UC DAVIS | NATIONAL CENTER NCIBT INTERVENTIONAL BIOPHOTONIC TECHNOLOGIES

Interventional Biophotonics Week Symposium & Summer School

July 17-23, 2033

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Welcome to Interventional Biophotonics Week

Griffith Harsh M.D., M.B.A
Deputy Director and Co-Leader of Training & Dissemination, NCIBT; Professor of Neurological Surgery, University of California, Davis.

Randy Carney, Ph.D
Co-Leader of Training & Dissemination, NCIBT; Associate Professor of Biomedical Engineering, University of California, Davis.

Laura Marcu Ph.D
Director of NCIBT; Professor of Biomedical Engineering and Neurological Surgery, University of California, Davis.

Dear Participants,

We are delighted to welcome you to this inaugural UC Davis Biophotonics Week of the National Center for Interventional Biophotonics Technologies!

The NCIBT is a national center for research and development, clinical testing, and dissemination of optical biomedical imaging. It was funded in 2022 by a 5-year grant from the National Institute of Biomedical Imaging and Bioengineering (NIBIB) of the National Institute of Health (NIH), with institutional support from UC Davis's Office of Research, College of Engineering, and School of Medicine.

Headquartered at the University of California, Davis, NCIBT is a consortium of over 40 scientists and clinicians from research institutions distributed throughout the United States and Europe.

Our scientists are predominantly scientists and engineers seeking to develop novel technological approaches to optical imaging of biological tissues that will eventually be of clinical value. Our clinicians are predominantly surgeons and medical intensivists eager to help the engineers identify shortcomings and develop and test novel solutions in the clinical application of optical imaging.

Specifically, we are advancing two optical technologies developed at UC Davis—interventional fluorescence lifetime imaging (iFLIm) and interferometric Diffuse Optical Spectroscopy (iDOS)—and combine them with an AI-deep learning platform in a novel paradigm of real-time guidance of decision making during medical and surgical procedures.

The imaging devices we are developing will address important challenges such as the definition of tumor boundaries during surgery and non-invasive monitoring of brain blood flow and oxygenation after stroke.

The Center also supports the clinical testing of the new technologies developed as well as the education and training of additional investigators and clinical users.

This week's Biophotonics Workshop is a fundamental component of that education and training. It consists of a two-day Scientific Symposium, led by well-recognized experts in the fields of optimal imaging as Keynote Speakers, Lecturers, and Panelists, followed by a three-day Biophotonics Summer School in which engineering students and postdoctoral scholars will learn from additional didactic sessions, group discussions, laboratory demonstrations, introductions to clinical environments, and hands-on training with NCIBT instruments. We hope to provide opportunities for both learning and establishing professional friendships beneficial to the careers of our participants.

Thank you for joining us for what we anticipate will be an educational and enjoyable week. Please do not hesitate to contact any of us or our staff is we can do anything to make your week more productive or enjoyable.

Sincerely,
Laura Marcu, Griff Harsh, and Randy Carney

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Program Overview

Monday, July 17th

Genome & Biomedical Sciences Facility, Room 1005
451 Health Sciences Drive, Davis, CA 95616

8:00-8:30 am	**Check-in & Breakfast**
8:30-9:00 am	**Welcome & Overview of NCIBT**
9:00-9:30 am	**Introductions: The Need for Interventional Imaging**
9:30-10:15 am	**Keynote Address A: Clinical Need - Deep Learning Enabled Virtual Staining**
10:15-10:45 am	**Break**

AI/ML-Informed Surgical Guidance

10:45-11:15 am	**Update on TRD3 Progress**
11:15-11:45 am	**Making the Invisible Visible: Human-AI Teaming in Healthcare Data Analytics**
11:45-12:15 pm	**General Questions & Discussion**
12:15-2:00 pm	**Lunch & Poster Presentations**
2:00-2:45 pm	**Keynote Address B: AI Analysis of Medical Data - Quantitative Methods in Precision Medicine**

2:45-3:30 pm	**Panel Discussion: AI in Interventional Biophotonics**
3:30-4:00 pm	**Break**
4:00-5:00 pm	**Mentoring Session I: Working with Industry** **Room: GBSF 2202**

NCIBT Key Personnel only - GBSF NCIBT Office

4:00-5:00 pm	**TRD Organizational Meeting: TRDs' Progress & Plans** **Room: GBSF 1005 (Auditorium)**
5:00-7:00 pm	**Free Time**
7:00-9:00 pm	**Reception & Dinner**

Tuesday, July 18th

Genome & Biomedical Sciences Facility, Room 1005
451 Health Sciences Drive, Davis, CA 95616

8:00-8:30 am	**Check-in & Breakfast**

iFLIm

8:30-8:50 am	**Update on TRD 1 Progress**
8:50-9:10 am	**AI-Enabled Detector Array for Deeper Vision & Sensing Beyond the Limits**
9:10-9:30 am	**Questions & Discussion**
9:30-10:15 am	**TRD1 Keynote Address C: iFLIm - Handheld Optical Imaging Systems**

10:15-10:45 am	**Panel Discussion**
10:45-11:15 am	**Break**

iDOS

11:15-11:30 am	**TRD2 Progress in Brain Monitoring**
11:30-11:45 am	**Transabdominal Fetal Oximetry**
11:45-12:30 pm	**Keynote Address D: Medical Monitoring - Imaging for Monitoring Human Organ Function**
12:30-1:00 pm	**Panel discussion – Optical Imaging for Medical Monitoring**
1:00-2:00 pm	**Lunch**

Applying NCIBT Technology

2:00-2:15 pm	**Overview of CPs & SPs**
2:15-3:00 pm	**iFLIm CPs & SPs**
3:00-3:15 pm	**iDOS CPs & SPs**
3:15-3:30 pm	**Panel Discussion**
3:30-4:00 pm	**Break**
4:00-5:00 pm	**Mentoring Session II: How to Prepare a Scientific Presentation**

NCIBT Key Personnel only - GBSF NCIBT Office

4:00-5:00 pm	**CP/SP Organizational Meetings: Assessment of CP & SP Progress**
5:00-7:00 pm	**Free Time**
7:00-9:00 pm	**Dinner & Poster Awards**

Wednesday, July 19th

Genome & Biomedical Sciences Facility, Room 1005
451 Health Sciences Drive, Davis, CA 95616

8:00-8:30 am	**Check-in & Breakfast**

Biophotonics Overview

8:30-9:30 am	**A Brief Introduction to Biophotonics**
9:30-10:00 am	**OCT in Ocular Diagnostics**
10:00-10:30 am	**Raman Spectroscopy in Diagnostics**
10:30-11:00 am	**Break**

Principles of Clinical Optical Imaging

11:00-11:30 am	**Tissue Identification in Surgery**
11:30-12:00 pm	**Assessing Intraarterial Pathology**
12:00-12:30 pm	**Assessing Tissue Perfusion in Surgery**

12:30-1:00 pm	**Brain Perfusion in Critical Care**
1:00-2:00 pm	**Lunch**

Biophotonics in Action

2:00-2:30 pm	**Stereotactic Platforms**
2:30-3:00 pm	**Lasers in Optical Imaging**
3:00-3:30 pm	**Break**
3:30-4:00 pm	**2-photon Microscopy for Brain Imaging**
4:00-4:30 pm	**Optical Microscopy & Computational Algorithms for Brain Imaging & Optogenetic Stimulation**
4:30-5:00 pm	**iDOS for Blood Flow, Tissue Oxygenation**
5:00-5:30 pm	**Dinner**

Thursday, July 20th

Genome & Biomedical Sciences Facility Room 1005
451 Health Sciences Drive, Davis, CA 95616

8:00-8:30 am	**Check-in & Breakfast**
8:30-9:30 am	**Lecture: Practical Aspects of iFLIm Measurement**

9:30-12:15 pm **Laboratory Demonstrations & Hands-On Training**
Participants will be assigned to groups & take turns performing the following demos:

Demo 1: iFLIm Training & Data Collection - *GBSF 3406*
Demo 2: iDOS Demonstration - *Kemper Hall 2211B*
Demo 3: iDOS Demonstration - *Kemper Hall 2236*

12:15-1:10 pm **Lunch**

1:14-1:46 pm **Travel to Sacramento Medical Center -** Depart on Causeway Connection to UCDMC from GBSF bus stop

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1:46-2:30 pm **Break**

All Participants

2:30–2:50 pm **Change into Scrub Suits**
Main OR Locker Rooms, Pavilion 3, UCDH

Biophotonics in Surgical, Endovascular, ICU Workflows

Group 1

2:50-3:20 pm **Demo 1: Imaging in the OR -**
NSICU Foyer, Pavilion 3, UCDH

3:20-3:50 pm **Demo 2: Imaging in the ICU**
NSICU Foyer, Pavilion 3, UCDH

3:50-4:20 pm **Demo 3: Imaging in Endovascular Suites**
Entry Foyer, UCDH

Group 2

2:50-3:20 pm **Demo 2: Imaging in the ICU**
NSICU Foyer, Pavilion 3, UCDH

3:20-3:50 pm **Demo 3: Imaging in Endovascular Suites**
Entry Foyer, UCDH

3:50-4:20 pm **Demo 1: Imaging in the OR**
NSICU Foyer, Pavilion 3, UCDH

Group 3

2:50-3:20 pm **Demo 3: Imaging in Endovascular Suites**
Entry Foyer, UCDH

3:20-3:50 pm **Demo 1: Imaging in the OR**
NSICU Foyer, Pavilion 3, UCDH

3:50-4:20 pm **Demo 2: Imaging in the ICU**
NSICU Foyer, Pavilion 3, UCDH

All Participants

4:20–4:30 pm **Change from Scrub Suits**
Main OR Locker Rooms, Pavilion 3, UCDH

4:30-5:00 pm **NCIBT's Future Home - Aggie Square walking tour**

5:00-7:45 pm **Free Time in Old Sacramento**

7:45-8:00 pm **Meet at Rocky Mountain Chocolate Factory**
1039 2nd St, Sacramento, CA 95814

8:00-8:30 pm **Travel back to Davis**

Friday, July 21st

Genome & Biomedical Sciences Facility Room 1005
451 Health Sciences Drive, Davis, CA 95616

8:00-8:30 am **Check-in & Breakfast**

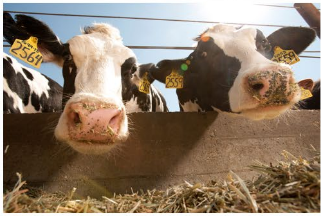
8:30-9:30 am	**Introduction to Artificial Intelligence**
9:30-10:00 am	**Intraoperative Pathology Guidance for Improved Surgical Outcomes**
10:00-10:30 am	**Biomedical Applications for Image Segmentation**
10:30-11:00 am	**Break**

Artificial Intelligence Lab I

11:00-12:30 pm	**iFIlm Hands-on Analysis -** *AS Computer Rm 1116*
12:30-1:30 pm	**Lunch**

Artificial Intelligence Lab II

1:30-4:00 pm	**Construction of an AI Algorithm -** *AS Computer Rm 1116*
4:00 pm	**Adjourn. Thank you for coming!**



Welcome to UC Davis

UC Davis is the home of the Aggies – go-getters, change makers and problem solvers who make their mark at one of the top public universities in the United States.

