER (26)	**NASA JET PROPULSION LABORATORIES** SOLAR COLLECTOR FOR OXYGEN GENERATION ON MARS (5)
10:05	**BAY AREA RAPID TRANSIT (BART)** VENTILATION AND ATOMIZATION ON OPEN PLAZAS (16)	**E. & J. GALLO WINERY** INCOMING BOTTLE DUST REMOVAL (27)	**SWEEP ENERGY** PRODUCTION LINE (20)
10:35	**BAY AREA RAPID TRANSIT (BART)** PAVED ROAD PERFECTION (17)		**SWEEP ENERGY** POWER SUPPLY (21)

California Poppy Track

	GROUP D | COB1 113	GROUP E | COB1 116	GROUP F | SSB 160
9:00	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**
9:05	**BOTTENS FAMILY FARM** LIVESTOCK WATERER (12)	**MORNING STAR** MOT REMOVAL AND FLUME WATER TREATMENT (11)	**UCSF FRESNO** WALKER PHASE 2 (22)
9:35	**BOWLES FARMING** MILKWEED SEED CLEANING (13)	**MORNING STAR** TOMATO VISION SYSTEM (24)	**EHSANI LAB** DESIGNING A SORTING MACHINE FOR PISTACHIO KERNELS (23)
10:05	**PARREIRA ENTERPRISES** DRY PLANT MATERIAL (9)	**CORBIN CASH-SWEET POTATO SPIRITS** SEMI-AUTOMATIC BOTTLE CRESTER (33)	**BAY AREA RAPID TRANSIT (BART)** VEHICLE VIBRATION ANALYSIS (28)
10:35	**HERMETIA PRO** BLACK SOLDIER FLY (8)	**CORBIN CASH-SWEET POTATO SPIRITS** VODKA FILTRATION SYSTEM (34)	**TERGIS TECHNOLOGIES** EARLY DETECTION OF CLABSI IN CENTRAL LINE HUBS (30

CAPSTONE INNOVATION DESIGN CLINIC PROJECTS

Merced Rye Track			
	GROUP G | COB1 263	**GROUP H | COB1 265**	**GROUP I | COB1 267**
9:00	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**
9:05	**SCHOLLE PACKAGING** TENSILE TEST OPTIMIZATION (2)	**TAYLOR FARMS** VALUABLE BROCCOLI CONSTITUENTS (1)	**TURATTI** HYGIENIC DESIGN OF TITANO (7)
9:35	**SCHOLLE PACKAGING** ABM HOLE PUNCH OPTIMIZATION (3)	**CITY OF MERCED** WASTEWATER METHANE RECLAMATION (6)	**T3 ENERGY** COMPRESSION DEVICE FOR HIGHLY INSULATED WALLS (10)
10:05	**TURLOCK IRRIGATION DISTRICT** FISH STRAINER (19)	**THE WINE GROUP** SOLAR DATA COMPILATION & REPORTING (29)	**CONAGRA** YIELD LOSS POINTS (32)
10:35	**TURLOCK IRRIGATION DISTRICT** WATER CONTAMINATION (31)		**TRANPAK** REUSABLE CHEESEBOX (18)

ENGINEERING SERVICE LEARNING PROJECTS

Tuolumne River Track		Merced River Track
	COB2 130	**COB2 140**
9:00	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**
9:05	**KEARNEY AGRICULTURAL RESEARCH AND EXTENSION (KARE) CENTER** UNMANNED AERIAL SYSTEMS (1)	**UC MERCED EXTERNAL RELATIONS** MOBILE MAKER LAB (5)
9:25	**UC MERCED SUSTAINABILITY** LEED LAB (3)	**HEALTHY HOUSE** PROJECT PROTECT (2)
9:45	**UC MERCED ADMISSIONS** CAMPUS DRONE PROJECT (4)	

