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RESEARCH
EXPO 2019

THURSDAY, APRIL 18 – 1:30-6:00PM – UC SAN DIEGO

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AGENDA

1:30 PM	REGISTRATION
	Price Center East Lobby - Level 2
2:00 PM–4:30 PM	POSTER SESSION
	Price Center West Ballroom 200 graduate students present their research results
2:30 PM–3:30 PM	FACULTY TALKS
	Price Center East Ballroom - Level 2
2:30 PM	ENABLING NATURAL LANGUAGE PROCESSING MODELS TO GENERALIZE Ndapa Nakashole Computer Science and Engineering Professor
2:50 PM	WARFIGHTER PROTECTION Ken Loh Structural Engineering Professor Associate Faculty Director, Center for Extreme Events Research
3:10 PM	BIOMIMETIC NANOVACCINES FOR CANCER IMMUNOTHERAPY Liangfang Zhang NanoEngineering Professor Co-Director, Center for Nano-ImmunoEngineering
3:30 PM–4:30 PM	RECRUITING HOUR AND COFFEE BAR
	Price Center West Ballroom
4:30 PM–6:00 PM	AWARDS PROGRAM + NETWORKING RECEPTION
	Price Center East Ballroom Network with faculty, students and industry partners

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FACULTY TALKS



2:30 PM

ENABLING NATURAL LANGUAGE PROCESSING MODELS TO GENERALIZE

Presenter: Ndapa Nakashole
Computer Science and Engineering Professor

Modern machine learning methods have shown success at various natural language processing (NLP) tasks (i.e., question answering, and machine translation). However, they perform well when the training and test data are drawn from the same distribution. I will talk about our work towards NLP models that generalize under data distribution changes.

Ndapa Nakashole is a member of the Artificial Intelligence Group within the computer science and engineering department at the Jacobs School. Her research interests are in natural language processing and machine learning. Collectively, natural language processing aims to develop algorithms that enable computers to understand and generate human language. Her focus is on developing machine learning methods that learn language from text data. Specific problems she is interested in include: machine reading, question answering, representation learning, and NLP for low resource languages.

nakashole.com



2:50 PM WARFIGHTER PROTECTION

Presenter: Ken Loh
Structural Engineering Professor
Associate Faculty Director, Center for Extreme Events
Research

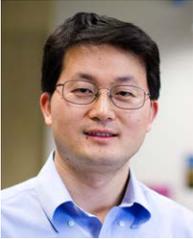
Monitoring the health of our warfighters and military assets is critical for operational readiness. This talk highlights how multifunctional materials can serve as a unique platform for building high-performance sensors and actuators for human assets and physical structures, specifically for the U.S. Navy and U.S. Army Corps of Engineers. Furthermore, this research is part of a larger, on-going effort to establish a major Engineering Research Center at UC San Diego focused on creating a personalized Digital Twin that can revolutionize individual physical health management.

Related posters: 143, 144, 179

ARMOR LAB

The Active, Responsive, Multifunctional, and Ordered-materials Research (ARMOR) Laboratory at the UC San Diego Jacobs School of Engineering is led by structural engineering professor Ken Loh. The lab conducts fundamental research, advances innovative ideas and technologies, and prototypes new sensing and actuation systems. The work spans the broad spectrum of technology readiness levels (TRL), with both civilian and military applications. Research themes include Structural Health Monitoring & Nondestructive Evaluation; Multifunctional Materials and Stimuli-Responsive Structures; and Human Performance Sensing and Assessment.

[ARMOR.ucsd.edu](https://armor.ucsd.edu)



3:10 PM
**BIOMIMETIC NANOVACCINES FOR CANCER
IMMUNOTHERAPY**

Presenter: Liangfang Zhang
NanoEngineering Professor
Co-Director, Center for Nano-ImmunoEngineering

Immunotherapy is now a key research strategy against cancer. The goal of anticancer vaccination is to train the immune system to properly utilize its own resources in the fight against cancer. This talk will highlight the use of nanotechnology for designing vaccine candidates that exhibit enhanced potency and specificity.

