SUMMER 2022 OPPORTUNITIES

1. **BENOIT LAB**: The student could work on a research experiment investigating behavior and physiology of ticks, mosquitoes, and cockroaches. In specific, our goal is to examine how these pests survive periods stress including drought and winter.
Website: http://insectphysiology.uc.edu/
Time requirement: Negotiated with mentor up to 250 hours of total work experience throughout the summer.

2. **GUERRA LAB**: *Project Title:* An examination of the complex architectural design of silk moth cocoons in North America
Project Description: The Guerra Lab is looking for a highly motivated student to participate in on-going research studying the complex architectural design of cocoons of North American silk moth species. We are examining the form and function of cocoons made by silk moth caterpillars, which act as natural structural buffers against environmental stress. Our studies determine if and how cocoons might protect animals from contemporary environmental pressures such as climate change, weather extremes, and sprawling urbanization. In particular, we focus on examining how cocoons can act as omniphobic biological membranes that protect the animal found inside it. This research uses an interdisciplinary approach – biology, materials science, design – to study this phenomenon. The student involved in this research will have opportunities to conduct laboratory experiments, and learn various experimental, observational, and analytical techniques. We anticipate that the student will be able to assist with research that will produce key information that can help us understand how animal extended phenotypes, namely architectural structures, function in our dynamic world. This information can facilitate conservation, management, and sustainability strategies that help protect animal species worldwide, as well as inspire the engineering and design of silk-based macro and nanomembranes with protective properties.
Website: https://homepages.uc.edu/~guerrapk/wordpress/
Time requirement: Time commitment and duties: 40 hours per week (Monday-Friday) during the summer period (250 hours total). Some activities that the student will have the opportunity to gain experience in are: assisting with performing laboratory experiments and making controlled observations; helping with specimen characterization and curation; performing quantitative analyses of large and varied data sets.

3. **LAYNE LAB:** In the Layne lab research interns will join ongoing, novel research projects in either of two broad areas: 1) spatial navigation, 2) color vision. In the first, **spatial navigation**, we study how animals know where they are, particularly how they know their current location relative to a starting point, such as home. We also study how animals know the location of other objects in the environment, particularly how they visually perceive the direction of objects seen with eyes that are highly mobile - how is this eye mobility accounted for? In the second, **color vision**, we study whether animals have 'color vision', that is, whether animals are capable of visually discriminating objects based solely on differences in reflected/emitted wavelengths of light. To test this we use a behavioral assay in which an unconditioned response is elicited by a visual stimulus that be changed in wavelength and intensity. This is a way of asking the animal 'can you see this? The device we use is novel and invented in the Layne lab.
Website: https://researchdirectory.uc.edu/p/laynejn
Time requirement: Negotiated with mentor up to 250 hours of total work experience

4. **DIGITAL FUTURES HUMAN PERFORMANCE & NEUROMECHANICS LAB**: This role involves helping initially set up and test facilities and research study protocols in a brand new lab at UC, the Advanced Human Performance & Neuromechanics Lab (AHPN Lab). The AHPN lab will open next summer in the Digital Futures building near the UC campus. The *vision* of the AHPN Lab is to become an internationally recognized center of excellence for research related to optimizing, maintaining, and restoring human performance. Our *mission* is to create knowledge and interventions to maximize mobility and performance for all. The AHPN Lab will include a motion capture system, force platforms, a split-belt instrumented treadmill, standard treadmills, exercise bicycles, a metabolic measurement system, and virtual/augmented/mixed reality headsets to enable a wide range of research including studies on gait and locomotion, sensorimotor control and decision-making, interactive AR/VR biofeedback technologies for rehabilitation, injury risk reduction, and human performance enhancement, and more. The research intern will have the opportunity to learn to use these technologies in a research setting and to help set up the equipment and get it ready for use in new research studies.
Website: Dr. Mike Riley, https://ucdigitalfutures.com/human-performance-lab/
Time requirement: Minimum 6 weeks @ 20 hours/week. Up to 250 hours of total work experience