STUDENT PRESENTATIONS SCHEDULE

MOBILE APP CHALLENGE

	SAAC 209	SAAC 211	SAAC 217	SAAC 219
9:00	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**	**WELCOME & OPENING REMARKS**
9:05	**BOWLES FARMING** FANTASTIC FARMERS (1)	**E. & J. GALLO WINERY** TEAM 6 (6)	**CHAN ZUCKERBERG INITIATIVE** TEAM COPY & PASTE (2)	**BIHAI TRUCKALERT** BOBCAT TRUCKERS (5)
9:20	**BOWLES FARMING** AGTRACK (11)	**E. & J. GALLO WINERY** GROUP 14 (14)	**CHAN ZUCKERBERG INITIATIVE** CPKV (12)	**BIHAI TRUCKALERT** A 15 BPM LIFE (15)
9:35	**BOWLES FARMING** TEAM KAT (13)	**E. & J. GALLO WINERY** DREAM TEAM 1.0 (17)	**CHAN ZUCKERBERG INITIATIVE** J.K.T. (21)	**BIHAI TRUCKALERT** TEAM 120 (23)
9:50	**BOWLES FARMING** J3X (19)	**UCSF FRESNO** TRISQUAD (7)	**TOPCON** I-LENS (4)	**BIHAI TRUCKALERT** IN THE WAY (22)
10:05		**UCSF FRESNO** TWO BIRDS WITH ONE STONE (16)	**TOPCON** DANG DIANA DANG (8)	**NATIONAL SAFETY COMPLIANCE NESTLÉ** THE DREAM TEAM (3)
10:20		**UCSF FRESNO** TEAM UNICRON (18)	**TOPCON** ROBOCON (24)	**NATIONAL SAFETY COMPLIANCE NESTLÉ** NESTLÉ SMARTIES (9)
10:35				**NATIONAL SAFETY COMPLIANCE NESTLÉ** J'S & S ©®™ (10)
10:50				**NATIONAL SAFETY COMPLIANCE NESTLÉ** TRUCKSY (20)

MAY 17, 2019 | FINALISTS AND PRIZE WINNERS

CAPSTONE LAKE YOSEMITE TRACK FINALISTS

COB1 102

1:00 P.M.	INTRODUCTORY REMARKS
1:05 P.M.	FINALIST 1 – PRESENTATION
1:25 P.M.	FINALIST 2 – PRESENTATION
1:45 P.M.	FINALIST 3 – PRESENTATION
2:05 P.M.	RESULTS TALLY

CAPSTONE CALIFORNIA POPPY TRACK FINALISTS

COB1 105

1:00	INTRODUCTORY REMARKS
1:05	FINALIST 1 – PRESENTATION
1:25	FINALIST 2 – PRESENTATION
1:45	FINALIST 3 – PRESENTATION
2:05	RESULTS TALLY

CAPSTONE MERCED RYE TRACK FINALISTS

COB1 120

1:00	INTRODUCTORY REMARKS
1:05	FINALIST 1 – PRESENTATION
1:25	FINALIST 2 – PRESENTATION
1:45	FINALIST 3 – PRESENTATION
2:05	RESULTS TALLY

MOBILE APP CHALLENGE FINALISTS

COB2 130

12:55	INTRODUCTORY REMARKS
1:00	FINALIST 1 – BIHAI TRACK
1:11	FINALIST 2 – BOWLES FARMING TRACK
1:22	FINALIST 3 – CZI TRACK
1:33	FINALIST 4 – GALLO TRACK
1:44	FINALIST 5 – NSC TRACK
1:55	FINALIST 6 – TOPCON TRACK
2:06	FINALIST 7 – UCSF TRACK
2:17	RESULTS TALLY

ENGINEERING SERVICE LEARNING FINALISTS

COB1 116

1:00	INTRODUCTORY REMARKS
1:05	FINALIST 1 – PRESENTATION
1:25	FINALIST 2 – PRESENTATION
1:45	FINALIST 3 – PRESENTATION
2:05	RESULTS TALLY

IN ADDITION TO THE TOP FINISHER PRIZES FROM THE ABOVE PROGRAM/TRACKS, FIVE SPECIAL RECOGNITION AWARDS WILL BE PRESENTED IN THE FOLLOWING CATEGORIES:

1.	SOCIAL IMPACT
2.	BEST POSTER
3.	TECHNICAL APPROACH
4.	TEAMWORK
5.	OVERCOMING ADVERSITY

DESIGN EXPO

Bay Area Rapid Transit (BART)
Track Obstruction Detection — 14

NASA Jet Propulsion Laboratories — 4
JPL - Recovery of Starlite Technology

Kearney Agricultural Research and Extension (KARE) Center
Unmanned Aerial Systems — 1

UC Merced External Relations — 5
Mobile Maker Lab

Bay Area Rapid Transit (BART)
Tracking Inspection Apparatus — 15

NASA Jet Propulsion Laboratories — 5
Solar Collector for Oxygen Generation on Mars