Since we first opened in 1908, we've been known for standout academics, sustainability and Aggie Pride as well as valuing the Northern California lifestyle. These themes are woven into our 100-plus-year history and our reputation for solving problems related to food, health, the environment and society.

Our 5,300-acre campus borders the city of Davis, a vibrant college town of about 68,000 people living in Yolo County. The state capital is 20 minutes away, and world-class destinations such as the San Francisco Bay Area, Lake Tahoe and the Napa Valley are within a two-hour drive.

College of Engineering

The UC Davis College of Engineering creates a sustainable world through socially responsible engineering. By connecting people and technology, we solve the world's most pressing problems and create the next generation of engineering leaders and entrepreneurs. Our faculty, students, staff and partners collaborate to design a better tomorrow and make a positive difference in the world. It's in everything we do.

Taking our college to the next level means amplifying our strengths to become outstanding leaders in the engineering challenges we address, the education we provide and the community we create.

Today's world demands next-level engineering solutions for our most challenging problems, from climate change to pandemic response. The UC Davis College of Engineering is already making great contributions in each of our departments and our interdisciplinary efforts.

Next Level means advancing beyond where we already excel to focusing our resources and collaborations on bold new solutions to society's most complex problems. It means preparing and inspiring the next generation of engineers to be agile thinkers who carry with them the commitment to engineer a better future. And it means doing so in a diverse, harmonious community.

Health Campus & Medical Center

UC Davis Medical Center serves a 65,000-square-mile area that includes 33 counties and 6 million residents across Northern and Central California. The 646-bed acute-care teaching hospital maintains an annual budget of roughly $1.7 billion.

UC Davis typically admits approximately 30,000 patients per year and handles more than 900,000 visits. The medical center's emergency room sees more than 200 patients per day on average.

In its 2022-23 survey, U.S. News & World Report ranked UC Davis Medical Center as one of the nation's best hospitals in nine adult medical specialties, including cancer; cardiology & heart surgery; diabetes & endocrinology; ear, nose and throat; geriatrics; neurology & neurosurgery; obstetrics & gynecology; orthopedics; and pulmonology & lung surgery. We also ranked as high-performing in gastroenterology & GI surgery and in urology.

We were recognized as the No. 1 hospital in the Sacramento area, and among the top 10 in California.

UC Davis Medical Center has also earned the nation's highest form of recognition for nursing excellence: Magnet® recognition from the American Nurses Credentialing Center. Less than 10 percent of U.S. hospitals typically achieve this designation from the world's largest and most prominent nurse credentialing organization – and as of the time of this writing, UC Davis is the only hospital in Sacramento to carry it.

Host Bios

Griffith Harsh MD, MBA

Dr. Harsh has extensive experience leading national neurosurgical organizations. He was a member of the ACGME Residency Review Committee for Neurosurgery for seven years, the last two of which he was Chair. He has been President of the American Academy of Neurological Surgery and the Neurosurgical Society of America, Vice President of the Society of Neurological Surgeons, and Chairman of the Neurosurgery Research and Education Foundation of the American Association of Neurological Surgeons. He currently serves as a distinguished Scholar of the American Board of Neurological Surgery. Dr. Harsh has also been an effective fund raiser from grateful patients, colleagues, and industry in support of the institutions and organizations with which he has been affiliated.

Randy Carney PhD

Randy Carney is an Associate Professor of Biomedical Engineering at the University of California, Davis. He received his B.S. in Chemistry in 2008 from University of Arkansas. His M.S. at Massachusetts Institute of Technology (2010) and PhD from MIT/EPFL (2013) focused on the impact of nanoscale surface structure in the organic ligand coating of metal nanoparticles on cell penetration. He continued his studies as a postdoctoral fellow at UC Davis in the fields of photonics characterization of soft nanomaterials, including exosomes and related extracellular vesicles (EVs). His group engineers platforms to examine the use of EVs as next-generation cancer biomarkers and therapeutics, particularly using Raman spectroscopy and SERS. He is the co-lead of the training and dissemination (TTD) arm of the P41 NCIBT center.

Laura Marcu PhD

Dr. Laura Marcu is Professor of Biomedical Engineering and Neurological Surgery at the University of California at Davis. She received her Ph.D. in biomedical engineering from the University of Southern California, Los Angeles. Her research interest is in the area of biomedical optics, with a particular focus on research for the development of optical techniques for tissue diagnostics including applications in oncology, interventional cardiology, and tissue engineering. Since 2007 she has served as co-leader of the Comprehensive Cancer Center - Biomedical Technology Program, at the UC Davis Medical Center. Currently, she serves as a member of the Editorial Board for the Journal of Biophotonics and the Translational Biophotonics, and was the Associate Editor for Biomedical Optics Express. She is elected Fellow of AAAS, AIMBE, BMES, OSA, SPIE, and NAI.

Keynote Speakers Bios

Baowei Fei, PhD

Baowei Fei is a Professor of Bioengineering and Cecil H. and Ida Green Chair in Systems Biology Science at the University of Texas at Dallas. He is also a Professor of Radiology at the University of Texas Southwestern Medical Center. He is Director of the Quantitative Bioimaging Laboratory (www.fei-lab.org) and Director of the Center for Imaging and Surgical Innovation (CISI imaging.utdallas.edu). Dr. Fei's research interests include medical hyperspectral imaging, image-guided surgery, artificial intelligence, and augmented reality for medical applications. He received his master's and PhD degrees from Case Western Reserve University in Cleveland, Ohio, USA. He was recognized as a Distinguished Investigator by the Academy for Radiology & Biomedical Imaging Research and as a Distinguished Scholar by the Georgia Cancer Coalition and the Governor of Georgia. He serves as Conference Chair for the International Conference of SPIE Medical Imaging – Image-Guided Procedures, Robotics Interventions, and Modeling from 2017-2020. He served as the Chair for multiple study section panels at the National Institutes of Health (NIH). He served as an Associate Editor for Medical Physics, an Editorial Board Member for the Journal of Biomedical Optics and other five journals in the field of biomedical imaging. He published more than 200 referred research articles. Dr. Fei is a Fellow of SPIE and AIMBE. Cecil H. and Ida Green Chair in Systems Biology Science Director, Center for Imaging and Surgical Innovation (CISI); Professor of Bioengineering, University of Texas at Dallas; Professor of Radiology, UT Southwestern Medical Center

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Robert Henderson, PhD

Robert K. Henderson is a Professor of Electronic Imaging in the School of Engineering at the University of Edinburgh. He obtained his PhD in 1990 from the University of Glasgow. From 1991, he was a research engineer at the Swiss Centre for Microelectronics, Neuchatel, Switzerland. In 1996, he was appointed senior VLSI engineer at VLSI Vision Ltd, Edinburgh, UK where he worked on the world's first single chip video camera. From 2000, as principal VLSI engineer in STMicroelectronics Imaging Division he developed image sensors for mobile phone applications. He joined University of Edinburgh in 2005, designing the first SPAD image sensors in nanometer CMOS technologies in the MegaFrame and SPADnet EU projects. This research activity led to the first volume SPAD time-of-flight products in 2013 in the form of STMicroelectronics FlightSense series, which perform an autofocus-assist function in more than 150 different smartphone models, recently passing the 1 billion-module milestone. He benefits from a long-term research partnership with STMicroelectronics in which he explores medical, scientific and high speed imaging applications of SPAD technology. In 2014, he was awarded a prestigious ERC advanced fellowship. He is an advisor to Sense Photonics and a Fellow of the IEEE and the Royal Society of Edinburgh.

Aydogan Ozcan, PhD

Dr. Aydogan Ozcan is the Chancellor's Professor and the Volgenau Chair for Engineering Innovation at UCLA and an HHMI Professor with the Howard Hughes Medical Institute. He is also the Associate Director of the California NanoSystems Institute. Dr. Ozcan is elected Fellow of the National Academy of Inventors (NAI) and holds >60 issued/granted patents in microscopy, holography, computational imaging, sensing, mobile diagnostics, nonlinear optics and fiber-optics, and is also the author of one book and the co-author of >1000 peer-reviewed publications in leading scientific journals/conferences. Dr. Ozcan received major awards, including the Presidential Early Career Award for Scientists and Engineers (PECASE), International Commission for Optics ICO Prize, Dennis Gabor Award (SPIE), Joseph Fraunhofer Award & Robert M. Burley Prize (Optica), SPIE Biophotonics Technology Innovator Award, Rahmi Koc Science Medal, SPIE Early Career Achievement Award, Army Young Investigator Award, NSF CAREER Award, NIH Director's New Innovator Award, Navy Young Investigator Award, IEEE Photonics Society Young Investigator Award and Distinguished Lecturer Award, National Geographic Emerging Explorer Award, National Academy of Engineering The Grainger Foundation Frontiers of Engineering Award and MIT's TR35 Award for his seminal contributions to computational imaging, sensing and diagnostics. Dr. Ozcan is elected Fellow of Optica, AAAS, SPIE, IEEE, AIMBE, RSC, APS and the Guggenheim Foundation, and is a Lifetime Fellow Member of Optica, NAI, AAAS, and SPIE. Dr. Ozcan is also listed as a Highly Cited Researcher by Web of Science, Clarivate.

