

Research Fair 2023 Attending Labs

Prof. Aydogan Ozcan

Ozcan lab works on the various topics in applied optics and biophotonics with the main focus on computational imaging, sensing, deep learning and all-optical computing. Every year we have >20 undergraduate students working with us on all of these projects.

Majors: Computer Engineering, Electrical Engineering

Prof. John Wallace

Testing of C-shaped and rectangular reinforced concrete walls under wind loading protocols. Students will participate in the instrumentation process, testing and the post processing of the test results.

Majors: Civil Engineering

Prof. Yoram Cohen

Our lab focuses on advancing water treatment and desalination technologies. We have field water treatment and desalination systems in multiple sites in California, which we operate, remotely monitor, and analyze the various operational modes, transport properties and fouling mechanisms. In our lab at UCLA, we have a lab-scale plate-and-frame membrane monitoring RO system, NF-RO concentrator, bench-scale salt precipitator, and membrane modification and characterization equipment. We have undergraduates working on Cyberinfrastructure for the remote monitoring of our field water treatment/desalination systems, as well as working/running experiments with the NF-RO concentrator and membrane characterization. Undergraduates new to the lab have a variety of options but could be expected to run experiments in the plate-and-frame RO module. LabVIEW experience preferred but can be learned as part of your research.

Majors: Chemical Engineering, Computer Science and Engineering, Electrical Engineering, Mechanical Engineering

Brain Tumor Imaging Lab

1. The interaction between sex and brain volumes in Huntington's disease
 - a. undergrads welcome, need to have basic programming skills or are willing to learn.
2. Personalized targeting of deep brain stimulation using advanced MRI
 - a. undergrads welcome, may participate in data downloading, data curation, and potentially analysis
3. Ferumoxytol MRI for tumor-associated macrophage imaging
 - a. undergrads welcome, preferably with web-lab experiences, for example, cell culture
4. Sequence development for accelerating the acquisition of multi-parametric MRI
5. Multiple other brain tumor related projects are available for undergrads to participate in

Majors: Bioengineering

Prof. David Jassby

Mineral Scale Prevention, Water treatment, Electrochemistry

Majors: Civil Engineering

CHIPS (Center for Heterogeneous Integration and Performance Scaling)/ Prof. Subramanian Iyer

Our lab is structured into 3 major focus areas:

- Flextrate: the focus of this subgroup is to design and build a flexible substrate/platform that integrates chips of different functions for applications like medicine and health monitoring.
- Neuro CTT: focus of this subgroup is to utilize the charge trap transistor (CTT) to create a neuromorphic computing platform that mimics the human brain.
- Silicon Interconnect Fabric: the focus of this subgroup is to design and fabricate a scalable heterogeneous platform with low latency, energy per bit, and I/O power while maintaining a high bandwidth per unit edge for high performance computing applications.

Majors: Computer Engineering, Computer Science, Computer Science and Engineering, Electrical Engineering, Materials Engineering, Mechanical Engineering

Sensing and Robotics for Infrastructure Lab

Mission Statement: Our overarching research goal is to better understand and quantify the condition and remaining useful life of civil and mechanical infrastructure systems through the intelligent use of sensors and data. In pursuit of this, we are pioneering sensing systems that can measure the state of infrastructure non-destructively above and below ground as well as in aquatic environments. In addition, we are developing analytical and algorithmic tools needed to process, interpret and transform sensor data into actionable information.

We are recruiting engineering and computer science undergraduate students for the following projects:

Project 1: Developing an Autonomous Surface Vehicle for Marine Perception and Navigation: We are rebuilding our Autonomous Surface Vehicle for future research in marine perception and navigation.

There are several sub-projects for which we will need assistance, including:

1. SolidWorks modeling: We would like to create new SolidWorks models of parts and assemblies for above and below water perception kits. We would like to maintain our existing SolidWorks models and clean-up their organization.
2. Hardware assembly/integration: We are currently developing a time-synchronization scheme using a Teensy 4.1 micro-controller for our lidar-visual-inertial sensor kit. Remaining hardware work involves finalizing wired connections and ruggedizing our vehicle's computer. We also plan on extending the time-synchronization scheme to additional sensors, such as a Doppler velocity log and a multibeam sonar.
3. Software development/integration in C++ and/or python: In support of hardware development, we will need to integrate Robot Operating System (ROS) drivers for our Doppler velocity log and our multibeam sonar sensors. We would also like to integrate CircleCI into our workflow to automate software building and testing.

Project 2: Automating Road Inspections for Transportation Network Improvements: We are developing and implementing a framework for automating road inspections for transportation network improvements. There is one subproject for which we will need assistance:

1. Machine learning student: students with experience in applying machine learning to object detection in image and/or in point cloud data are welcome to drop by our booth!

We look forward to seeing you all at the event!

Majors: Aerospace Engineering, Civil Engineering, Computer Engineering, Computer Science, Computer Science and Engineering, Electrical Engineering, Mechanical Engineering

JVL Orthopaedic Biomechanics Lab / Prof. Sophia Sangiorgio

The JVL research center has a longstanding heritage of collaborating with orthopedic surgeons in addressing questions related to implant design and biomechanics, using clinical and radiographic outcome studies to compliment or enhance biomechanical models. Current projects include the assessment of retrieved total disc replacements, the evaluation of a novel tracheal splint, comparison of various fixation techniques in scaphoid non-union fractures, analysis of retrieved total hip replacements, and the wear testing of a novel ankle replacement.

Majors: Bioengineering, Computer Engineering, Computer Science, Computer Science and Engineering, Materials Engineering, Mechanical Engineering

UCLA Human-Computer Interaction Research Lab

AI-empowered interaction techniques for accessibility, health and well-being. Related skills you can improve when doing projects: Natural language processing, large language models, computer vision, deep learning, prototyping web page, extension or mobile applications, augmented reality, user interface and experience design, user study, qualitative and quantitative research methods, research paper writing for top-tier conference in the field

Majors: Computer Engineering, Computer Science, Computer Science and Engineering, Electrical Engineering

Scalable Analytics Institute, Prof. Wei Wang

Our ongoing projects are based on using novel AI techniques to analyze molecular and healthcare data. It will involve building different state of the art machine learning and computer vision pipelines and figuring out new ways of adding knowledge informed biases to them to beat baselines. It will require knowledge of python and basic machine learning.

Majors: Computer Science

UCLA Interventional Oncology Lab

We work on building image-guided minimally invasive medical devices to treat cancer.

Majors: Bioengineering, Computer Science and Engineering, Electrical Engineering

Interconnected & Integrated Bioelectronics Lab (Emaminejad Lab)

We seek outstanding and motivated students who are interested in developing biosensing and electronic systems to realize the next generation of wearable and implantable biomonitoring platforms. Applicants are expected to work on electrochemical sensor development and soft and stretchable bioelectronics development. Applicants must have a strong interest in working on interdisciplinary projects that will lead to real-world applications. Our vision at Interconnected & Integrated Bioelectronics Lab (I2BL) is to develop an ecosystem of integrated physiological and environmental monitoring platforms to enable personalized and precision medicine. To this end, we utilize micro- and nanotechnologies to isolate, control, sense and target biological and chemical species in human samples and their surrounding environments. Additionally, we integrate our devices into electronic platforms with system-level functionalities to enable translational applications.

Majors: Bioengineering, Chemical Engineering, Electrical Engineering, Materials Engineering