Related posters: 124, 125

CENTER FOR NANO-IMMUNOENGINEERING

Nanoengineering professors Liangfang Zhang and Nicole Steinmetz co-direct the newest agile research center at the Jacobs School of Engineering: the Center for Nano-ImmunoEngineering. The Center develops bio-inspired materials and technologies to activate, program, and reinstate optimal immune system function. This work opens new avenues for treating and preventing cancer, cardiovascular disease, autoimmune disorders and infectious disease. At the same time, the Center trains and educates the next generation of scientists and engineers in immunology, nanotechnology and bioengineering.

NanoIE.ucsd.edu

BIOENGINEERING

1. INCREASED OXYGENATION DURING CHRONIC ANEMIA WITH PEGYLATED EARTHWORM HEMOGLOBIN

Carlos Munoz, Krianthan Govender | Professor: Pedro Cabrales Arevalo

2. USE OF DYNAMIC TIME WARPING FOR DIGITAL VELOCITY ESTIMATION IN THE MICROCIRCULATION

Krianthan Govender, Alfredo Lucas | Professor: Pedro Cabrales Arevalo

3. MICROCIRCULATION HYPERSPECTRAL IMAGING TO QUANTIFY OXYGEN DELIVERY VIA ANALYSIS OF HEMOGLOBIN OXYGEN SATURATION DURING HYPOXIA AND ANEMIA

Alfredo Lucas, Carlos Munoz | Professor: Pedro Cabrales Arevalo

4. THE IMPACT OF BLOOD REPLACEMENT PRODUCTS ON COAGULATION

Manon Magill | Professor: Pedro Cabrales Arevalo

5. POLYMERIZED HEMOGLOBIN TOXICITY IS DETERMINED BY ITS MOLECULAR SIZE

Alexander Williams | Professor: Pedro Cabrales Arevalo

6. PERFORMANCE TRADE-OFFS IN WEIGHT QUANTIZATION FOR MEMORY-EFFICIENT INFERENCE

Pablo Tostado Marcos | Professor: Gert Cauwenberghs

7. INTRACORONARY DELIVERY OF A SOLUBLE EXTRACELLULAR MATRIX THERAPY FOR TREATING ACUTE MYOCARDIAL INFARCTION

Martin Spang | Professor: Karen Christman

8. MANUFACTURING CONSIDERATIONS FOR PRODUCING AND ASSESSING DECELLULARIZED EXTRACELLULAR MATRIX HYDROGELS

Melissa Hernandez | Professor: Karen Christman

9. EXTRACELLULAR VESICLES SHED FROM ENDOTHELIAL COLONY FORMING CELLS (ECFCs) WITH HIGH EXPRESSION OF CD44 ARE PARACRINE MEDIATORS OF NEUROVASCULOTROPHIC RETINAL REPAIR

Kyle Marra | Professor: Martin Friedlander

10. MAGGIE: GENOME-WIDE DISCOVERY OF IMPORTANT TRANSCRIPTION FACTORS FOR GENOTYPE-SPECIFIC TRAITS

Zeyang Shen | Professors: Chris Glass, Kun Zhang

11. SAMPLE-TO-ANSWER QUANTITATION OF CYSTEINE PROTEASES

Michael Sveiven | Professor: Drew Hall

**12. MODELING FORCES OF A MOBILE GRAVITY SUIT
FOR LONG-DURATION SPACEFLIGHT**

Neeki Ashari | Professors: Alan R. Hargens, Lonnie G. Petersen

**13. MICROFLUIDIC DEVELOPMENT FOR THE SIMULTANEOUS CULTURING
OF 2,048 UNIQUE E. COLI AND S. CEREVISIAE STRAINS**

Nicholas Csicsery, Elizabeth Stasiowski, Gregoire Thouvenin | Professor: Jeff Hasty

**14. STABILIZED GENETIC CONSTRUCTS THROUGH
ENGINEERED SYNTHETIC ECOLOGIES**

Michael Liao | Professor: Jeff Hasty

**15. CASCADED DEEP LEARNING BASED APPROACH FOR AUTOMATED
PRESCRIPTION OF CARDIAC LONG-AXIS VIEWS**

Kevin Blansit | Professor: Albert Hsiao

**16. INFERRING METABOLIC PRESSURES AND CONSEQUENCES
OF DRUG RESISTANCE EVOLUTION FROM
MICROBIAL GENOMICS-PHENOMICS DATA**