Scholle Packaging
Tensile Test Optimization — 2

Conagra — 32
Yield Loss Points

UC Merced Sustainability
LEED Lab — 3

Healthy House — 2
Project Protect

Bay Area Rapid Transit (BART)
Ventilation and Atomization on Open Plazas — 16

TranPak — 18
Reusable CheeseBox

Scholle Packaging
ABM Hole Punch Optimization — 3

T3 Energy — 10
Compression Device for Highly Insulated Walls

UC Merced Admissions
Campus Drone Project — 4

Bay Area Rapid Transit (BART)
Paved Road Perfection — 17

Sweep Energy — 20
Production Line

Turlock Irrigation District
Fish Strainer — 19

Turatti — 7
Hygienic Design of Titano

E. & J. Gallo Winery
Safe Hose Key — 25

Sweep Energy — 21
Power Supply

Turlock Irrigation District
Water Contamination — 31

The Wine Group — 29
Solar Data Compilation & Reporting

E. & J. Gallo Winery
Single Head Capper Adapter — 26

E. & J. Gallo Winery — 27
Incoming Bottle Dust Removal

Taylor Farms
Valuable Broccoli Constituents — 1

City of Merced — 6
Wastewater Methane Reclamation

ENGINEERING SERVICE LEARNING (ENGSL)

CAPSTONE INNOVA CLINIC (IDC)

REGISTRATION

GUEST RELATIONS

MAIN ENTRANCE

Bottens Family Farm Livestock Waterer	12	22	**UCSF Fresno** Walker Phase 2	**UCSF Fresno** Team Unicron	18	11	**Bowles Farming** AgTrack	**UCSF Fresno** TriSquad	7	4	**Topcon** i-Lens
Bowles Farming Milkweed Seed Cleaning	13	23	**Ehsani Lab** Designing a Sorting Machine for Pistachio Kernels	**Bihai TruckAlert** Bobcat Truckers	5	13	**Bowles Farming** Team KAT	**UCSF Fresno** Two Birds With One Stone	16	8	**Topcon** Dang Diana Dang
Parreira Enterprises Dry Plant Material	9	28	**Bay Area Rapid Transit (BART)** Vehicle Vibration Analysis	**Bihai TruckAlert** A 15 BPM Life	15	19	**Bowles Farming** J3X	**National Safety Compliance - Nestlé** The Dream Team	3	24	**Topcon** Robocon
Hermetia Pro Black Soldier Fly	8	30	**Tergis Technologies** Early detection of CLABSI in Central Line Hubs	**Bihai TruckAlert** Team 120	21	2	**Chan Zuckerberg Initiative** Team Copy & Paste	**National Safety Compliance - Nestlé** Nestle Smarties	9	6	**E. & J. Gallo Winery** Team 6
Morning Star MOT Removal and Flume Water Treatment	11	34	**Corbin Cash-Sweet Potato Spirits** Vodka Filtration System	**Bihai TruckAlert** In The Way	22	12	**Chan Zuckerberg Initiative** CPKV	**National Safety Compliance - Nestlé** J's & S ©®™	10	14	**E. & J. Gallo Winery** Group 14
Morning Star Tomato Vision System	24	33	**Corbin Cash-Sweet Potato Spirits** Semi-Automatic Bottle Crester	**Bowles Farming** Fantastic Farmers	1	23	**Chan Zuckerberg Initiative** J.K.T.	**National Safety Compliance - Nestlé** Trucksy	20	17	**E. & J. Gallo Winery** Dream Team 1.0

LUNCH

ATION DESIGN

MOBILE APP CHALLENGE (MAC)

RESTROOM ACCESS

CAPSTONE INNOVATION DESIGN CLINIC (IDC) TEAMS

TEAM 1 | SPLENDID BROCCOLI

TAYLOR FARMS

Valuable Broccoli Constituents: This project pertains to a research opportunity to determine if the by-product leftover from the Taylor Farms harvesting of broccoli contains any protein or phenolic compounds. The team investigated the protein and phenolic compounds found in broccoli plants through assessments to see if there is any use of the by-products. The result will be a quantitative analysis report discussing the total protein and phenolic compounds found in the by-product of the broccoli plants.

TEAM 2 | TENSILE TEST OPTIMIZATION

SCHOLLE PACKAGING

Tensile Test Optimization: The project pertains to tensile testing of flexible packaging for Scholle IPN's wine bags and other packaging products. The team investigated the clamps used to perform seal and perforation tests of the bag at various locations and is optimizing the current pneumatic grips used for quality testing. The results will be a prototype of an optimized pneumatic grip that will be able to perform consistent, reliable, and relatively quick tensile tests.