Arjun Yodh, PhD

Arjun G. Yodh is the James M. Skinner Professor of Science and Chair of the Department of Physics and Astronomy at the University of Pennsylvania. He was recently Director (2009-2020) of Penn's Materials Science and Engineering Center (NSF-MRSEC). Areas of Yodh's ongoing research include: the physics of soft materials such as colloids and liquid crystals, and biophotonics, especially functional imaging and monitoring of living tissues with diffuse light. Most of his experiments involve optics in one way or another, including diffuse optics and spectroscopy, optical microscopy and micromanipulation, nonlinear optics, and light scattering. He was awarded the 2021 Feld Biophotonics Prize of the Optical Society of America (now Optica). In addition to mentoring more than one hundred PhD students and post-doctoral associates, Yodh has made significant contributions to education, outreach and diversity at the University of Pennsylvania broadly defined, for example leading partnerships with the University of Puerto Rico and research experience programs for undergraduates and high school students/teachers. Yodh graduated from Cornell University (1981) with a B.Sc. in Applied & Engineering Physics. He obtained his Ph.D. from Harvard (1986) and then spent two years at AT&T Bell Laboratories as a post-doc. Yodh joined the faculty at Penn in 1988, where he has remained for his entire career.

Invited Speakers & Lecturers Bios

Alba Alfonso Garcia, PhD

Alba's background is in optical physics and biophotonics imaging technologies. During her training, Alba developed protocols to study lipid-related diseases with label-free nonlinear microscopy techniques such as coherent Raman scattering and two-photon fluorescence lifetime imaging microscopy. With the aim of bridging the gap between the development of imaging technologies and biomedical applications, her research now focuses on the clinical translation of label-free fluorescence lifetime imaging for neurosurgery and gastrointestinal disease.

Marco Arrigoni, PhD

Marco Arrigoni received his MSEE from Politecnico di Milano in 1984 where he specialized in optical engineering and applications to studies of biologically relevant molecules. He has been director of strategic marketing for the scientific market segment of Coherent Inc. since 2007. His 35-year tenure at Coherent includes various position in R&D, international sales, and business unit management, in the US, Europe and Japan, where he lived for two years. Prior to joining at Coherent, he worked for Italian company FIAR where, in 1987, he designed diode-pumped lasers at the very early stage of this technology.

Wesley Baker, PhD

Wesley Baker is an assistant professor in the division of neurology at the Children's Hospital of Philadelphia and Perelman School of Medicine at the University of Pennsylvania. He received his PhD in physics from the University of Pennsylvania in May, 2015. He is broadly interested in the translation of diffuse optics technologies, as well as using optical techniques to study the interplay between the delivery of critical care and the patient's long-term brain health. A recent focus of his research is the use of diffuse optics to non-invasively assess intracranial pressure.

Andrew Birkeland, MD

Dr. Birkeland's research focus is translating novel clinical and basic research findings directly to patient care. To this end, he utilizes next generation sequencing, immune profiling, biomarker identification, and animal models to understand the causes of and treatments for head and neck cancers. His overarching aim is to advance precision medicine: providing personalized, optimized treatments for each head and neck cancer patients.

Orin Bloch, MD

Dr. Bloch specializes in neurosurgical oncology and is internationally recognized for the management of patients with brain tumors. His clinical practice is focused on innovative treatments for benign and malignant tumors of the brain and skull base. His surgical expertise Dr. Bloch's research is focused on innovative new medical and surgical therapies for the treatment of primary and metastatic cancer of the brain. His laboratory studies mechanisms of immune resistance in patients with cancer to identify new targets to enhance brain tumor immunotherapy. In the operating room, his team is developing new technologies for minimally invasive tumor detection and treatment utilizing fluorescence microscopy and laser ablation. This includes awake craniotomies for eloquent tumors, minimally invasive brain surgery, stereotactic laser ablation for tumors, and stereotactic radiosurgery. He directs the multi-disciplinary brain tumor program at UC Davis and is the leader of the neuro-oncology disease team at the UC Davis Comprehensive Cancer Center.

Julien Bec, PhD

After an early career as an R&D engineer in the automotive industry, Julien Bec joined the UC Davis Biomedical Engineering Department working on the design, fabrication, and evaluation of biomedical imaging systems in the nuclear and optical imaging fields. His current activity is focused on the development and clinical validation of fluorescence lifetime instrumentation for interventional cardiology and surgical guidance of cancer resection. As such, he is supervising hardware and software developments, clinical study design, development of data analysis methods, and compliance activities.

Kay Behan, RN

Katjana Ehrlich, PhD

Coming from a background in optical physics, working with optical fibres for telescope integration, Katjana explored the use of time-resolved photon detection for applications in lung disease diagnostics, mainly developing fibre-based sensing platforms for Raman and fluorescence spectroscopy in her PhD. Afterwards, she worked in medical device design and integration developing fibre-optic imaging and sensing platform combining modalities like fluorescence lifetime spectroscopy, Raman spectroscopy, OCT and optical laser ablation. Her current research interest include clinical translation of fluorescence lifetime imaging for Head and Neck surgery applications.

Kevin Floyd, RN

Soheil Ghiasi, PhD

I am interested in design methodologies for embedded and cyber-physical systems (CPS). In my research, I aim to build systems that can monitor, predict and influence application-specific processes, including those in the physical world and/or involving humans. More specifically, my research work deals with system-level modeling, analysis, synthesis and optimization of embedded systems, programmable execution platforms (e.g., processors, DSPs, GPUs and FPGAs) and tools for automating the design process. The area focuses on system-level and human-integration challenges, and offers an interesting blend of theory and practice: real-world applications give rise to research problems, for which solutions are developed using a combination of analytical and experimental (data-driven) techniques.

Our team is always on the lookout for emerging applications of societal significance, which can benefit from advances in the technology. While the specific application focus may change from time to time, we are presently focused on human health and wellness as the target domain. In particular, we are currently working on transabdominal fetal oximetry, wearable bladder volume sensing, data analytics & machine intelligence for health.

Saif Islam, PhD

M. Saif Islam is a Professor of Electrical and Computer Engineering at UC Davis and serves as the director of CITRIS at UC Davis. He obtained his B.Sc. degree from Middle East Technical University, Ankara, M.S. degree from Bilkent University, and Ph.D. degree in Electrical Engineering from UCLA in 2001. With over 300 scientific publications and 42 patents, his research focuses on semiconductor ultrafast optoelectronics, nanoscale transistors, nanosensors for AI-enabled imaging, and wide bandgap semiconductor materials and devices for harsh environment applications. He has organized 35 conferences and is a fellow of AAAS, Optica, SPIE, IEEE, and the National Academy of Inventors.

Farouc Jaffer, PhD

Dr. Jaffer was a research fellow under the supervision of Dr. Manning from 1998-2001. He subsequently completed a fellowship in cardiovascular medicine and interventional cardiology at Massachusetts General Hospital, and joined the Cardiology Division as faculty in 2003. Dr. Jaffer is currently an Associate Professor of Medicine at Harvard Medical School and an Attending Interventional Cardiologist at Massachusetts General Hospital. He is also Director of Coronary Intervention and Director of the Chronic Total Occlusion (CTO) PCI Program at MGH. His NIH-funded laboratory develops novel molecular imaging approaches to image high-risk plaques and blood clots to better prevent heart attacks, strokes, and venous blood clots.

Richard Levenson, PhD

Richard Levenson, MD, FCAP, is Professor and Vice Chair for Strategic Technologies, Department of Pathology and Laboratory Medicine, UC Davis Health. He received his MD at University of Michigan and pathology training at Washington University, followed by a cancer research fellowship at Univ. of Rochester and faculty positions at Duke and Carnegie Mellon. He then joined Cambridge Research & Instrumentation, Inc., becoming VP of Research before assuming his present position at UC Davis. He helped develop multispectral microscopy and small-animal imaging systems, birefringence microscopy, multiplexed ion-beam imaging (MIBI), and slide-free as well as enhanced-content microscopy approaches, and is an inventor on some 15 patents. He is section editor for Archives of Pathology and is on the editorial board of Lab. Invest. and AJP. Regrettably, he also taught pigeons histopathology and radiology. He is a recipient of the 2018 UC Davis Chancellor's Innovator of the Year award and is a Fellow of SPIE. Dr. Levenson is a board-certified anatomic pathologist, and vice-chair for strategic technologies in the Dept. of Pathology and Laboratory Medicine at UC Davis Health. He has extensive experience in optics systems development, having served as VP for

Research at Cambridge Research and Instrumentation (CRI) prior to returning to academia. There he helped develop hardware, software and application areas for an innovative multispectral imaging approach that is still playing a major role in the spatial omics field as part of the offerings of Akoya Biosciences. He also helped with the original development of MIBI (multiplexed ion-based imaging), a leader in high-complexity molecular spatial profiling, and just graduated his (first-ever) PhD student (age 19!) who focused on implementing cycle-dependent generative adversarial network mode conversion, not only for FIBI, but also for qOBM (quantitative oblique back-illumination microscopy) in collaboration with Prof. Francisco Robles at Georgia Tech. He is a co-inventor of the FIBI technology and co-founder of Histolix, a start-up that will commercialize and thus make available to the general research and clinical community these slide-free methods.

Jennifer Macatangay, RN

Ryan Martin, MD

Dr. Ryan Martin is an Associate Professor of Neurological Surgery and Neurology at UC Davis and serves as the Neurocritical Care Fellowship Director. His clinical interests are related to acute brain injury from a variety of different pathologies. In addition to working in the ICU, he manages an outpatient multidisciplinary traumatic brain injury clinic. His research interests focus on outcomes following TBI.

Jinyi Qi, PhD

Jinyi Qi is a Professor in the Department of Biomedical Engineering at UC Davis. He received the Ph.D. degree in Electrical Engineering from the University of Southern California in 1998 and was elected to the College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE) in 2012 and Fellow of IEEE in 2014. His research focuses on developing advanced signal and image processing techniques for molecular imaging and image guidance.

Jonathan Sorger, PhD

Jonathan Sorger has over 20 years of experience in medical imaging, with a focus on using volumetric imaging as a tool to better understand physiologic processes and medical interventions. After studying bioengineering at the University of California, San Diego, Sorger received his PhD and MBA from Johns Hopkins University, where he used MRI to guide medical interventions related to heart disease. Jonathan then moved to Stanford University, where he assisted in the creation of the Bioengineering Department.

