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UC San Diego International Summer Research Program Pre-Approved Mentors 2020

Mentor Last Name	Mentor First Name	Department	Research Description and Requirements
Atanasov	Nikolay	Electrical and Computer Engineering	Professor Atanasov's project will develop a python simulation of ground wheeled and aerial robotics. The student will need to understand and implement core robotics algorithms for localization, mapping, planning and control in the simulation. If time allows, the algorithms will be tested on an autonomous car of quadrotor robot. Students must be proficient in Python or C+ and have taken courses in data structures and algorithms. Experience in ROS is preferred but not required. Website: https://existentialrobotics.org/index.html
Bayram	Ece	Department of Neuroscience	Dr. Bayram is a research fellow primarily focused on cognition in movement disorders. Her research during the summer will focus on utilizing existing data including behavioral and neuroimaging data. She is also included in data collection for observational and intervention studies in Parkinson's disease and other parkinsonisms as Dr. Litvan's research fellow. Students will assist with organizing datasets, analyzing and writing up the results for abstracts and publications. Knowledge of computer programming, neuroimaging and statistical analysis is preferred but not necessary.
Cauwenberghs	Gert	Bioengineering, Neurograd Program	Professor Cauwenberghs is the co-director at the Institute for Neural Computation, a center that is devoted to the research and development of a new generation of massively parallel computers through a coherent and cohesive plan of research that spans neuroscience, visual science, cognitive science, AI, mathematics and social science, and computer engineering. His lab requires students that are interested and familiar with bioinstrumentation, neuromorphic engineering, computational or systems neuroscience. Students should be advanced in electrical engineering and/or bioengineering and have previous lab experience Website: https://isn.ucsd.edu/
Chandraker	Manmohan	Bioengineering, Neurograd Program	Professor Chandraker works on computer vision and 3D reconstruction. Other interests include scene understanding, graphics-based vision with applications in autonomous driving robotics and augmented reality. Website: https://cseweb.ucsd.edu/~mkchanProfessoraker/
Chen	Shaochen	Nanoengineering	Professor Chen's research interests are as follows: 3D Printing and Bioprinting, Stem Cells and Tissue Engineering, Biomaterials and Nanomaterials, and Organ/ Tissue on a Chip. Website: http://schen.ucsd.edu

Chukoskie	Leanne	Institute for Neural Computation	Professor Chukoskie is an Assistant Research Scientist at the Institute for Neural Computation, a center that is devoted to the research and development of a new generation of massively parallel computers through a coherent and cohesive plan of research that spans neuroscience, visual science, cognitive science, AI, mathematics and social science, and computer engineering. The lab requires students that are interested and familiar with bioinstrumentation, neuromorphic engineering, computational or systems neuroscience. Website: https://inc.ucsd.edu/index.php
Cortes	Jorge	Mechanical and Aerospace Engineering	Professor Cortes's research interests are in the area of systems and control, distributed control, network science, game theory, multi-agent coordination in robotics, power systems, and neuroscience, geometric and distributed optimization, nonsmooth analysis, and geometric mechanics. To work in his lab, students must be familiar with open source software (Linux) and have some programming experience (C++/python). Website: http://carmenere.ucsd.edu/jorge/ and http://muro.ucsd.edu/
Dow	Steven	Cognitive Science	The Dow lab focuses on human-computer interaction, social computing, and design thinking. Requires that students have a computer science background, and genuine interest in human-computer interaction. It's preferred that students have some programming and data science skills, particularly with Node and React. At least one quarter or semester in a research lab is preferred but not required. Website: protolab.ucsd.edu
Engler	Adam	Bioengineering	Professor Engler researches mechanobiology, of the application/ analysis of the role of mechanical forces in eliciting a molecular response, leading to a change in form and/ or function that can be quantified. The Engler Lab focuses on mechanobiology applications in cancer and heart disease. Some experience (six months or more) in a biological wet lab would be preferred. Other preferences include a knowledge of cell culture and programming experience (especially in MATLAB). Website: http://ecm.ucsd.edu/
Feng	Gen-Sheng	Molecular Biology	The Feng Lab focuses on liver cancer research. The research is centered on deciphering the molecular and cellular mechanisms driving development of hepatocellular carcinoma (HCC). Websites: http://fenglab.ucsd.edu/fenglab.ucsd.edu/Research.html and https://sites.google.com/site/fenglivercancerresearchlab/