Erol Kavvas | Professor: Bernhard O. Palsson

**17. APPLICATION OF CYBERNETIC CONTROL VARIABLES IN THE
MODELING OF LIPID METABOLISM IN MAMMALIAN SYSTEMS**

Lina Aboulmouna | Professor: Shankar Subramaniam

COMPUTER SCIENCE & ENGINEERING

18. DIFFERENTIAL PRIVACY WITH A CAPACITY BOUNDED ADVERSARY

Jacob Imola | Professor: Kamalika Chaudhuri

19. CUFFLESS BLOOD PRESSURE MONITORING WITH A 3-AXIS ACCELEROMETER

Po-Ya Hsu | Professor: Chung-Kuan Cheng

20. QUALITY OF SERVICE OPTIMIZATION FOR VEHICULAR EDGE COMPUTING WITH SOLAR-POWERED ROAD SIDE UNITS

Yu-Jen Ku | Professor: Sujit Dey

21. MIXED-SIGNAL CHARGE DOMAIN ACCELERATION OF DEEP NEURAL NETWORKS THROUGH INTERLEAVED BIT-PARTITIONED ARITHMETIC

Soroush Ghodrati | Professor: Hadi Esmaeilzadeh

22. FASTER BOOSTING WITH SMALLER MEMORY

Julaiti Alafate | Professor: Yoav Freund

23. DEEP REINFORCEMENT LEARNING FOR BUILDING HVAC CONTROL

Francesco Fraternali | Professor: Rajesh Gupta

24. PROGRAMMABLE BUILDINGS WITH BRICK

Jason Koh | Professor: Rajesh Gupta

25. ENRICHING AUGMENTED REALITY ASSISTED SURGICAL IMAGE GUIDANCE

Michael Barrow | Professor: Ryan Kastner

26. THE RETURN OF POWER GATING: SMART LEAKAGE ENERGY REDUCTIONS IN MODERN OUT-OF-ORDER PROCESSOR ARCHITECTURES

Elbruz Ozen | Professor: Alex Orailoglu

27. HUNTING SYBILS IN CROWDSOURCED MOBILE SENSOR NETWORKS

Nickolai Verchok | Professor: Alex Orailoglu

28. PIERCING LOGIC LOCKING KEYS THROUGH REDUNDANCY IDENTIFICATION

Leon Li | Professor: Alex Orailoglu

29. TEST PATTERN GENERATION FOR SIDE-CHANNEL HARDWARE TROJAN DETECTION

Chris Nigh | Professor: Alex Orailoglu

- 30. BRAIN-INSPIRED HYPERDIMENSIONAL COMPUTING:
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Mohsen Imani, Justin Morris | Professor: Tajana Simunic-Rosing
- 31. ALOOK: ADAPTIVE LOOKUP FOR GPGPU ACCELERATION**
Daniel Peroni | Professor: Tajana Simunic-Rosing
- 32. PROCESSING IN-MEMORY FOR BIG DATA APPLICATIONS**
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- 33. APPLICATION PERFORMANCE PREDICTION AND OPTIMIZATION
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Anthony Thomas, Yunhui Guo | Professor: Tajana Simunic-Rosing
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Sahand Salamat | Professor: Tajana Simunic-Rosing
- 37. THERMAL-AWARE DESIGN AND FLOW FOR
FPGA PERFORMANCE IMPROVEMENT**
Behnam Khaleghi | Professor: Tajana Simunic-Rosing
- 38. EMBEDDED F* - A FRAMEWORK FOR WRITING
VERIFIED IOT APPLICATIONS**
Shravan Narayan | Professor: Deian Stefan
- 39. WHAT YOU SKETCH IS WHAT YOU GET: QUICK AND EASY
AUGMENTED REALITY PROTOTYPING WITH PINTAR**
Danilo Gasques Rodrigues, Janet Johnson, Tommy Sharkey | Professor:
Nadir Weibel

ELECTRICAL & COMPUTER ENGINEERING

40. FACILITATING RELIABLE MMWAVE LINK USING REFLECTORS

Ish Jain, Manideep Dunna, Tejas Sadarhalli | Professors: Dinesh Bharadia, Xinyu Zhang