Jeffrey Southard, MD

Dr Southard is an interventional cardiologist at UC Davis. He is the medical director of the cardiac catheterization and electrophysiology labs at Davis and he is the founding director of the transcatheter aortic valve replacement program at UC Davis and Shasta Regional Medical Center in Redding. His research interests include transcatheter therapies for patients with aortic valve disease and assessment of coronary plaque using multi-modality imaging.

Vivek Srinivasan, PhD

Dr. Srinivasan invents new light-based technologies for in vivo imaging and sensing of the brain and eyes. The Srinivasan Group develops and applies these technologies both to understand fundamental disease processes in experimental models and to detect these changes earlier in humans. The group puts theory into action by actively collaborating with clinicians and other scientists to address pressing needs in the diagnosis of disease in the eye (glaucoma, age-related macular degeneration) and brain (Alzheimer's disease, traumatic brain injury).

Bogdan Valcu PhD

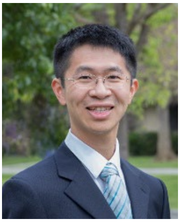
Clinical affairs expert with international management experience in medical devices and software.
Business development visionary with broad experience in implementing technology for multidisciplinary use.
Strategic project leader who can formulate marketing, communication and commercial plans.
Empirical scientist with extensive expertise in various applied physics and medical fields.
Team leader and motivator with proven results and performance at all levels.
Ability to analyze markets and manage products, brands and strategic partnerships on an international scale Strong presentation and public speaking skills in complex subject matter.

Work Experience
BRAINLAB, AG - Medical Devices and Software, Munich, Germany
BRAINLAB, INC - Medical Devices and Software, Chicago, IL
DHHS/NATIONAL INSTITUTES OF HEALTH - Office of Extramural Research, Bethesda, MD
HARVARD SMITHSONIAN - Center for Astrophysics, Cambridge, MA

Yi Xue, PhD

Yi Xue is the Principal Investigator of the Computational Optics for Biomedical Imaging (COBI) lab. She has extensive research experience in the interdisciplinary field of optical instrumentation, computational tools, and neuroengineering. Her lab jointly develops customized optical microscopy and computer algorithms for biomedical imaging to break the physical limits of optical imaging in terms of imaging throughput, resolution, and speed. She is a member of the Program Committee for the SPIE Photonics West Adaptive Optics and Wavefront Control for Biological System IX conference and co-Chair of the Computational Cameras and Displays Workshop at the IEEE Conference on Computer Vision and Pattern Recognition (CVPR). She has been awarded the Weill Neurohub Fellowship, the JenLab Young Investigator Award, and the HHMI Graduate Student Fellowship.

Weijian Yang, PhD



Weijian Yang is an associate professor at the Department of Electrical and Computer Engineering at the University of California, Davis. He received his undergraduate degree from Peking University and a PhD from the University of California, Berkeley, all in Electrical Engineering. After postdoctoral training in neuroscience at Columbia University, Dr. Yang started his own laboratory at UC Davis in late 2017. His current research aims to develop advanced optical methods and neurotechnologies to interrogate and modulate brain activity, with a goal to understand how neural circuits organize and function and how behaviors emerge from neuronal activity. He is a recipient of the Career Awards at the Scientific Interface from Burroughs Wellcome Fund in 2016, the Early Career Award from National Science Foundation in 2019, and the Science and PINS Prize for Neuromodulation (second prize) from American Association for the Advancement of Science in 2021.

Guoqiang Yu, PhD

As Jack and Linda Gill Eminent Professor in Science and Engineering with 25+ years of leading expertise in Biomedical Engineering, Dr. Yu leads a large team of students, postdocs, and research faculty members to develop various innovative diffuse optical imaging technologies for noninvasive quantification of deep tissue blood flow and oxygenation information, with the goal of translating these advanced technologies into healthcare. As the primary inventor, he has pioneered camera-based high-density 3D tomographic techniques for noninvasive hemodynamic imaging of brains, tumors, burns, wounds, and reconstructive tissues (US Patent #9861319, 2016; US Patent Application #63/408,921, 2022), a wearable fiber-free optical sensor for continuous monitoring of cerebral hemodynamics in freely behaving subjects (US Patent #10842422, 2017; US Patent Application #63/143,667, 2021), and a low-cost, wearable, eye-loupe fluorescence imaging device for intraoperative identification of tumor margins to guide resection (US Patent Application #0038339, 2018). Under the support of NIH STTR programs, these innovative techniques are being translated into the clinic for diagnosis and management of traumatic brain injury, stroke, Alzheimer's disease, cancer, reconstructive flap, and peripheral arterial disease. Most importantly, these proprietary techniques provide many advanced features over other competitive technologies, which may lead to lasting impacts in biomedical engineering and medicine. Dr. Yu's research has been continually supported by multiple funding agencies (NIH, NSF, DOD, AHA) with a total amount of >$55 million (2004-2023). In the past five years (2019-2023), Dr. Yu has been awarded >$10 million as the single PI; on average >$2 million annually. In collaboration with industry, Dr. Yu has secured >$5 million for product translation and commercialization. This significant level of support from diverse funding agencies and mechanisms demonstrates the broad appeal and competitiveness of his multidiscipline and translational research program. Dr. Yu has published 110+ peer-reviewed journal papers (citations = 6,865; h-index = 45; i10-index = 75) and contributed 400+ presentations including 50+ invited speeches. His research has been highlighted by many public media including Biomedical Optics Express, Journal of Biomedical Optics, IEEE Transactions on Medical Engineering, Physiological Measurements, Fibromyalgia Network, Medical Physics Web, and Kentucky Engineering Journal. He has also received numerous research awards including Young Investigator Award of DOD (2004), Young Investigator Award of the Society of Vascular Medicine and Biology (twice: 2004 & 2006), University of Kentucky (UK) Black Engineers Notable Research Professor (2012), Global Brain Race Winer for Advance Innovation in Fighting Brain Tumors (2019), Kentucky Innovator Award (2018-2022), UK Office of Technology Commercialization Award (2018-2022), UK College of Engineering Dean's Award for Excellence in Research (twice: 2015 & 2021), and Jack and Linda Gill Science and Engineering Eminent Professorship (2022).

Xiangnan Zhou, PhD

In his current role as a postdoc researcher in Marcu lab, Xiangnan develops novel biomedical imaging technologies such as fluorescence lifetime imaging and optical coherence tomography instrument for clinical oncology and cardiovascular disease. Xiangnan was born in Beijing and holds a B.S. in Physics from Hong Kong Baptist University, a M.Sc. in Photonics from Imperial Collage London, and a Ph.D. in Biomedical Engineering from UC Davis. He is an expert in photonics and a fluent coder and programmer. He is excited about the potential of emerging biomedical imaging technologies and thrilled to apply his expertise in optics and photonics for improving patient care. In his spare time, he likes to work out, play video games and explore the nature with his dog.

Participants Bios

Ahamed, Ahasan

Ahasan Ahamed is a fourth-year graduate student pursuing his Ph.D. degree focusing on hyperspectral imaging enabled by photon-trapping photodetectors and machine learning in the Electrical and Computer Engineering department at the University of California, Davis. He received a M.S. Degree in the Electrical and Computer Engineering from University of California, Davis in 2023. B. S. Degree in Electrical and Electronics Engineering from Bangladesh University of Engineering and Technology in 2018. He is currently working on spectral response engineering of photon-trapping photodiodes paving towards spectrometer-on-a-chip. His research works also include designing, fabricating, and characterizing ultra-fast photodiodes and SPADs for hyperspectral imaging with an emphasis on Fluorescence Lifetime Imaging Microscopy (FLIM) and other biomedical imaging modalities.

Poster Abstract: The wide-ranging applications of hyperspectral imaging in fields such as biomedical imaging, remote sensing, astronomy, agriculture, healthcare, forensics, food quality assessment, environmental monitoring, and cultural heritage preservation. Recent advancement in medical science and research demand small-scale, mobile, ultra-fast spectrometers, but their miniaturization is limited by the need for complex filters and dispersion lenses. However, combining engineered spectral response, advanced signal processing, and deep learning-based image reconstruction enables a promising spectral imaging platform with enhanced performance, accessibility, and usability. We present a spectral response design method using photon-trapping surface textures (PTSTs) that eliminates the need for external diffraction optics, enabling system miniaturization. We additionally demonstrate the fabrication of cost-effective, high-performance silicon photodiodes with unique spectral responses by integrating PTSTs. These CMOS-compatible photodiodes are designed to be ultra-fast and highly sensitive, making them suitable for wideband multi/hyperspectral imaging systems thus enhancing in the emerging biomedical applications such as fluorescence lifetime imaging microscopy (FLIM), pulse-oximetry, etc.

Calvarese, Matteo

Matteo Calvarese received his BSc and MSc degrees in engineering physics from Politecnico di Milano in 2018 and 2020, respectively. After completing his degrees, he actively contributed to research projects and specialized in micro-optics fabrication and integrated microscopy while working as a research fellow at Consiglio Nazionale delle Ricerche. Since September 2021, he has been pursuing a PhD at Leibniz-Institute für Photonische Technologien in Jena, focusing on the integration of multimodal imaging platforms for biomedical applications.'

Rigid endomicroscopic system for cancer diagnosis and tissue removal

Matteo Calvarese, Chenting Lai, Hyeonsoo Bae, Karl, Reichwald, Franziska Hoffmann, Anna Mühlig, Tobias Meyer-Zedler, Bernhard Messerschmidt, Orlando Guntinas-Lichius, Micheal Schmitt, Juergen Popp
First Author email: matteo.calvarese@leibniz-ipht.de

Topic: multimodal nonlinear imaging, endomicroscopy, femtosecond laser ablation, cancer detection

Abstract: One of the biggest challenges in modern medicine is prevention and diagnosis of cancer, as well as effective surgical treatment. However, diagnostic and surgical tools for early detection and minimally invasive treatment are still lacking. Laser-based endoscopy is among the most promising technologies currently being developed to improve cancer diagnostics. Endoscopic probes allow the implementation of non-invasive imaging modalities into a compact platform, they do not require tissue removal from the patient and can be also used for in vivo imaging of non-easily accessible human tissues. The implementation of molecular selective spectroscopic approaches in an endoscope offers the potential to image besides the tissue morphology also its molecular composition. In this work, we combine several nonlinear imaging techniques, as coherent anti-Stokes Raman scattering (CARS), second harmonic generation (SHG) and two-photon excited fluorescence (TPEF) with standard indocyanine green (ICG) fluorescence in a single rigid endomicroscopic system for head and neck cancer diagnosis. Alongside the imaging capability, we integrate the system with a high-power femtosecond laser to implement fs-laser ablation and remove tumorous parts of tissue. A complete endomicroscopic system with large field of view (FOV) of about 650 µm was developed and tested and a high resolution of 1 µm over an effective FOV of 430 µm was achieved. The device was tested on head and neck tissue slices and demonstrated a high signal quality and the possibility of distinguishing the diverse chemical composition of the tissue. Furthermore, it resulted to be robust to the transmission of high energetic ultrashort pulses which are needed for fs-ablation of tissue. Next steps will involve clinical testing of the system on head and neck cancer tissue slices and the comparison with standard histopathology methods (H&E) to validate the diagnosis capability of the device.