TEAM 3 | TEAM KNOCKOUT

SCHOLLE PACKAGING

ABM Hole Punch Optimization: Design of a more efficient hole punch apparatus that minimizes risk of misalignment of the die and blade, while optimizing its degree of range allowing the hole punch to punch holes at varying lengths. The system will serve to be more convenient while simultaneously removing knockouts created by the hole punch.

TEAM 4 | STARLIT JPL

NASA JET PROPULSION LABORATORIES

Recovery of Starlite Technology: Our goal is to develop a material that is capable of withstanding 10,000 degrees Celsius, drawing inspirations from the work of Mr. Maurice Ward, an English inventor best known for his invention of Starlite. As we continue with our work, we develop a quantitative testing methodology designed to hone in on future formulations that give rise to desired material characteristics relative to Starlite technology.

TEAM 5 | THE MARTIANS

NASA JET PROPULSION LABORATORIES

Solar Collector for Oxygen Generation on Mars: NASA's Jet Propulsion Laboratory is looking for alternative methods to generate oxygen using the Martian atmosphere. A previous study identified a catalysis based oxidation-reduction reaction to generate oxygen, which is a viable candidate for larger production scales. However, one of the main setbacks is the power required to facilitate such a reaction. The objective is to design a system for the collection of solar power and provide simulations to demonstrate the performance of the system under Martian atmospheric conditions.

TEAM 6 | WASTEWATER METHANE RECLAMATION

CITY OF MERCED

Wastewater Methane Reclamation: This project pertains possible uses for methane gas produced as a by-product in the process of wastewater treatment that could be considered as beneficial renewable energy projects. The team investigated different uses of the gas for the City of Merced. The result will be a professional report based on 3 final options which the team has deemed most viable, giving the a dvantages and disadvantages of each option.

TEAM 7 | KPR

TURATTI

Hygienic Design of Titano: The objective of this project is to redesign Titano by Turatti Group to reduce the time it takes to clean and sanitize the machine while efficiently following the most current EPA standards. The plan is to remove the large bulky side panels while also implementing further barriers within the machine to isolate the products reducing the cleaning volume and thus the time to clean said volume.

TEAM 8 | BLACK SOLDIER FLY

HERMETIA PRO

Black Soldier Fly: HermetiaPro is a sustainable agriculture company specializing in the cultivation and drying of black soldier fly larvae for animal feed. Currently they are using a batch drying technique for drying the larvae. The team is designing a method of drying these larvae continuously using a series of infrared lights and ultra violet light after a freezing euthanization stage. The result will be a detailed CAD of the final device and a scale table top prototype of the device.

TEAM 9 | DRYERS

PARREIRA ENTERPRISES

Dry Plant Material: This project pertains on researching and developing method(s) to dry plant material such as alfalfa and hemp. The team investigated current methods several other companies are implementing in aim to determine which drying method is more efficient and cost effective. The result will be providing our client with a thorough research analysis on which drying method is best for their interests.

TEAM 10 | T3NSION

T3 ENERGY

Compression Device for Highly Insulated Walls: The purpose of this project is to design a complex metal plate that conforms to the shape of its surrounding components when a desired amount of pressure is applied. This plate is a part of a tension arrangement meant to stabilize and transfer loads experienced by a composite brick wall. The team is optimizing the thickness and bending profile of the plate in order to achieve the optimum levels of strength, conformity, and cost effectiveness.

TEAM 11 | LOS TOMATEROS MOT

MORNING STAR

Removal and Flume Water Treatment: The Morning Star Packing Company produces processed tomato products. Tomatoes for the processed food industry are harvested by machine which pulls the entire plant from the ground. Most of the plant material other than tomatoes (MOT) is discarded in the field, but about 20% of a load arriving at the factory is MOT. The tomatoes are washed down a flume system (sort of a water slide) from the unloading point into the plant. The tomatoes and MOT are separated, but some MOT remains in the flume water. Our team has designed a system to improve the water treatment/MOT removal system presently in place.

TEAM 12 | WATER MOOVERS

BOTTENS FAMILY FARM

Livestock Waterer: The Livestock Waterer project requires a solution for transporting 250 gallons of drinkable water to cows at the Bottens Family Farm, located in Cambridge, IL.The team identified heating as the most important issue to address; it is essential to keep the drinking water in a liquid state, especially during the freezing-cold winter months. The result will be a design for an insulated box that encapsulates a water tank with an attached recirculation system, all equipped with sensors to detect cow proximity, water levels, and temperature.