Graham	Fan	Mathematics	Professor Graham's research interests are primarily in graph theory, combinatorics and algorithm design. This includes, spectral graph theory, random graphs with general degree distribution, quasi-randomness and unavoidable and universal graphs. Website: http://www.math.ucsd.edu/~fan/biolong.html
Gutkind	Silvio	Pharmacology	Professor Gutkind is a professor of Pharmacology whose research interests include genomic and molecular alterations to develop new precision therapies to prevent and treat cancer. His lab is currently investigating the mechanisms by which genetic mutations in $G\alpha q$ proteins initiate uveal and cutaneous melanomas, the role of $G\alpha s$ and its targets, PKA, in cancer, with an emphasis on colorectal cancer. Pre-requisites include having previously taken molecular biology or organic chemistry and interest in cancer research. Students will need to be driven to and ready to work and be comfortable accepting advice from a mentor. Website: https://www.gutkindlab.org/home-1

Jung	Tzyy-Ping	Institute for Neural Computation and Center for Advanced Neurological Engineering	Professor Jung works in the Institute for Neural Computation in the Center for Advanced Neurological Engineering. This institute focuses on real-world neural imaging. The lab takes novel approaches to recording and modeling brain activities and body functions, including and combining electroencephalographic, electromyographic, behavioral, and physiological measures. The lab uses dry EEG sensor arrays and wearable/wireless data acquisition and signal processing hardware and software that can monitor and record non-invasive, high spatial and temporal resolution, brain activity of unconstrained, actively engaged human subjects. The lab applies computational approaches such as independent component analysis (ICA), time-frequency analysis, and statistical analysis to analyze and model neural activity associated with human cognition, perception and awareness. Additionally, they fuse multiple streams of psychophysiological information to construct prototypes of neurocognitive brain-machine interface to improve overall human performance. Professor Jung and his colleagues use methods and concepts to characterize and clarify neuropathogenic processes, and improve prevention, diagnosis, and treatment of neurological diseases and injuries. Website: https://iem.ucsd.edu/centers/cane-advanced-neurological-engineering.html
Kastner	Ryan	Computer Science and Engineering	The Kastner lab current research interests fall into three areas: hardware acceleration, hardware security, and remote sensing. Professor Kastner is the co-director of the Wireless Embedded Systems Master of Advanced Studies Program. He also co-directs the Engineers for Exploration Program. http://kastner.ucsd.edu/

Koushanfar	Farinaz	Electrical and Computer Engineering	Professor Koushanfar is the Director of the Adaptive Computing and Embedded Systems (ACES) Lab and the co-founder of the Center for Machine-Integrated Computing and Security (MICS). Her research interests include embedded computing systems, secure and privacy-preserving computation, automated and adaptive computing, and big data analytics. Her lab focuses on enabling the realization of automated, end-to-end frameworks that address security, robustness and real-world practicality of data-intensive applications. Students who are interested in the summer research internship position in ACES lab shall have a strong background in machine learning theories, computer architecture, embedded systems, and programming skills. Personal Website: https://farinaz.eng.ucsd.edu/home Group Website: http://www.aceslab.org/
Kuester	Falko	Computer Science and Engineering	Kuester is a cultural heritage engineer, working on methodologies and techniques for cultural heritage diagnostics and preservation, including diagnostic and analytical imaging as well as visual and cultural analytics techniques that provide engineers, scientists, art historians and restorers, with a means to intuitively and interactively explore historic artifacts. Website: chei.ucsd.edu/team/fkuester/
Litvan	Irene	Department of Neurosciences	Professor Litvan works for the UC San Diego Movement Disorder Center. The Center conducts studies to slow progression of Parkinsonian neurodegenerative disorders using novel therapeutic approaches and searches for biomarkers that would allow early diagnosis and best outcome measures in several Parkinsonian neurodegenerative diseases by collecting clinical information, imaging (MRI, DAT, PET), blood and cerebrospinal fluid (CSF). Students should have prior knowledge and interest in neuroscience. Knowledge of computer programming or coding is preferred but not necessary. Social skills and the ability to work well in a team is essential.
Liu	Ping	Nanoengineering	Professor Liu's research focuses on designing materials and architectures for electrochemical energy conversion and storage applications. To work in this lab, the student should be a Chemistry major. Previous lab experience is preferred but not required. Website: http://liugroup.ucsd.edu/
Liu	Thomas	Center for Functional MRI	Professor Liu is the Director of the UCSD Center for Functional MRI. His lab uses functional magnetic resonance imaging (fMRI) to study the workings of the human brain using methods from the areas of statistics, signal processing and deep learning. Student projects will focus on the processing, analysis and interpretation of fMRI data. Students would have some experience with scientific programming with hands-on experience in one or more of the following: MATLAB, Python, or R. No prior lab experience is required but an interest in working with brain imaging data is key. Website: https://cfmriweb.ucsd.edu/tliu/