Chen, Jiabin

Corbetta, Elena

Elena Corbetta is originally from Milano (Italy), where she received her BSc and MSc in Engineering Physics from Politecnico di Milano. She gained experience in optical microscopy and image processing during her master's thesis and by working as a research fellow after graduation. Elena now resides in Jena (Germany), where she is enrolled as PhD student in the research department of Photonic Data Science at Friedrich Schiller University Jena and Leibniz Institute of Photonic Technology. Her work mainly focuses on the processing and characterization of optical microscopy measurements for biomedical applications.

No-reference method for the characterization of microscopic artifacts validated by informed machine learning. **Authors: Elena Corbetta**[1,2], Thomas Bocklitz[1,2,3]
First Author email: elena.corbetta@uni-jena.de

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2. *Leibniz Institute of Photonic Technology, Member of Leibniz Health Technologies, Member of the Leibniz Centre for Photonics in Infection Research (LPI), Albert-Einstein-Strasse 9, 07745 Jena, Germany.*
3. *Institute of Computer Science, Faculty of Mathematics, Physics & Computer Science, University Bayreuth Universitaetsstraße 30, 95447 Bayreuth, Germany*

Optical microscopy is a powerful and minimally invasive tool for the investigation of samples of biomedical interest. In this context, established processing algorithms are applied to improve the quality of experimental optical images, that are always affected by artifacts generated by the optical system and the sample [1]. Nevertheless, the judgment of the effect of these processing methods is problematic because a lack of no-reference quantitative methods for the evaluation of image quality exists. Standard metrics can provide ambiguous results, with a poor agreement of the metrics with human visual perception. In addition, the ground truth is often needed for comparison [2]. To address this issue, we performed a systematic study for the identification of reliable markers to characterize microscopic artifacts based on the experimental images. The study is performed on a dataset composed of synthetic and semi-synthetic images, generated by simulating basic biological structures and microscopic artifacts. A set of no-reference metrics, such as resolution, contrast, and signal-to-noise ratio, is selected to provide a comprehensive and stable characterization of image features. In addition, we applied Linear Discriminant Analysis (LDA) [3] to the set of quality metrics for the automatic classification of microscopic artifacts. Our approach identifies specific markers for different microscopic artifacts. Moreover, trained LDA models can be assessed and interpreted for a deeper characterization of the quality metrics and the artifacts. Our method can be applied to classify artifacts in raw measurements, but also for the evaluation of processed and corrected images. Future work will include the extension of this method to the automatic selection of the best algorithm in specific processing applications.

[1] Roels, J., et al. (2016). "Image degradation in microscopic images: Avoidance, artifacts, and solutions.", Adv Anat Embryol Cell Biol., 219: 41-67.
[2] Koho, Sami; Fazeli, Elnaz; Eriksson, John E.; Hänninen, Pekka E., 'Image Quality Ranking Section 4.3, p.106-119. Method for Microscopy.', Sci Rep, 2016/6, 28962.
[3] Hastie T., Tibshirani R., Friedman J. (2008), "The Elements of Statistical Learning",

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Dongyu, Liu

I am Dongyu Liu, currently a PostDoc at MIT Schwarzman College of Computing. I am hosted by Dr. Kalyan Veeramachaneni in the Data To AI group within the Laboratory for Information and Decision Systems (LIDS). I received my Ph.D. in Computer Science and Engineering from The Hong Kong University of Science and Technology where I worked with Prof. Huamin Qu.

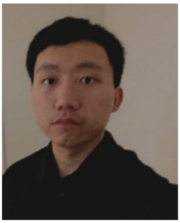
My research focuses on innovating at the intersection of Machine Learning (ML), Visualization (VIS), and Human-Computer Interaction (HCI). I design and develop human-centered AI systems and interactive visual interfaces to promote the interplay between humans, data, and machines. The central theme driving my research is the pursuit of “big data, intelligent algorithms, intuitive interfaces” to bridge data gaps, making the data-to-decision process more efficient, effective, and trustworthy in critical domains including urban sustainability and social good. My ultimate goal is to catalyze solutions to pressing challenges in these areas to enhance both human life and urban environment.

My systems have been released as open-source projects, and have drawn wide attention from open-source communities. Some of my techniques have been adopted for external or internal use by leading companies and nonprofits including Microsoft and Bosch, (satellite communication), (renewable energy), Colorado Department of Human Services, and Children’s Hospital of Zhejiang University School of Medicine. My work is widely covered by a variety of media such as MIT News, Dataconomy, ScienceDaily, InfoQ, and Health IT Analytics. Below you can find some system demos of my work.

Gonaguntla, Sravya

Sravya Gonaguntla is a Biomedical Engineering undergraduate student with a specialization in Medical Devices. As an undergraduate researcher in the Passerini Lab, she focuses on unraveling the origins of atherosclerosis, the inflammation of arteries underlying cardiovascular disease. Through artery-on-a-chip microfluidic tools, she investigates how mechanical cues from blood flow interact with diet and metabolism to modulate endothelial inflammatory responses. This research aims to improve cardiovascular risk prediction and alleviate the burden of human disease.

Guo, Shu



Shu was working on imaging through scattering media in LinOptx as an optical engineer. He worked on specific projects such as objects recovery through fog; speedy light focusing through static diffusers. He is specially familiar with optical setups and algorithms that handle wavefront shaping technologies and scattering corrections.
He is now seeking to improve his skills in research, machine learning, deep learning, optical microscopy, and neuron engineering in the Ph.D. program at UC Davis. His current projects include the development of multiphoton microscopes, lensless imaging, and optogenetics in vivo.

Jeong, Diana

Diana is interested in working on ultrafast detection of ionizing radiation to improve coincidence time resolution of the PET system, using techniques in modern optics.

Kraft, Lisanne

Supports the research at the frontiers of biomedical engineering and medical imaging. Takes responsibility for organizing and administrative tasks. Currently involved in developing and testing fluorescence lifetime imaging techniques. Enjoys hiking and loves dogs.

Liu, Shing-Jiuan

I am a Ph.D. student at the University of California, Davis. My research interests include optical wireless communication systems, machine learning, the Internet of Things (IoT), biomedical measurement, near-infrared spectroscopy, and miniaturized two-photon microscopy for in-vivo bio-sensing, imaging, and modulation.

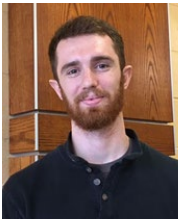
In my Ph.D. research, I focus on developing advanced optical tools for in-vivo bio-sensing, imaging, and modulation. Two optical modalities for two different applications are my ongoing works: time-domain functional near-infrared spectroscopy (fNIRS) for transabdominal fetal oximetry and two-photon miniaturized microscopes which can image and manipulate neuronal activity in freely-behaving mice.

For my previous works (before my Ph.D. study), please see my previous website: https://shingjiuan.weebly.com

My career goal is to be a scientist, who can build an innovative device to launch in the area of smart health as well as improving quality of life. Optical system designing for specific applications is my major research interest. My research is highly interdisciplinary, combining knowledge in biophotonics, integrated optoelectronics, signal processing as well as neuroengineering. I am looking forward to finding opportunities to contribute to various fields such as health care, neuroscience, communication, IoT, etc.

Maddipatla, Reddikumar

Majeski, Joseph



Joseph Majeski received his undergraduate training in Electrical Engineering at Manhattan College in the Bronx, NY. Upon completion of his Bachelor of Science, he moved to Rochester, NY and earned his Ph.D. in Biomedical Engineering under the Supervision of Dr. Regine Choe, focusing on the development of diffuse optical instrumentation. He is currently a postdoctoral fellow at the University of Pennsylvania, working in the laboratory of Dr. Arjun Yodh.

Abstract: Diffuse correlation spectroscopy is a widely used tissue optical monitoring technique that enables recovery of *in vivo* blood flow. It has been applied to studies of cerebral blood flow monitoring of ischemia, monitoring of blood flow in tumors, exercise-induced changes in muscular blood flow, cerebral blood flow, and much more. In recent years, several variants of blood flow monitoring based on fluctuations have been developed that hold potential to enhance sensitivity to deep tissues, increase signal-to-noise ratio, and lower costs due to detectors that are amenable to high density measurement geometries. In this study we employ diffuse correlation spectroscopy, speckle contrast optical spectroscopy, and interferometric diffusing wave spectroscopy concurrently to measure blood flow during cuff-induced ischemia and hyperemia, as well as in tissue-mimicking optical flow phantoms. The experiments enable us to critically examine the agreement across methodologies per recovered blood flow index, measurement signal-to-noise ratio, recovered blood flow pulsatility, and other metrics. The advantages and disadvantages gleaned from the results of this study will aid researchers in their selection of an optical blood flow monitoring technique for particular applications.