CAPSTONE INNOVATION DESIGN CLINIC (IDC) TEAMS

TEAM 13 | MONARCH REVIVAL

BOWLES FARMING

Milkweed Seed Cleaning: This project involves developing a machine that will effectively separate milkweed seed from the floss material that it is bound to within the milkweed pod. The team investigated different seed and floss separation techniques such as agitation and gravitational separation. The prototype developed will utilize a positive air pressure and intercrossing combing system for optimal seed separation. By doing so, this will minimize the overall cleaning time necessary for seed collection and yield a greater seed output. The team also hopes to repurpose the floss collected after separation for alternate uses, such as in hypoallergenic materials or fabrics.

TEAM 14 | OBSTRUCTION DETECTION

BAY AREA RAPID TRANSIT (BART)

Track Obstruction Detection: Our main goal for this project is to design and test a solution that will help BART minimize the time to detect and identify obstructions on the track way. We decided to use a camera in conjunction with an object detection algorithm. This means that the camera will record the data and then we will use the algorithm to run through the footage. Once an obstruction is detected, it will then notify BART's control center though email/ message.

TEAM 15 | TEAM TRERAILWAY

BAY AREA RAPID TRANSIT (BART)

Tracking Inspection Apparatus: This project pertains different methods of track inspection to improve efficiency for BART. The team investigated different sensors to measure deterioration and is developing a system that would measure deterioration underneath the railbase as well as the distance between the heads of the rails. The result will be a small scale prototype that can be scaled up to fit the required dimensions of BART's rail system.

TEAM 16 | ODOR ABATEMENT

BAY AREA RAPID TRANSIT (BART)

Ventilation and Atomization on Open Plazas: This project pertains two methods for odor abatement in BART Plazas. The team investigated minimal maintenance approaches to lowering odor perception. They are developing a ventilation system with a wind funnel to improve air circulation, as well as, an atomization system to infuse treated air. The result will be a scaled prototype and implementation study to prove the design's adaptability for other plaza varieties.

TEAM 17 | PERFECT PAVEMENT

BAY AREA RAPID TRANSIT (BART)

Paved Road Perfection: Our client, BART has stations in various cities in the Bay Area. At these stations, pavement will tend to crack and uplift due to various factors over time. Our project is to resolve pavement that has been uplifted and/or cracked. Current practices either makes the pavement unattractive or is too costly. Our solution will repair concrete while keeping cost low, improving the aesthetic, increasing the strength of the pavement and also improving customer safety.

TEAM 18 | TRIUMVIRATE BOX GROUP

TRANPAK

Reusable CheeseBox: We are tasked with engineering a reusable plastic box for Gallo Farms in order for them to produce cheese with an environmentally friendly method while saving time and costs with a more structural sound box to hold the cheese in its shape.

TEAM 19 | TID FISH STRAINER

TURLOCK IRRIGATION DISTRICT

Fish Strainer: This project pertains to preventing salmon from entering two drainage pipes owned by Turlock Irrigation District, the Harding and Nielson drains. The team investigated physical and behavioral barriers to deter fish from entering the drainage and is currently developing a drainage outlet attachment that will both prevent fish from entering the drainage as well as allow for the passage of weeds. The result will be a working prototype and the conclusions from experiments for changes in water flow, the prevention of all fish from entering, and the effectiveness of allowing a variety of debris to exit.

TEAM 20 | PRODUCTION LINE TEAM

SWEEP ENERGY

Production Line: Sweep Energy's Production Line Team is working on implementing a more efficient assembly process. The team has two areas of focus that include: streamlining their printed circuit board (PCBs) assembly, and improving their injection molding process to increase production yields. Production Line Team has investigated various manufacturing techniques in attempt at maximizing Sweep Energy's assembly process and will be providing the company with design ideas and a prototype.

TEAM 21 | POWER

SWEEP ENERGY

Power Supply: Sweep Energy uses an Internet of Things device in real time to monitor load and performance of a wide range of machinery. Currently the way power is supplied to their device is an invasive method. This is driving up cost for Sweep Energy due to labor for a certified electrician. The team was asked to design, build, and test a non-invasive power supply to generate enough power to two of their monitoring devices.

TEAM 22 | SPRING TEAM

UCSF FRESNO

Walker Phase 2: The goal is to design a device that attaches to any walker. When the walker begins to tilt backward, the device will launch a small rod that is perpendicular to the floor, 'catching' the individual and preventing them from falling. The device will be composed of a mixture of both mechanical and electrical components. A gyroscope and accelerometer will be used to measure the orientation of the walker. When it senses that the walker is tilting back, a signal will be sent to the Arduino, which will then activate the solenoid to release the spring loaded rod.