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Liu	Zhaowei	Electrical and Computer Engineering	Professor Zhaowei Liu's research group is dedicated to a multidisciplinary and interdisciplinary field that bridges researches across disciplines especially in the areas of nanophotonics, plasmonics, nanomaterials and life science. Students should have a prior knowledge of photonics to wok in this lab. Website: https://www.zhaowei.us/
Lo	Yu-Hwa	Electrical and Computer Engineering, Department of Photonics	Professor Lo's research focuses are biomedical electronic and optical devices and systems and nanoscale semiconductor devices. His group designs biomedical devices and systems that combine microfluidic, photonic, acoustic, and electronic technologies for in-vitro and invivo diagnosis and prognosis for a variety of diseases including cancers, infectious diseases, and chronic diseases. Website: http://nanomedicine.ucsd.edu/
Longardner	Katherine	Neurology	Katherine Longardner a Research Fellow involved in several research projects. One is exploring the relationship with orthostatic hypotension (low blood pressure on standing upright) and cognition in people with Parkinson disease and related disorders. This will involve working toward finding an optimal device for continuous blood pressure monitoring and repeated cognitive assessments. Another interest is using technology-based measures (accelerometers, surface electromyography, digitizing tablets, etc.) in people with tremor and other movement disorders to characterize their movements and guide diagnostic and therapeutic clinical decisions. It's preferred that students are in at least their third year of education and be able to use Microsoft Office (Word and Excel).
Lyumkis	Dmitry	Salk Institute for Biological Studies	Professor Lyumkis's interests lie in utilizing electron microscopy to gain insight into macromolecular assemblies, their structure, function, and dynamics, while at the same time pushing the technological limits of cryo-EM methodologies. Students should have previously taken biochemistry and have at least one year of lab experience. Website: https://www.salk.edu/
McCartney	John	Structural Engineering	Professor McCartney's Research Group focuses on unsaturated soil mechanicals, thermo-hydro-mechanical behavior of saturated and unsaturated soils, hydraulic and mechanical interaction between unsaturated soils and geosynthetics, shear strength of geosynthetic clay liner interfaces. Website: http://mccartney.eng.ucsd.edu/home

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Ng	Tina	Electrical and Computer Engineering	Professor Tina Ng's research focuses on the development of flexible electronics (shortwave infrared detector, wearable medical devices, and energy storage supercapacitors). Her research method is based on additive printing, which allows low-temperature patterning that is compatible with a wide range of materials, reduces wastes from mask steps, and enables rapid design changes and complex geometric or materials permutation. Her research aims to push the boundary of how electronics are made and used by incorporating electronic control and power sources onto any surface. Students should be familiar with device physics and have done hands-on lab courses. At least one year of undergraduate research is required. Website: http://flexible-electronics.ucsd.edu/
Nizet	Victor	Pediatrics, Pharmacology	The Nizet Lab focuses on pathogens and the host response to infection. His lab conducts research on Group A and B Streptococcus Pathogenesis, Staphylococcus aureus Virulence, Streptococcus pneumoniae, Bacillus anthracis Pathogenesis, and others. Prior research experience preferred but not required. Website: http://nizetlab.ucsd.edu/index.html
Sailor	Michael	Chemistry and Biochemistry	Professor Sailor's research revolves around nanotechnology, nanomedicine and sensors. Students should have previously completed Chem 6 Series to work in the lab. Website: http://sailorgroup.ucsd.edu/courses/SummerSchool/
Sanchez	Antonio	Mechanical and Aerospace Engineering	The dynamics of flames is known to change significantly in the presence of ambient flow circulation. For example, the interactions of the swirling flow with the uprising plume of hot gas induced by a fire leads to the formation of so-called fire whirls or fire tornados, which have been found to occur both in wildland and urban conflagrations, with disastrous consequences for people and surroundings. The principal aim of this project is to increase understanding of the flow dynamics by using as a vehicular example the canonical case of a round liquid-pool fire. The work will focus on controlled laboratory experiments to clarify the complex interacting processes governing the dynamics of pool fires in the presence of ambient swirl. The investigation targets quantification of the different combustion regimes corresponding to different levels of ambient circulation, namely, axisymmetric puffing, fire whirls, dwarf fire whirls, and blue whirls, as well as characterization of several key fluid-mechanical phenomena that control their existence, including global instabilities, vortex breakdown, and edge-flame detachment and lift-off. The work is experimental, so no pre-requisites are required. Website: http://asanchez.ucsd.edu/