Mattison, Ben

Mazumder, Dibbyan

McAdoo, Ashtyn

Meleppat, Ratheesh

Dr. Ratheesh K. Meleppat is a Research Scientist at Dept. Of Ophthalmology & Vision Science University of California Davis (UC Davis), USA. Dr. Meleppat received his Ph.D. in Biomedical Engineering from Nanyang Technological University (NTU) Singapore. He completed his bachelor's degree (B. Tech) in Electronics & Communication Engineering from University of Calicut, India and master's degree (MTech) in Optoelectronics & Optical communication from the University of Kerala, India. His research investigates the novel cutting-edge biomedical instrumentation and image processing schemes for the advanced ophthalmic imaging and applications. The primary focus on the instrumentation research is the development and use of imaging technologies such as Optical Coherence Tomography (OCT), OCT Angiography (OCTA), Scanning Laser Ophthalmoscope (SLO), Multispectral Fluorescent microscopy, Adaptive Optics (AO), and their combinations to study the retina noninvasively at the cellular level. Research focuses on the implementation of novel algorithms based on graph theory, ML/AI for the analysis of in vivo and ex vivo retinal data acquired using different imaging modalities. Research also investigates these technologies to determine their usefulness in retinal diagnostics, the study of disease processes, and the testing of new drugs and therapies in pre-clinical animal (mouse) models. He serves as an active member of the Society of Photo-Optical Instrumentation Engineers (SPIE), The Association for Research in Vision and Ophthalmology (ARVO),Institute of Electrical and Electronics Engineers (IEEE) and IEEE Photonics Society and the Indian Society for Technical Education (ISTE).

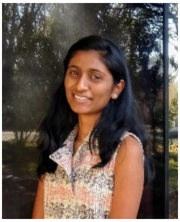
Abstract: Melanosomes and lipofuscin are the two in the retinal pigment epithelium (RPE) cells serve as vital biomarkers of aging and various retinal diseases. Therefore, investigation into the changes in RPE pigments with age and disease has a great significance in clinical ophthalmology and vision research. Herein, we demonstrate the capability of a multicolor confocal fluorescence imaging for in situ visualization and quantification of RPE cells and the pigmented granules from the live RPE tissues. A sub-cellular resolution live imaging of the flat-mounted RPE tissues was performed with a multicolor confocal imaging system integrated with a Live Cell Stage Top Incubation System. Three-dimensional confocal z-stacks of RPE cells and autofluorescence (AF) spectra were acquired with four different excitation wavelengths (405 nm, 488 nm, 561 nm and 641 nm). The 3-dimensional multicolor confocal data provided a detailed visualization of the RPE cell mosaic, including its melanosomes and lipofuscin granules and their autofluorescence emission properties. The high-resolution confocal image stack of RPE tissues of mouse model of stargardt disease model (Abca4-/-) and agouti wild-type (WT) control of different age groups were also

acquired. The confocal images acquired with and without the emission filters allowed the visualization and quantification of both pigments and their AF spectra over age. Both qualitative and quantitative analysis revealed that an increased number of lipofuscin and decreased number of melanosomes with age is common in both mouse strain, albeit, more rapid in Abca4-/-. The AF emission spectra was increased over the age in both strains and were linked directly with the concentration of lipofuscin pigments in the individual strains.

Mingjun, Zhao

Nabina, Taifa Azim

Noble Anbunesan, Silvia



Currently working on the clinical application of FLIm in studying brain cancer and metabolism; Love to read, write and learn video editing.

Park, David

David Park, MD, PhD, is a neurosurgeon who graduated medical school from the Catholic University of Korea in Seoul, South Korea. He then completed his internship and residency training in the Department of Neurosurgery, Seoul St. Mary's Hospital. He became a board-certified neurosurgeon in South Korea in 2014 and then completed his 2-year fellowship in the same hospital in the fields of brain tumor surgery and skull base surgery. During his residency training, he attended graduate school while practicing neurosurgery as a trainee. He successfully defended his Ph.D. thesis titled "Combination therapy for gliomas using temozolomide and interferon-beta secreting human bone marrow-derived mesenchymal stem cells." in 2015.

After completing his fellowship in South Korea, Dr. Park moved to Singapore in 2016. He worked as a clinical fellow (clinical associate) for one year at the National Neuroscience Institute, focusing on Neurosurgical Oncology and Skull base surgery.

In 2017, Dr. Park joined Dr. Christian Badr's lab at the Massachusetts General Hospital, Harvard Medical School, as a postdoctoral research fellow to perform translational research on glioblastoma to complement his clinical expertise. His research focused on the role of fatty acids and lipid metabolism in glioblastoma.
During this period, in addition to his work in the lab, Dr. Park launched his own start-up business based on his invention. He came up with the idea of an intraoperative diagnostic tool for tumor detection during glioma surgery, collaborated with bioengineers at M.I.T. to develop a prototype, and received seed funding from the MIT Sandbox Innovation Fund. As an MIT Sandbox program alumnus, he continues to work on this project.

In 2020, Dr. Park joined the North Shore University Hospital, Zucker School of Medicine at Hofstra/Northwell in Long Island, New York, as a Neurosurgical Oncology and Radiosurgery Fellow (Teaching Associate). During this one-year fellowship, he worked with Dr. Michael Schulder focusing on brain tumor surgery including laser interstitial thermal therapy (LITT) and stereotactic radiosurgery (SRS).
From July 2021 to June 2022, Dr. Park completed a Neurosurgical Oncology and Radiosurgery Fellowship at the Cleveland Clinic in Cleveland. He devoted his efforts to minimally invasive neurosurgical techniques such as LITT and Gamma Knife SRS, as well as awake brain tumor surgery under the guidance of Drs. Gene Barnett, Lilyana Angelov, and Ali Mohammadi.

In July 2022, Dr. Park joined the Department of Neurosurgery at Stanford University as a Clinical Instructor. Dr. Park now works with Drs. Steven D. Chang and Antonio Meola in the field of Cyberknife stereotactic radiosurgery and Neurosurgical oncology.

Pillar, Nir

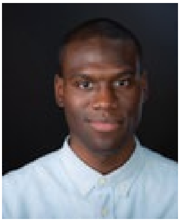
I am a certified surgical pathologist with a Ph.D. in molecular biology, with a strong background in both experimental pathology and epigenetics. In recent years, my research interests have shifted towards digital and computational pathology. Currently, I am a postdoctoral scholar in Prof. Aydogan Ozcan group at UCLA. My research is centered around the development of virtual histology, where I leverage cutting-edge technologies and deep learning to drive advancements in histological imaging.

Abstract: Identification of Resection Margins Using Virtual Inking Background-surgical margins assessment play a crucial role in predicting the outcome of oncological operations, as they provide valuable information about the extent of tumor removal and the likelihood of disease recurrence. However, in certain cases, such as small resections, the task of accurately identifying surgical margins can become particularly difficult.
Aim-to createa virtualinking, that will label the surgical margin area based on tissue autofluorescence changes that occur after cauterization. **Methods-**train a deep learning based virtual staining that can be used for detection of cautery effect followed by labeling the cauterized tissue in unstained tissue sections. Current training set-pig H&N resection with cautery effect (Lagratoet al, 2018) Additional training/testing-human H&N samples (prospectively recruitment in progress).

Qi, Brandon

Rodewald, Marko

Schoop, Ryan

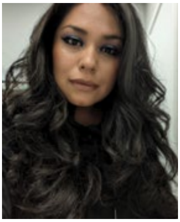


I started out in my bachelor as a pure mathematician in algebra and geometry with most of my experience being in low dimensional (2D and 3D) geometric topology. With a desire to use my theoretical knowledge in direct practical environments I took the opportunity to advance into the field of medical imaging. Due to my technical background it is the computer vision subjects such as: image processing, image and data analysis, and computer aided diagnosis which I've taken most research interest in.

Abstract: Robot-assisted laparoscopic prostatectomy (RARP) is one of the most widely used treatments for localized prostate cancer. The main aim is to ensure complete resection of the tumor, whilst minimizing damage to other anatomical structures to ensure good functional outcome. However, incomplete resection is observed in about 38% of the patients that undergo RARP, which often implies additional radiotherapy for the patient. The vision of a solution to this problem is to equip the surgeon with a tool that provides real-time surgical guidance to detect tumor tissue using Fluorescent Lifetime Imaging (FLIM). Currently available is a collection of FLIM data measurements of 45 prostate specimens. This data is obtained by doing ex-vivo FLIM measurements of the prostate directly after RARP surgery excision. The key to this line of research is to figure out which FLIM characteristics correspond to tumor tissue and not to healthy tissue. In order to analyze the optical measurements, they have to be correlated to hematoxylin-eosin (HE) images, which are considered the golden standard in establishing tissue type information. However, the HE images are deformed during histopathological processing which makes it difficult to register them to camera images containing the optical measurement locations. To account for these deformations an unsupervised deep neural network was developed to do such an image registration. With the correlation of the optical measurements to tissue type, it is possible to analyze the FLIM data with the goal of differentiating tumor tissue from healthy tissue. In analyzing the FLIM data the current focus is on developing a characterization method using the novel fit-free method of phasor analysis for FLIM. Phasors are a lot faster to obtain than conventional deconvolution methods of FLIM analysis, which is an important benefit for real time application. Furthermore, phasors are a lot more intuitive and interpretable than the conventional deconvolution methods, making it worthwhile to investigate.

Sun, Yifei

Villarreal, Paula



Paula Villarreal is a research associate and graduate student in the Vargas lab at the University of Texas Medical Branch (UTMB). She received her BS degree in biological sciences from the University of Texas at El Paso and is pursuing a Ph.D. degree in clinical sciences. Her research interests include the application of in vivo imaging techniques to assess metabolic and molecular morphological changes and aiding in the development of advanced optical techniques for translational research.

Abstract: Depth-resolved label-free optical imaging by the method of multiphoton autofluorescence microscopy (MPAM) may offer new ways to examine cellular and extracellular atypia associated with epithelial squamous cell carcinoma (SCC). MPAM was evaluated for its ability to identify cellular and microstructural atypia in head and neck tissues from resected discarded tumor tissue. Three-dimensional image volumes were obtained from tissues from the floor of the mouth, tongue, and larynx, and were then processed for histology. MPAM micrographs were evaluated for qualitative metrics of cell atypia and quantitative measures associated with nuclear pleomorphism. Statistical analyses correlated MPAM endpoints with histological grade from each imaged site. Cellular overcrowding, discohesion, anisonucleosis, and multinucleated cells, as observed through MPAM, were found to be statistically associated with dysplasia and SCC grading, but not in histologically benign regions. A quantitative measure of the coefficient of variance in nuclear size in SCC and dysplasia was statistically elevated above histologically benign regions. MPAM also allowed for the identification of cellular heterogeneity across transitional areas and other features, such as inflammatory infiltrates. In the future, MPAM could be evaluated for the non-invasive detection of neoplasia, possibly as an adjunct to traditional conventional examination and biopsy.