TEAM 23 | PISTACHEWS

EHSANI LAB

Designing a Sorting Machine for Pistachio Kernels: This project pertains in considering different approaches to sort pistachio based on their color for the Agricultural Engineering Technology Lab that is conjoined with the the University of California, Merced. The team investigated different approaches that aims to reduce the chance of the sorting machine to inaccurately sort pistachios and is developing a three stage process of singulation, detection, and sorting to accurately sort pistachios kernels using their physical properties. The result will be scale-sized prototype that works with the parameters of color that could help with revenue in the food industry.

CAPSTONE INNOVATION DESIGN CLINIC (IDC) TEAMS

TEAM 24 | TEAM RED
MORNING STAR

Tomato Vision System: Using the technology provided by Morning Star Company, this project aims to accurately count a tray of plants, specifically tomato seedlings within a 1% accuracy. Our solution must comply with the green house operations and be economically practical to counting plants as opposed to using hand labor.

TEAM 25 | SAFE HOSE KEY
E. & J. GALLO WINERY

Safe Hose Key: This project pertains to a hose key used to attach and detach pipes that transfer grape juice into tanks for the wine making process for E.&J. Gallo. The team investigated different materials, manufacturing methods and the most efficient design to produce a long lasting hose key. The result will be a hose key prototype that will attach and detach pipes as well as provide an ergonomic grip for the workers.

TEAM 26 | CFW ENGINEERING COPPERHEADS
E. & J. GALLO WINERY

Single Head Capper Adapter: This project pertains to making E&J Gallo Winery's single head capper testing apparatus, originally made for Zalkin capper heads, compatible with the Bertolaso capper heads. The team investigated and performed preliminary design analysis for multiple adapter design options for Gallo. The design concept with the most merit will be fully realized in CAD drawings and tested with stress simulation. Then a functional prototype will be created to test on the Single Head Capper, to ensure operation.

TEAM 27 | THE DUST ELIMINATORS
E. & J. GALLO WINERY

Incoming Bottle Dust Removal: This project relates a variety of possible ways to remove and collect excess dust in the process of bottling of the E & J Gallo Winery. The team investigated different possible sources of dust emittance and is developing a contained blower and vacuum concept that would significantly reduce the amount of dust accumulation in the bottling process. The result will be a working prototype and a design for full scale implementation of this concept, that will minimize employee exposure to harmful levels of dust and help Gallo improve the quality of their bottling process.

TEAM 28 | VEHICLE VIBRATION
BAY AREA RAPID TRANSIT (BART)

Vehicle Vibration Analysis: Our team is working with Bart to help develop an instrumentation set for vibration analysis, collect live vibration data, perform basic data processing, and clearly define the instability in the locomotive. Thisproject is split into two semesters with this semester considered as Phase 1. The goal of this phase is to pinpoint the location or locations of the vehicle's troublesome components by determining where, when, and at what frequency vibrations are occurring. The product for Phase 1 will be a report characterizing the vehicle's instability and identifying the most likely causes of the unwanted movement through an analysis report. The vibration data collection tools/ sensor system should be designed with ease of use, maintainability, durability, reliability, and accuracy as key design criteria.

TEAM 29 | SOLAR GROUP
THE WINE GROUP

Solar Data Compilation & Reporting: This project focuses on the operation of an online tool to optimize and simplify the evaluation of The Wine Group's solar energy performance and monitoring of PG&E data. The team investigated different software platforms and service providers and assessed their ability for data consolidation, as well as real-time automation. The end product will utilize the Wexus app as the one-stop-shop for all energy and solar analysis ranging from month-to-month generation, energy offsets, and most importantly, annual true-up performance evaluations.

TEAM 30 | PROACTIVE MEASURES
TERGIS TECHNOLOGIES

Early detection of CLABSI in Central Line Hubs: Central Line Associated Blood Stream Infections (CLABSI) are devastating blood infections. CLABSI are most severe when the hub of the Central Line is infected and those pathogens travel downstream. Detection downstream of the hub will reduce reliance on broad-spectrum antibiotics and reduce mortality rates if the detector can discriminate pathogen species. A culture-free early detection system for these pathogens will be presented.