5. **KALAFUT LAB:** A major goal of captive animal environments is to create environments where animals can truly thrive. From animal shelters to aquariums and zoos, these facilities strive to provide the highest welfare for the animals in their care. In order for these institutions to meet this goal, they require the expertise of individuals with backgrounds in, not only biology and zoology, but also behavior, conservation, education, and engineering. My name is Katie Kalafut, and I am an animal behavior researcher. My research focuses on helping zoos collect behavioral data on the animals in their care, to use these data to make proactive changes to an animal's welfare, as well as create environments that allow these animals to truly thrive. To do this work effectively, I often need to build my own equipment (you can't buy an elephant feeder off the shelf!), or adapt existing materials to suit my needs. This often includes programming microcontrollers for various inputs and outputs, painstakingly testing materials in controlled environments and the field, and developing new prototypes for future projects. Interns interesting in learning more about the ways engineering can be implemented into the field of animal care and welfare will hopefully have some basic programming knowledge, interest in mechanical engineering, a keen eye for detail, good communication skills, patience, and appreciation for all animals.
Website: https://www.linkedin.com/in/kathryn-kalafut-ph-d-bcba-3551a513/
Time requirement: Available in May and/or June; 3-4 weeks minimum (6-8 ideal). Minimum 2-3 hours each day up to 250 hours total.

6. **MOREHOUSE LAB:** *Depth Perception Mechanisms in Hunting Spiders*. Much like a camera, our retinas can only image in 2D–however we are still able to seamlessly perceive the world in 3D. We are not extraordinary in this sense. In fact, most visual animals perceive depth information by utilizing similar mechanisms. Hunting spiders, on the other hand, use a variety of unique mechanisms to gauge distances, making them a fascinating system to study. This project is aimed towards identifying the depth perception mechanisms available to various hunting spider families, and understanding how these mechanisms work based on optical principles. The students involved will take part in field collections, physiological measurements, behavioral experiments, animal husbandry, and have the option to learn about computational scientific methods.
Website: https://homepages.uc.edu/~morehonn/
Time requirement: Negotiated with mentor up to 250 hours of total work experience

7. **ROLLMANN LAB**: The student would work on experiments aimed at understanding the genetic and neural bases of behavior in fruit flies. Behaviors examined may include an examination of their thermal preference, humidity preference, or taste/smell preferences as well as the neurons that mediate these responses.
   Website: https://homepages.uc.edu/~rollmasm/
   Time requirement: A minimum of 10 hours per week. Negotiated with mentor up to 250 hours of total work experience

8. **STOFFER LAB**: The student could work on a research experiment investigating the effects of biogenic amines (octopamine and serotonin) and behavioral plasticity in wolf spiders. Specifically, examine questions regarding the trade-off between aggression and mating decisions.
   Website: https://researchdirectory.uc.edu/p/stoffebm
   Time requirement: Negotiated with mentor up to 250 hours of total work experience

9. **VANDERELST LAB**: My lab works on modeling bat echolocation using computer simulations and robots. Based on their interests, students could be involved in all aspects of the work in the lab. Students could help programming robots, building setups, running computer simulations or robotic experiments. In addition, interested students could work on 3D design, 3D printing, or laser cutting to create parts for the robotic experiments. Finally, the internship could also focus on basic electronics, for example, working with microcontrollers.
   Website: https://www.bitsofbats.net/
   Time requirement: Negotiated with mentor up to 250 hours of total work experience. The internship duration and timing will be determined based on your availability. However, preferably, you would be working in the lab for a limited period (e.g., two weeks) but multiple hours per day.

New additional opportunities – Updates 2/13/22

10. **GROSS LAB**: *Project Title:* Examining the genetics of taste system development in blind Mexican cavefish. *Project Description:* The Gross Lab is looking for interested, motivated and dedicated high school student interested to gain research experience examining the development of the taste system. Our lab studies the blind Mexican cavefish, and closely-related surface fish, which live in very different environments. These environments have led to dramatic differences in the positions of taste buds.

Specifically, cavefish have taste buds distributed across their heads and chins. The interested student would be involved in examining this trait from developmental, genetic and functional perspectives. Additionally, this work will involve direct work with our organism, including assisting with breeding and routine animal care.
Website: https://homepages.uc.edu/~grossja/Home.html
Time requirement: Up to 250 hours, negotiated with the lab head and personnel.

11. **FUCHS LAB:** Pinball machines provide an interesting application for developing and testing a range of sensing and artificial intelligence (AI) algorithms. Within my research group, we use both commercially manufactured pinball machines that you would find in an arcade as well as customed designed machines to examine how computers can learn to control cyber-physical systems. Basically, we train computers to play pinball. Students working in my lab can assist in the design and construction of custom pinball-based test rigs, programming microntroller boards to control pinball devices (such as flippers, pop bumpers, and lighting animations), and/or performing data collection (playing pinball). These tasks provide an opportunity to learn skills in basic 2D and 3D design, prototyping techniques (3D printing and laser cutting), basic electronics, and programming.
    Website: https://researchdirectory.uc.edu/p/fuchsze
    Time requirement: Negotiated with mentor up to 250 hours of total work experience