Zhang, Zixiao

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Venue Information

Genome & Biomedical Sciences Facility
451 Health Sciences Drive
Auditorium Room 1005
Davis, CA 95616
Map

UC Davis Health Campus
The UCD Pavilion
1419 H Street
Sacramento, CA 95814
Map

Aggie Square
Stockton Blvd & Second Ave
Sacramento, CA 95817
More info

Old Sacramento Waterfront
Things to do in Old Sac

Code of Conduct

Harassment, bullying, and retaliation create divisive and exclusionary environments. The science and engineering ecosystem thrives on a diversity of ideas, perspectives, and talents, so therefore must be free of these types of behaviors. Providing a professional and safe conference environment, as well as raising awareness of harassing behaviors, are priorities for Optica and SPIE. Both organizations are determined to eliminate harassment in any form at their respective events.

Harassment

Consists of unwanted, unwelcomed, and uninvited behavior that demeans, threatens, or offends another.

Report Harassment or Unethical Behavior

- Laura Marcu: lmarcu@ucdavis.edu
- Griff Harsh: gharsh@ucdavis.edu
- Randy Carney: rcarney@ucdavis.edu
- Lisa Hayes: lisahayes@ucdavis.edu

Parking & Transportation

Parking

There are parking lots to the west and east of the GBSF building. Information about campus parking is available from the Transportation And Parking Services (TAPS) website, or call 530-752-TAPS (8277).

Please note that a valid UC Davis permit is required to park on campus; at this time, daily parking types and rates for students, employees, and visitors are available. You can purchase a parking permit online from TAPS or via the ParkMobile app.

Visitor permits may be purchased for $12.00 per day from permit dispensing machines or by using the ParkMobile app. There is also limited metered parking directly in from of the GBSF building. More information about visitor parking at UC Davis can be found online at TAPS.

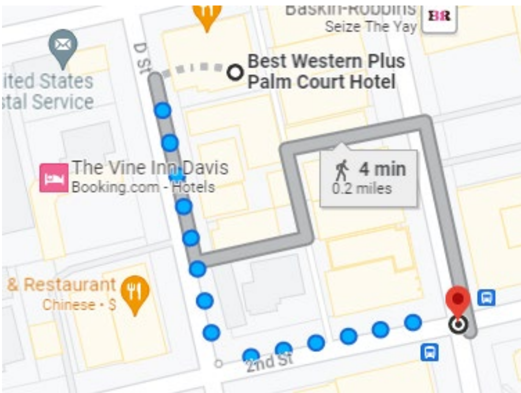
Traveling beyond Davis

Unitrans

Unitrans is operated in partnership by the Associated Students of UC Davis (ASUCD) and the City of Davis, and provides public transportation service to the entire city with over 40 buses on 15 routes, carrying over 3 million passengers a year. For routes, fares, and schedules, visit the Unitrans website, or call 752-BUSS (2877).

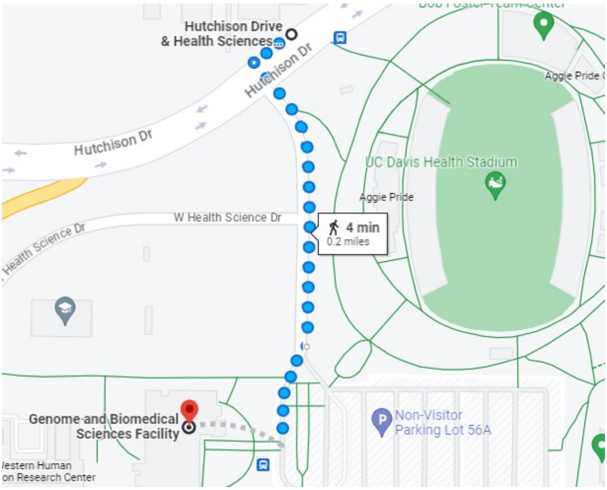
Transportation instructions: Bus runs every hour. Please make sure to arrive at the bus stop on time.

- Board A line bus at 2nd and E street at 7:30am (ask for transfer ticket)
- Get off at Silo Terminal (last stop) 7:50am



- Board V line at Silo Terminal at 7:55am
- Get off Hutchison/Health Science at 7:58am

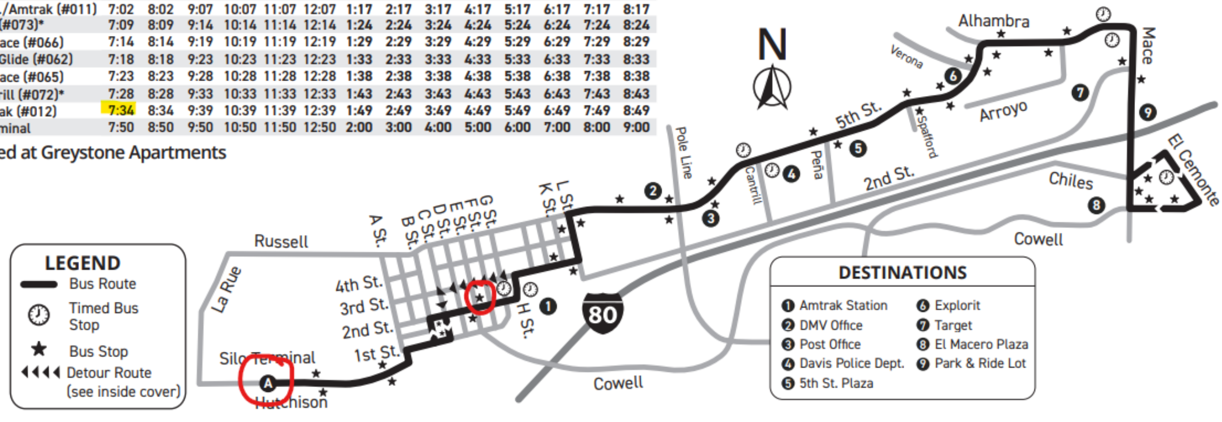
- Walk towards Health Sci drive.



Summer Service (No Break Service)

Depart Silo Terminal (#258)	6:55	7:55	9:00	10:00	11:00	12:00	1:10	2:10	3:10	4:10	5:10	6:10	7:10	8:10
H St. @ 2nd St./Amtrak (#011)	7:02	8:02	9:07	10:07	11:07	12:07	1:17	2:17	3:17	4:17	5:17	6:17	7:17	8:17
5th @ Cantrill (#073)*	7:09	8:09	9:14	10:14	11:14	12:14	1:24	2:24	3:24	4:24	5:24	6:24	7:24	8:24
Alhambra @ Mace (#066)	7:14	8:14	9:19	10:19	11:19	12:19	1:29	2:29	3:29	4:29	5:29	6:29	7:29	8:29
El Cemonte @ Glide (#062)	7:18	8:18	9:23	10:23	11:23	12:23	1:33	2:33	3:33	4:33	5:33	6:33	7:33	8:33
Alhambra @ Mace (#065)	7:23	8:23	9:28	10:28	11:28	12:28	1:38	2:38	3:38	4:38	5:38	6:38	7:38	8:38
5th St. @ Cantrill (#072)*	7:28	8:28	9:33	10:33	11:33	12:33	1:43	2:43	3:43	4:43	5:43	6:43	7:43	8:43
H @ 2nd/Amtrak (#012)	7:34	8:34	9:39	10:39	11:39	12:39	1:49	2:49	3:49	4:49	5:49	6:49	7:49	8:49
Arrive Silo Terminal	7:50	8:50	9:50	10:50	11:50	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	

*Stop located at Greystone Apartments

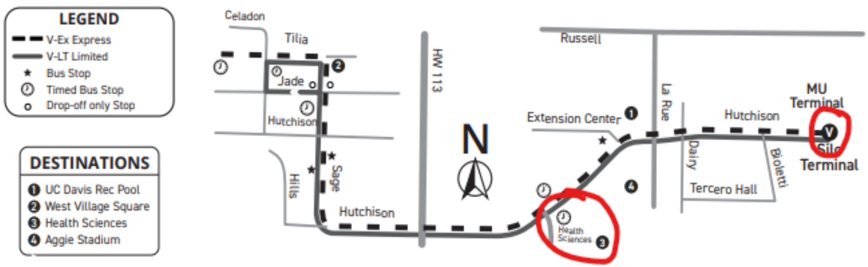


A Line Amtrak / 5th Street / Alhambra Silo Terminal

Summer

Depart Silo (#256)	6:55	7:25	7:55	8:25	9:00	9:30	10:00	10:30	11:00	11:30	12:00	12:40	1:10	1:40	2:10	2:40	3:10	3:40	4:10	4:40	5:10	5:40	6:10	6:40	7:10	7:40	8:10	*After 8:10pm, see U line schedule.*
Hutchison @ Health Sci. (#361)	6:58	7:28	7:58	8:28	9:03	9:33	10:03	10:33	11:03	11:33	12:03	12:43	1:13	1:43	2:13	2:43	3:13	3:43	4:13	4:43	5:13	5:43	6:13	6:43	7:13	7:43	8:13	
The Green/2080 Tilia (#305)	7:02	7:32	8:02	8:32	9:07	9:37	10:07	10:37	11:07	11:37	12:07	12:47	1:17	1:47	2:17	2:47	3:17	3:47	4:17	4:47	5:17	5:47	6:17	6:47	7:17	7:47	8:17	
West Village Sq. (SB) (#289)	7:05	7:35	8:05	8:35	9:10	9:40	10:10	10:40	11:10	11:40	12:10	12:50	1:20	1:50	2:20	2:50	3:20	3:50	4:20	4:50	5:20	5:50	6:20	6:50	7:20	7:50	8:20	
Hutchison @ Health Sci. (#240)	7:08	7:38	8:08	8:38	9:13	9:43	10:13	10:43	11:13	11:43	12:13	12:53	1:23	1:53	2:23	2:53	3:23	3:53	4:23	4:53	5:23	5:53	6:23	6:53	7:23	7:53	8:23	
Due Silo Terminal	7:15	7:50	8:15	8:50	9:20	9:50	10:20	10:50	11:20	11:50	12:20	1:00	1:30	2:00	2:30	3:00	3:30	4:00	4:30	5:00	5:30	6:00	6:30	7:00	7:30	8:00	8:30	

*** For Break, Summer Night, and Weekend Service, see U line schedule.*



V Line West Village Silo Terminal

Walking directions

Consent to be Recorded

At this event, photos and videos may be recorded.

By attending this event, you may be included in these photos and videos.