TEAM 31 | WATER & PUMP CONSULTANTS
TURLOCK IRRIGATION DISTRICT

Water Contamination: This project pertains to pumping water from a trench-pit. The treated water is then expected to be stored in two tanks. The team investigated different possibilities to find water pumps and storage replacements to renovate the Turlock Irrigation District System.

TEAM 32 | DO NOT SPILL THE BEANS
CONAGRA

Yield Loss Points: This project pertains in identifying the yield loss points throughout the making process of Rosarita Beans at Conagra Brands. The team has been investigating losses by observing and quantifying visible losses that occur in machinery, as well as the actual cooking process. Working closely with Conagra, the team has summarized the process which highlights major losses that the team is working to quantify. The result will be a yield loss map, that summarizes all yield loss points, and potentially suggested methods to reduce or prevent future losses.

TEAM 33 | SWEET POTATO SPIRITS SABC
CORBIN CASH

Semi-Automatic Bottle Crester: This project focused on optimizing a portion of the bottling process for Corbin Cash sweet potato distillery by creating a more efficient way to apply and glue metallic family crests to their signature bottles. The team explored several mechanical solutions for applying glue and centering the crests, before settling on the creation of a custom hand tool. The final deliverables will be a custom hand tool designed to perfectly center the family crests, along with an improved glue application system featuring better adhesive.

TEAM 34 | SWEET POTATO SPIRITS VODKA FILTRATION
CORBIN CASH

Vodka Filtration System: Our client has tasked us to design and build a new vodka Filtration system. The previous filtration system is of no use and a new one is needed. Vodka is currently being filtered in a gravity filtration process that requires constant supervision and does not give a constant flow rate. The goal is to create a brand-new vodka filtration system that minimizes losses, cuts production time and reduces the labor required. The number one constraint is that the flavor profile of the vodka must be consistent.

ENGINEERING SERVICE LEARNING (ENGSL) TEAMS

UNMANNED AERIAL SYSTEMS

COMMUNITY PARTNER:
KEARNEY AGRICULTURAL RESEARCH AND EXTENSION (KARE) CENTER

Nematode infestations account for up to 15% of crop losses due to tree stress; costing more than $104 million dollars each year. The Kearney Agricultural Research and Extension Center and the Unmanned Aerial Systems Engineering Service Learning team are teaming up to reduce the effects of nematode infestations on walnut orchards. The UAS team is in the process of validating a proof-of-concept prototype system that scans and detect nematodes in walnut trees, with field testing scheduled for early September 2019.

PROJECT PROTECT

COMMUNITY PARTNER:
HEALTHY HOUSE

In cooperation with Healthy House, the Project Protect Engineering Service Learning team is creating an app to improve access to healthcare for the multi-ethnic communities in Merced County. Features of the app include oral health providers, insurance coverages, general oral health guidelines, and educational resourcesin English, Spanish, and Hmong. User testing is in progress and the app will be available for download on both the Google Play store and the Apple App store by the end of April 2019.

LEED LAB

COMMUNITY PARTNER:
UC MERCED SUSTAINABILITY

In partnership with the UC Merced Sustainability Department, the LEED Lab Engineering Service team is performing the Existing Buildings Certification: Operations & Maintenance for the Sierra Terraces housing buildings at UC Merced. The LEED Lab team is gathering technical data on operations and maintenance activities which will be analyzed to rate the performance of the facility. The expected rating for these buildings is Platinum Level. Additionally, participation in this project satisfies LEED Accredited Professional Certification requirements for professional licensing.

CAMPUS DRONE PROJECT

COMMUNITY PARTNER:
UC MERCED ADMISSIONS

Each year, over 5,000 prospective students visit UC Merced. For international and out of state visitors, traveling to UC Merced is a challenge. The Campus Drone Project Engineering Service Learning team is designing a drone-assisted tour that will allow prospective students to live stream a UC Merced campus tour to showcase points of interest on campus. The campus drone tour is scheduled to be in operation by late April of 2019.

MOBILE MAKER LAB

COMMUNITY PARTNER:
UC MERCED EXTERNAL RELATIONS

UC Merced was created to increase access to higher education for the Central Valley. To continue to build upon its success, the Mobile Maker Lab Engineering Service Learning team is designing a traveling maker-lab to attend hands-on activities STEM during outreach events at K-12 schools to showcase UC Merced's innovative programs and inspire the rising generation to continue towards higher education. Field testing of activities and programs are in progress and the maker-lab is scheduled to be unveiled during the late summer of 2019.