41. AN INTRINSICALLY LINEAR TRANSISTOR FOR MILLIMETER-WAVE AMPLIFIERS

Woojin Choi | Professor: Shadi Ahmad Dayeh

42. OPTIMIZING IGZO TFTS FOR USE IN ELECTROPHYSIOLOGICAL SENSING FROM THE CENTRAL NERVOUS SYSTEM

Andrew Bourhis, Ritwik Vatsyayan | Professors: Shadi Ahmad Dayeh, Ian Galton

43. ULTRA SHARP INDIVIDUALLY ADDRESSABLE NANOWIRE ARRAYS RECORD INTRACELLULAR ACTIVITY FROM PRIMARY RODENT AND CARDIOMYOCYTES

Ren Liu, Youngbin Tchoe, Jihwan Lee | Professor: Shadi Ahmad Dayeh

44. GAN VARACTOR DEVICES FOR TUNABLE RF FILTER APPLICATIONS

Po Chun Chen | Professors: Shadi Ahmad Dayeh, Peter M Asbeck

45. ENCODING OF EEG SIGNALS FOR IMAGE CLASSIFICATION AND THE EFFECT OF THE SEQUENCE OF STIMULI PRESENTATION

Chinmayee Bhanu | Professor: Virginia de Sa

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Po-Han Chiang | Professor: Sujit Dey

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Xueshi Hou | Professor: Sujit Dey

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Ahmed Youssef, Prannoy Pilligundla, FatemehSadat Mireshghallah | Professor: Hadi Esmaeilzadeh

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Jongha Jon Ryu | Professor: Young-Han Kim, Sanjoy Dasgupta

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Mojan Javaheripi, Mohammad Samragh | Professor: Farinaz Koushanfar

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Lujiang Yan | Professor: Yu-Hwa Lo

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Abdullah Abdulslam | Professor: Patrick Mercier

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Junkang Zhang | Professor: Truong Q. Nguyen

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Aditya Sant | Professor: Bhaskar Rao

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Hankyeol Jung | Professor: Alina Schimpf
- 98. RADIATIVE EMISSIONS OF FLAMES IN MICROGRAVITY**
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- 99. ESOPHAGEAL DEFELECTION DEVICE FOR CARDIAC ABLATION SURGERY**
Karcher Morris | Professor: Frank E. Talke

- 100. DESIGN AND MANUFACTURE MINIMALLY INVASIVE
ENDOSCOPIC SUBMUCOSAL ROBOTIC SURGERY DEVICE**
Siu Lim Lee | Professor: Frank E. Talke
- 101. DETACHABLE INTUBATION DEVICE**
Matthew Kohanfars, Yu Li | Professor: Frank E. Talke
- 102. AN IMPLANTABLE INTRAOCULAR PRESSURE SENSOR FOR
PATIENT POINT OF CARE MONITORING OF GLAUCOMA**
Phuong Truong, Alex Phan, Buu Truong | Professor: Frank E. Talke
- 103. LIFE-TIME STUDIES OF THE HEAT-ASSISTED
MAGNETIC RECORDING HEAD-DISK INTERFACE**
Tan Trinh | Professor: Frank E. Talke
- 104. EVERSION AND RETRACTION OF A SOFT ROBOT
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Jamie Luong | Professor: Michael Tolley
- 105. TRIPLE DIPPING: MAGNETIC, CAPACITANCE, AND
ACOUSTIC WIRELESS POWER TRANSFER THROUGH
STRAIN-MEDIATED COMPOSITE MULTIFERROICS**
Scott Newacheck | Professors: George Youssef, Prabhakar Bandaru

NANOENGINEERING

106. ARTIFICIAL INTELLIGENCE ASSISTED LIGHT BASED 3D PRINTING

Shangting You | Professor: Shaochen Chen

107. TOWARD COMMERCIAL PEROVSKITE SOLAR APPLICATION

Zachary Dorfman | Professor: David Fenning

108. A-AMINO ADSORPTION ON METAL OXIDE NANOPARTICLES: A SPECTROSCOPIC STUDY OF PH AND PARTICLE TYPE EFFECT

Irem Ustunol | Professor: Vicki Grassian

109. GADOLINIUM DOPING ENHANCES THE PHOTOACOUSTIC SIGNAL OF SYNTHETIC MELANIN NANOPARTICLES: A DUAL MODALITY CONTRAST AGENT FOR STEM CELL IMAGING