Your attendance at this event grants your permission to be in these photos or videos, which may be used for educational, archival, social media, and website purposes.

If you have any concerns, please contact Lisa Hayes, lisahayes@ucdavis.edu

Things to do in Davis & Beyond

Get to know Davis

Between our campus and our college town, you'll find something new to do every day in Davis. You can choose from dozens of farm-to-fork restaurants and weekly events and attractions. You'll also find museums, a 100-acre arboretum, an arcade, bowling alley, and so much more.

Davis is a city located fifteen minutes away from Sacramento, CA and is the largest city in Yolo County. Davis was founded in 1868 after the installation of a railroad depot. The city's original name was "Davisville," in honor of a local farmer, Jerome C. Davis. This reference to agriculture is a common theme running throughout the history of Davis. In 1908, Davis became home to the University of California's University Farm. The Farm eventually earned the title of University of California, Davis. While the modern city core is quite urbanized, the surrounding lands are still used for farming today.

Davis, CA is also known for being extremely bike-friendly. Miles of bike lanes criss-cross town and the 12-mile Davis Bike Loops is a popular route that offers views of major parts of the city. The United States Bicycling Hall of Fame is also located in downtown to commemorate the city's dedication to cycling infrastructure and culture.

For more information, visit the official city website or the community wiki.

Aggie Square

Aggie Square is where university, industry and community come together to create opportunities for everyone. This planned innovation district on UC Davis' Sacramento campus will be home to research programs, private industry partners, classrooms, student housing, and public-facing programs that engage local communities and entrepreneurs. The first phase of construction began in 2022. This phase includes two buildings designed for science, technology and engineering, a classroom building dedicated to lifelong learning, and a building designated for housing and programs that focus on food and health.

Aggie Square will create a unique live/learn/work/play environment to foster collaboration and creativity. Entrepreneurs, companies and workers can thrive in our technology campus that values inclusion and creates chance encounters among creative people.

The campus will feature state-of-the-art research facilities, modern office and mixed-use space, world-class amenities and a dynamic, thriving community. Aggie Square will create new public space with welcoming, accessible entry points that connects the university with its neighboring communities.

Aggie Square will create new public space with welcoming, accessible entry points that connects the university with its neighboring communities.

The entrepreneurial partnerships we forge at Aggie Square will advance human health, enrich lifelong learning, enhance emerging technologies, support student and community development and set the stage for future collaborations.

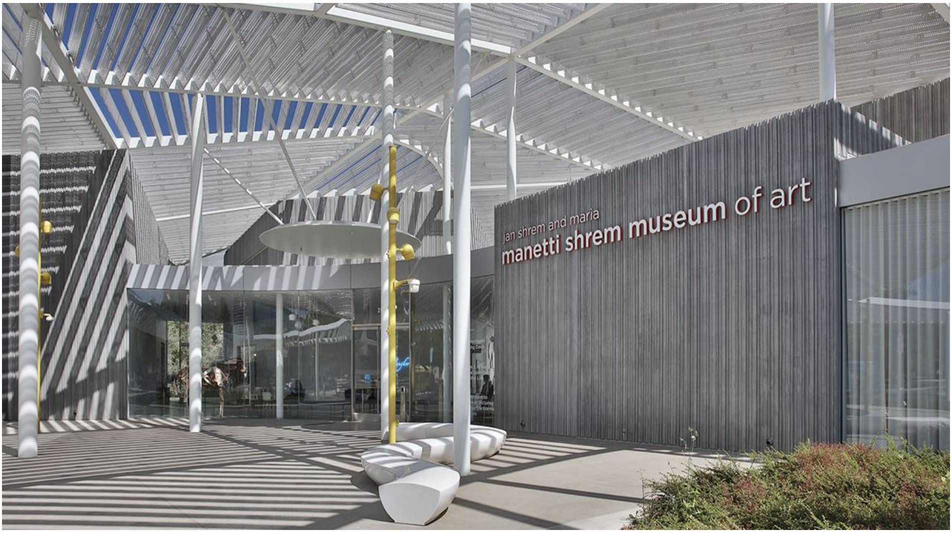
Mondavi Center

The Robert and Margrit Mondavi Center for the Performing Arts is a performing arts venue located on the UC Davis campus in unincorporated Yolo County, California. It is named for arts patron and vineyard operator Robert Mondavi, who donated $10 million to help with the building costs, and who also helped finance The Robert Mondavi Institute for Wine and Food Science on the same campus. The current annual operating budget is approximately $7.3 million, 58% of which comes from earned income.

Mondavi Center opened on October 3, 2002 for the UC Davis Symphony Orchestra and today serves as a venue for musical concerts, theater, dance, lecturers and other entertainers.[1] The façade is a large glass paneled lobby that is surrounded by sandstone that also lines the interior walls.

The Mondavi Center explores the full range of the performing arts, from the traditional to the innovative, and from diverse cultures and disciplines through presentation, education, public service, and research. As part of the UC Davis mission as a land grant university, the Mondavi Center provides outstanding cultural programming, support for the University's academic departments, and a professional laboratory to train students in the performing arts.

The Mondavi Center is committed to maintaining state-of-the art, world-class performance facilities and providing the highest quality experience for both artists and audiences. Our mandate is to maintain a balance between our regional responsibility, fiscal responsibility, artistic integrity, and the educational mission of the University of California.



Manetti Shrem Museum

Born of a distinctive legacy, the Manetti Shrem Museum is committed to the interdisciplinary experimentation that makes UC Davis a leading university. The museum's dedication to impactful education is evident in every aspect, from programming to architecture.

On November 13, 2016, the museum opened as a fulfillment of UC Davis' rich legacy of education and innovation.

The museum has taken shape because of the incredible support of the UC Davis community. We owe deep gratitude to Jan Shrem and Maria Manetti Shrem, Margrit Mondavi, and all of our supporters for making this vision a reality.

With the same passion for experimentation that first brought prominence to the arts at UC Davis, the Manetti Shrem Museum cultivates transformational art experiences to inspire new thinking and the open exchange of ideas.

Serving both the public and our university community with a dynamic artistic program, the museum: presents exhibitions and events that advance students' understanding of their place in the world; connects to faculty teaching and research; and creates a lively forum for community engagement and creative practice.

Old Sacramento & Downtown

Water Front District

Old Sacramento Waterfront is a unique 28-acre National Historic Landmark District and State Historic Park that lives in homage to California's beginning with the Gold Rush of 1849. The district is located along the beautiful Sacramento River. Bustling with activity, it is alive with shopping, dining, entertainment, historical attractions, and world-renowned museums set within the time of the California Gold Rush and the Transcontinental Railroad.

Old Sacramento Waterfront features dozens of recreated or restored buildings from the Gold Rush era. Wooden sidewalks, horse-drawn carriages, and living history characters provide a glimpse into 19h-century life.

Downtown Sacramento

Downtown Sacramento has grown and changed remarkably over the past 20 years, burgeoning into a 24-hour urban center that offers fine dining, unique boutique shopping, hotels, entertainment, events and cultural festivities. On any given night, you can enjoy a theater performance, a fine dining experience at one of the more than 150 restaurants, or dance the night away at one of the newly renovated lounges. Downtown is the central hub and heartbeat of Sacramento.

San Francisco

Grab your coat and a handful of glitter, and enter a wonderland of fog and fabulousness. So long, inhibitions; hello, San Francisco!

San Francisco, officially City and County of San Francisco and colloquially known by its initialism SF, is a city in, and the cultural, commercial, and financial center of, Northern California. San Francisco succeeds in winning over visitors immediately and without any special effort. The city of the lovers, the mild Mediterranean beauty immersed in pastel colors attracts with bridges, cable cars, hills and Victorian wooden houses, Alcatraz and Fisherman's Wharf, Chinatown and enormous beaches in the north. You know all these films and TV series that have taken advantage of the great scenery of the city. Many visitors come back because they can't – and certainly don't want to - escape this flair. San Francisco is one of the cosmopolitan cities whose embedding in a magnificent natural landscape creates a fantastic overall picture. Many cities to which this applies do not exist in this world - the City an der Bay is definitely one of them.

The North Californian city already experienced its first great boom in the 18th century, at the time of the great gold rush. In the 1960s, the San Francisco hippie movement left a lasting mark on the city. San Francisco's most famous landmark is the Golden Gate Bridge. But what would San Francisco be without its lively neighborhoods? One of the most famous districts is Chinatown. With around 80,000 inhabitants, it is one of the largest Chinese neighborhoods outside China.

The cultural diversity that San Francisco has to offer is also reflected in its cuisine: in addition to ethnic cuisine, there is a colorful cross-section of California cuisine. First-class wines from the region are served with it.

Exploratorium

The Exploratorium isn’t just a museum; it’s an ongoing exploration of science, art and human perception—a vast collection of online experiences that feed your curiosity. The Exploratorium is a hands-on museum for science, art and human perception. It is dedicated to experimentation, discovery and play. Visitors of all ages can explore the more than 650 exhibits indoors and outdoors, groping to better understand the world. The Tactile Dome offers visitors the opportunity to go on an interactive journey in complete darkness, relying solely on their sense of touch. There is also a museum shop and two places where food is offered. The Exploratorium is located at Pier 15 on Embarcadero in San Francisco, between Pier 39 and the Ferry Building.

Lake Tahoe

Lake Tahoe (‘the lake’) is a large freshwater lake in the Sierra Nevada of the United States. Lying at 6,225 ft (1,897 m), it straddles the state line between California and Nevada, west of Carson City. Lake Tahoe is the largest alpine lake in North America. Its depth is 1,645 ft (501 m), making it the second deepest in the United States after Crater Lake in Oregon.

The lake was formed about two million years ago as part of the Lake Tahoe Basin, with the modern extent being shaped during the ice ages. It is known for the clarity of its water and the panorama of surrounding mountains on all sides. The area surrounding the lake is also referred to as Lake Tahoe, or simply Tahoe. More than 75% of the lake’s watershed is national forest land, comprising the Lake Tahoe Basin Management Unit of the United States Forest Service.

Lake Tahoe is a major tourist attraction in both Nevada and California. It is home to winter sports, summer outdoor recreation, and scenery enjoyed throughout the year. Snow and ski resorts are a significant part of the area’s economy and reputation. The Nevada side also offers several lakeside casino resorts, with highways providing year-round access to the entire area.