SAVE THE DATES:
Friday, Dec. 13, 2019
Friday, May 15, 2020

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MOBILE APP CHALLENGE (MAC) TEAMS

BIHAI TRUCKALERT TRACK – MAC1

TEAM 5: **BOBCAT TRUCKERS**
TEAM 15: **A 15 BPM LIFE**
TEAM 21: **TEAM 120**
TEAM 22: **IN THE WAY**

SEARCH ALONG ROUTE: Truckers inherently rely on truck navigation systems, and would enormously benefit from real-time information, because any change causes much bigger problems, delays, and costs than to cars. An app is proposed to perform search for information that is useful to truckers along a specific route. This information includes traffic conditions, obstacles, police activities, weight limits, height limits, truck stops, closed lanes, road damage, toll roads, etc. To be compliant with traffic regulations, this app must be operated using voice commands.

BOWLES FARMING TRACK – MAC2

TEAM 1: **FANTASTIC FARMERS**
TEAM 11: **AGTRACK**
TEAM 13: **TEAM KAT**
TEAM 19: **J3X**

FARM OPERATIONS DASHBOARD: Agworld is a modern farm management program that allows farm operators to plan and track jobs as well as costs associated with an operation. Although a large amount of data is gathered in Agworld, it is not presented as informative as it could be. A step toward making Agworld data presentable is to have a dashboard showing upcoming and completed jobs while highlighting overdue jobs. This data would be presented on TVs or as web platforms for users around the farm to get updated about what is going on and what has happened.

CHAN ZUCKERBERG INITIATIVE TRACK – MAC3

TEAM 2: **COPY & PASTE**
TEAM 12: **CPKV**
TEAM 23: **J.K.T.**

SCAVENGER HUNT: An app that allows teachers to create scavenger hunts for students to follow in the real world environment as homework or during a field trip. With this app, students have to go find something, take a picture or write a note, and submit it as homework or to receive points. For example, find a spider in the woods for bio class or find 3 examples of a certain writing in the library or find examples of 3 types of engineering in the science museum.

E. & J. GALLO WINERY TRACK – MAC4

TEAM 6: **TEAM 6**
TEAM 14: **GROUP 14**
TEAM 17: **DREAM TEAM 1.0**

INDUSTRIAL APPLICATION OF DYKSTRA'S ALGORITHM: The Manifold application is a software system that manages a network of pipe lineups that transport wine between various types of locations such as tanks, filters, or trucks within a cellar. To improve the performance of creating lineup plans, the application is modified to incorporate the real-time status of each network components so that active components from current lineup can be reused in the next lineup. The new system will also optimize the distance of lineups as well as the number of components used within a lineup.

NATIONAL SAFETY COMPLIANCE - NESTLÉ TRACK – MAC5

TEAM 3: **THE DREAM TEAM**
TEAM 9: **NESTLÉ SMARTIES**
TEAM 10: **J'S & S ©®™**
TEAM 20: **TRUCKSY**

DAILY VEHICLE INSPECTION REPORTS: Truck drivers are completing Daily Vehicle Inspection Reports (DVIRs) daily for both power and trailing equipment. When a defect is identified on the training equipment and the trailing equipment is swapped for another unit, the equipment with the defect is not communicated to the next driver who attaches the power unit to the defective trailing equipment. To overcome this problem, a mobile app is designed to help drivers and mechanics complete and maintain the records.

TOPCON TRACK – MAC6

TEAM 4: **I-LENS**
TEAM 8: **DANG DIANA DANG**
TEAM 24: **ROBOCON**

3D ENVIRONMENT TO SET OUT OBJECTS: A mobile app that allows users to select objects or families of objects in a 3-Dimensional model, create selection sets of those objects, establish control of the Robotic Total Station used in construction sites, rotate (turn) the total station to the location of an object in the model and 'set out' the object.

UCSF FRESNO TRACK – MAC7

TEAM 7: **TRISQUAD**
TEAM 16: **TWO BIRDS WITH ONE STONE**
TEAM 18: **UNICRON**

SKIN TEST RESULT ANALYZER: Tests for Tuberculosis or Valley Fever require placing a skin test and reading the results (as measured by induration) 48-72 hours later. Reading the tests requires expertise (reaction size measured in millimeters) and two visits - one to place and one to read the test. Both of these factors limit the utility of the testing. Smart phone technology (camera, measurement tools, etc.) could do the accurate readings remotely and therefore avoid the second visit by the patients.

NOTES

THANK YOU TO OUR SPONSORS

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MOBILE APP CHALLENGE

Friday, May 17, 2019

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