Jeanne Lemaster | Professor: Jesse Jokerst

110. WEARABLE BIOSENSORS BASED ON SINGLE-LAYER GRAPHENE DECORATED WITH METALLIC NANOISLANDS

Julian Ramirez | Professor: Darren Lipomi

111. ROLL-TO-ROLL FABRICATION OF LARGE AREA SOLAR TARPS

Rory Runser, Derick Ober | Professor: Darren Lipomi

112. FABRICATING THIN AND FLEXIBLE COMPOSITE ELECTROLYTES FOR SCALABLE ALL SOLID-STATE BATTERIES

Darren Tan | Professors: Ying Meng, Zheng Chen

113. QUANTIFYING INACTIVE LITHIUM IN LITHIUM METAL BATTERIES

Chengcheng Fang | Professor: Ying Meng

114. HIGH EFFICIENCY LITHIUM METAL ANODE ENABLED BY LIQUEFIED GAS ELECTROLYTES

Yijie Yin, Yang Yangyuchen | Professor: Ying Meng

115. UNDERSTANDING THE STRUCTURAL AND VOLTAGE RECOVERY OF LI-RICH LAYERED OXIDES UNDER HEAT TREATMENT THROUGH OPERANDO NEUTRON DIFFRACTION

Yixuan Li | Professor: Ying Meng

116. DATABASE OF GRAIN BOUNDARY PROPERTIES OF ELEMENTAL METALS

Hui Zheng | Professor: Shyue Ping Ong

- 117. RELATIVE CONTRIBUTIONS OF CALCIUM DEPENDENT ACS AND PDES DRIVE THE PHASE OF CYCLIC AMP AND CA²⁺ IN**
Michael Getz | Professor: Padmini Rangamani
- 118. FABRICATION AND CHARACTERIZATION OF COLLOIDAL PLASMONIC NANOCOMPOSITES**
Matthew Creyer | Professor: Andrea Tao
- 119. ENHANCED SECOND HARMONIC GENERATION IN DOUBLE-RESONANCE METASURFACE**
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- 123. FIRST-PRINCIPLES STUDIES OF INFLUENCES OF CAPPING LAYERS ON PERPENDICULAR MAGNETIC ANISOTROPY CONSTANT (K_I) IN X/CO₂FEAL/MGO (X = 4D/5D/6P METALS) STRUCTURES**
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Jia Zhuang | Professor: Liangfang Zhang

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- 129. MESHFREE METHOD FOR DAMAGE AND FAILURE MODELING WITH APPLICATIONS IN FRACKING AND LANDSLIDE PREDICTION**
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- 131. SEISMIC RESPONSE OF SUCTION CAISSON FOUNDATION FOR OFFSHORE WIND TURBINES**
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- 133. EXPLODING WIRES AND TRACKING SHOCK WAVE PROPERTIES IN DIFFERENT CONFINEMENT STATES**
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Michael Morano | Professor: Tara Hutchinson

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- 137. OPTIMIZATION OF THERMAL STRUCTURES: LINEAR AND NONLINEAR**
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Douglas de Aquino Castro, Sandilya Kambampati | Professor: Hyunsun Kim
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Raghavendra Sivapuram | Professor: Petr Krysl
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Ranting Cui | Professor: Francesco Lanza di Scalea
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Margherita Capriotti | Professor: Francesco Lanza di Scalea
- 142. 3-D ULTRASONIC IMAGING OF SOLIDS & HIGH SPEED INSPECTION OF RAILS BY PASSIVE ACOUSTIC MONITORING**
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Radhavi Samarakoon | Professor: John McCartney
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Leticia Nocko | Professor: John McCartney

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Patrick Hughes | Professor: Gilberto Mosqueda

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Niall O'dowd | Professor: Michael Todd

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Mayank Chadha | Professor: Michael Todd

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Mahta Movasat | Professor: Ingrid Tomac

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Brian Yamashiro | Professor: Ingrid Tomac

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Paulina Diaz Montiel | Professors: Satchi Venkataraman, Hyonny Kim

CONTEXTUAL ROBOTICS INSTITUTE

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Ibrahim Akbar | Professor: Nikolay Atanasov

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Qiaojun Feng | Professor: Nikolay Atanasov

159. SPARSE LEARNING-BASED OCCUPANCY MAPPING AND SAFE NAVIGATION IN UNKNOWN ENVIRONMENTS

Thai Duong, Zhichao Li | Professor: Nikolay Atanasov

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Pengcheng Cao, Danny Tran | Professors: Thomas Bewley, Falko Kuester