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Shing	Benson	Structural Engineering	Professor Shing's research focuses on earthquake engineering and structural dynamics of the built environment. Fundamental education in solid mechanics and a background in structural engineering is desirable. Website: https://www.jacobsschool.ucsd.edu/faculty/faculty_bios/se-profile.sfe?fmp_recid=236&print
Su	Hao	Computer Science and Engineering	Professor Su's research interests include sensing, modeling, reasoning and acting on the physical world. This includes computer vision and graphics, machine learning and AI, and robotics. Students should have strong communication skills and a background in robotics (mechanical engineering). Website: http://ai.ucsd.edu/~haosu/index.html
Preetham	Suresh	Anesthesiology, Simulation Center	Professor Suresh works in the Stimulation Center in the School of Medicine. He builds human body parts by using 3D printing molds to product anatomic models that can be used for procedural training. Students should have a strong sense of creativity. Knowledge of 3D printing is also required. Website: https://medschool.ucsd.edu/education/simcenter/Pages/default.aspx
Palmer	Taylor	Pharmacology	Professor Taylor investigates neurotransmission in the central and peripheral nervous systems with a focus on the molecular recognition of acetylcholine analogues and other cholinergic drugs that interact with nicotinic acetylcholine receptors and acetylcholinesterase. He also conducts studies into the structure and function of a post-synaptic adhesion protein homologous to AChE, neuroligin, and its pre- synaptic partner, neurexin. Studies employ both crystallographic and solution-based techniques and are directed to macromolecular recognition of ectodomain adhesion molecules. Website: https://pharmacy.ucsd.edu/faculty/taylor

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Tomac	Ingrid	Structural Engineering	Professor Tomac's research relates to Experimental evaluation of proppant (sand) slurry flow and transport in a narrow fracture. Her team built a rock fracture analog in the lab and are injecting different sands and fluids in the fracture. They record the slurry flow and transport with high speed cameras and analyze results from video footage. This research will be conducted in June and July 2020. For June, July and August, the lab will conduct experimental investigation of rain induced mudflows in water repellent soils relevant for post-wildfire flash floods. They will conduct experiments on a small-scale slope in the lab, where we rain on a slope and record soil and water movement. This includes preparing experimental setup and analysis of video footage. To work in this lab, students must be able to lift a 30kg bucket and be in good physical fitness. Knowledge on how to use mechanical tools in the lab and be inclined to conduct experiments, sieve sand, prepare mixtures, help with post processing of video, use MATLAB or other program languages. Basic to intermediate programming skills are a must, including good writing skills and the ability to prepare graphics, PowerPoint presentations and reports. Website: http://ingridtomac.eng.ucsd.edu/home-1
Wang	Peter Yanxiao	Bioengineering	The Wang Lab focuses on molecular engineering for cellular imaging and reprogramming. The lab focuses on the integration of biotechnologies in cellular and molecular engineering for the development of genetically-encoded biosensors and the application of them to visualize molecular events in live cells and animals. Website: http://wang.ucsd.edu/
Wu	Chengbiao	Neuroscience	Professor Wu's lab research is centered on investigating the cellular and molecular mechanisms of neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, Huntington's disease. His lab uses mouse models and human iPSC-derived neurons to define cellular and molecular pathways that are altered in early stages of the different diseases un order to identify potential targets for developing effective therapies. Students should have already taken courses in biology such as protein biochemistry, genetics and physiology. Web lab experience is preferred but not required. Website: https://wulaboratory.weebly.com/
Zhang	Dong-Er	Molecular Biology	Professor Zhang's lab focuses on understanding the molecular pathology of cancer development and progression, in hopes that it will lead to better treatment for patients. The lab uses molecular biology, protein biochemistry, cell biology, and animal models to address relevant questions. Much of the work is conducted in the contact of the hematopoietic system, through studies in cancer cell lines and in mice. Website: https://zhanglab.biology.ucsd.edu/