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163. TIP-TRACKING SYSTEM FOR THE VINE ROBOT

Connor Watson | Professor: Tania Morimoto

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Michael Ishida | Professor: Michael Tolley

CENTER FOR VISUAL COMPUTING

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Zhengqin Li | Professors: Manmohan Chandraker, Ravi Ramamoorthi
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Alexandr Kuznetsov, Zexiang Xu | Professor: Ravi Ramamoorthi
- 169. DEEP VIEW SYNTHESIS FROM SPARSE PHOTOMETRIC IMAGES**
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- 170. LIVE GLOBAL INTRINSIC DECOMPOSITION**
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- 172. ROBUST VIDEO STABILIZATION BY OPTIMIZATION IN CNN WEIGHT SPACE**
Jiyang Yu | Professor: Ravi Ramamoorthi
- 173. SINGLE IMAGE PORTRAIT RELIGHTING**
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- 174. AN INTERACTIVE EVALUATION OF AI MACHINE EXPLANATIONS FOR VQATASK**
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- 175. TOWARDS FINE-GRAINED AND HIERARCHICAL PART-LEVEL 3D OBJECT UNDERSTANDING**
Shilin Zhu | Professor: Hao Su

CENTER FOR WEARABLE SENSORS

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Juliane Sempionatto | Professor: Joseph Wang

CENTER FOR MICROBIOME INNOVATION

183. NORMCO: DEEP DISEASE NORMALIZATION FOR BIOMEDICAL KNOWLEDGE BASE CONSTRUCTION

Dustin Wright | Professor: Chun-Nan Hsu

184. MICROBIAL TOLERANCE TO ACID STRESS: MAINTANANCE OF INTERNAL METABOLITES PROTECTS AGAINST ACID STRESS

Brian Taylor | Professor: Terence Hwa

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Alison Vrbanac | Professors: Rob Knight, Victor Nizet

186. STABILITY SELECTION FOR STRUCTURE ESTIMATION IN MICROBIOME DATA

Lingjing Jiang | Professor: Rob Knight

187. HOW MANY BACTERIA ARE IN A DROP OF SALIVA?

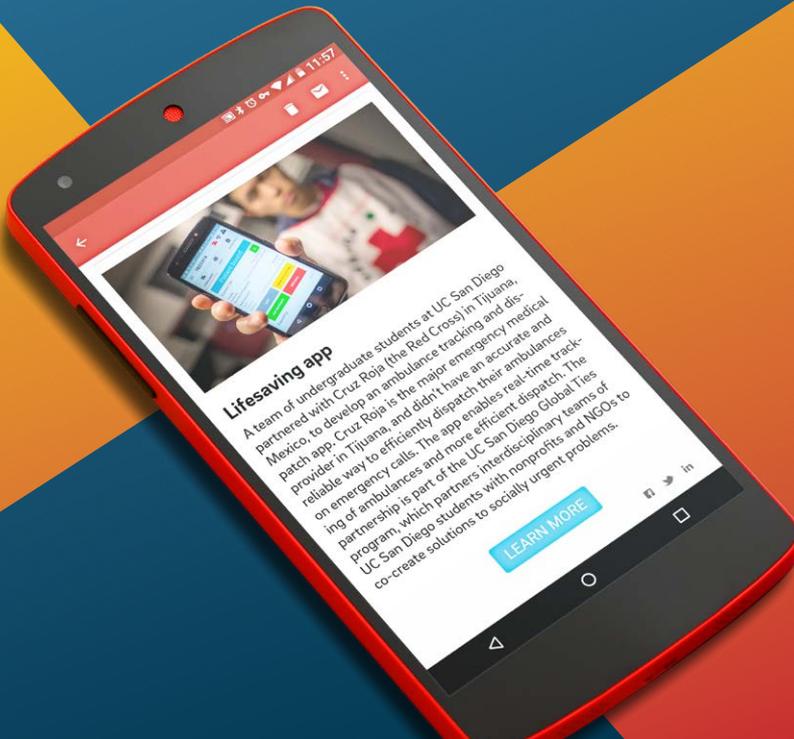
Clarisse (Lisa) Marotz | Professors: Karsten Zengler, Rob Knight

CALIBAJA CENTER FOR RESILIENT MATERIALS AND SYSTEMS

- 188. DYNAMIC FRACTURE OF CARBON FIBER COMPOSITES UNDER MARINE CONDITIONS**
Rodrigo Chavez | Professor: Veronica Eliasson
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Ved Vakharia | Professor: Olivia A Graeve
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- 191. SYNTHESIS METHODS OF BATIO₃ WITH CUBIC MORPHOLOGY: A LITERATURE REVIEW**
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- 192. SAM₂X₅: STRONGER THAN THE STRONGEST STEEL**
Arash Yazdani | Professor: Olivia A Graeve
- 193. SUPERELASTIC RESPONSE AND SHAPE MEMORY BEHAVIOR IN CERAMIC MATERIALS**
Hamed Hosseini Toudeshki | Professor: Olivia A Graeve
- 194. DSC STUDIES OF THE COMBUSTION SYNTHESIS OF LAB₆ AND CEB₆: THE EFFECT OF KCL AND LICL ADDITION**
Carlos Ingram Vargas Consuelos | Professor: Olivia A Graeve
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- 197. PHASE STABILITY AND MISCIBILITY IN ALCOHOL MICROEMULSIONS: DO REVERSE MICELLES FORM IN ETHANOL/AOT/N-HEPTANE SYSTEMS?**
Robyn Ridley | Professor: Olivia A Graeve

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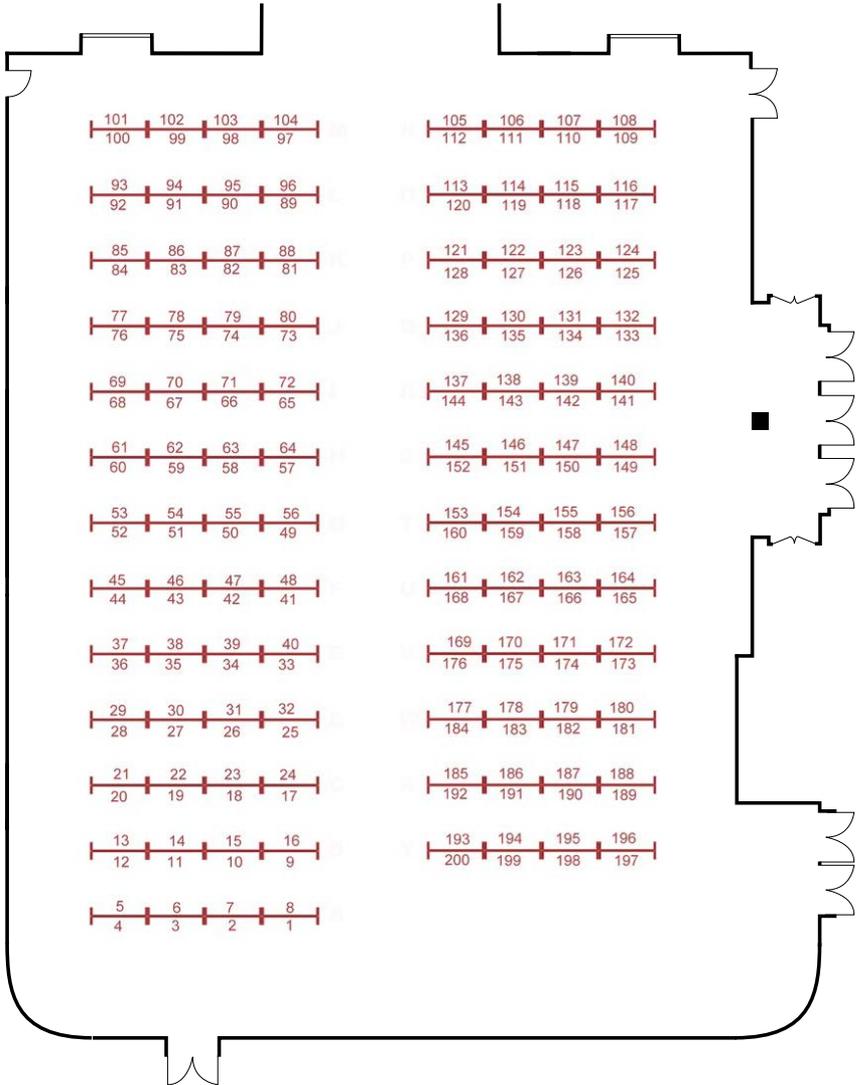
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WEST BALLROOM



ENTRANCE

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