SUMMER 2023 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 of 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. For example, the student could work for 2 months or the entire 250 hours.

2. **COHEN LAB:** The promise and potential of AI for biomedical applications with an emphasis on Ethics, Biases, Introduction to trustworthy AI, and if the student is so inclined basic AI algorithm development/programming in Matlab/Python.
   Website: https://researchdirectory.uc.edu/p/cohenky
   Time requirement: Student should be open to dedicating up to the maximum 250 hours and be able to work independently as needed.

3. **GROGAN LAB:** Our lab uses humans and ring-tailed lemurs as a study system, to understand how environmental change interacts with the genome and affects fitness at the population and species levels. Ring-tailed lemurs are endangered non-human primates that are endemic to Madagascar, with an estimate of about 2,000individuals currently living in the wild. The driver of biodiversity loss in Madagascar remains unresolved today, and there as being a debate on whether climatic changes before humans inhabited Madagascar in the last 5,000 years are responsible for the current population size or whether recent anthropogenic changes from human practices are driving the change we see today. For this project, we will be looking into how past climatic fluctuations and anthropogenic activities have shaped the population of Ring-tailed lemurs. We will use genomic data to infer the demographic history of ring-tailed lemurs in Madagascar. Understanding how the effective population size has changed over time would help tease climatic and anthropogenic factors related to these changes. Also, it would provide information about how ring-tailed lemurs would respond to future climate change and can help guide the conservation management.

Students would learn how to perform quality control on genomic data, align genomic data to a reference genome, and analyze genomic data using R and Python.
Website: https://sites.google.com/site/kathleengroganphd/
Time requirement: The total amount of time: 8 weeks. Hours per week: 30 hours. Maximum 250 hours total.

4. **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. This research experience will involve some animal husbandry and breeding, potentially cloning some taste receptor genes, performing immunohistochemistry to identify taste buds in other cavefish populations, and expression analyses (either quantitative PCR, or in situ hybridization) for our expanded extraoral taste bud project.
Website: https://homepages.uc.edu/~grossja
Time requirement: Up to 250 hours, negotiated with the lab head and personnel. At least a one month commitment, with ~4-5 hours a few days a week.

5. **GUERRA LAB**: *Project Title:* An examination of the complex architectural design of silk moth cocoons in North America. *Project Description:* The Guerra Lab in the Department of Biological Sciences at the University of Cincinnati 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.

6. **JHA LAB:** Students will work on understanding corticalc ircuitry involved in sensing and storage of information in a biological brain. If time permits, students will develop models for these in Python.
Website: https://researchdirectory.uc.edu/p/jhari
Time requirement: Time dedicated to this work - 1 Month; 5-10 Hours as appropriate (maximum 250 hours total allowable).

7. **KALAFUT LAB:** We are currently working on various studies that attempt to identify factors that contribute to a cat's overall welfare (i.e. choice and control, predictability, individual preferences, etc.) . These studies are being done in collaboration with Conservation Research of Endangered Wildlife (CREW) at the Cincinnati Zoo. The intern will be included in the collaborator meetings, will be trained to identify and score video recordings of cat behavior, will prepare and work with others to prepare, visualize and interpret data collected, and get to meet some pretty amazing cats.
Website: https://www.linkedin.com/in/kathryn-kalafut-ph-d-bcba-3551a513/
Time requirement: Time could be flexible, but preference for someone for around 25 hours/week for 10 weeks. Week to week may change, but preference for more time each week than less (and extend it out over the whole summer). Total maximum hours would be 250.

8. **KUMAR LAB:** The student will be involved in development of indoor Unmanned Aerial Vehicles (UAVs) with applications such as emergency response in buildings or telehealth services inside people's homes. Operation of drones in indoor environment is

particularly challenging due to several reasons including loss of access to GPS information, and proximity with obstacles and humans. For safe operation of UAVs in indoor environment, some level of autonomy is needed to allow UAVs to avoid collisions and carry out basic maneuvers without any assistance from humans. Incorporating autonomy in drones operating in indoor environment is often challenging due to the fact that positional feedback from GPS is intermittent or unavailable. The UAV needs to solve the problem of localization, i.e., finding its position and orientation using onboard sensors such as vision, laser, or other proximity sensor such as ultrasound sensors, via a process called Simultaneous Localization and Mapping(SLAM). Furthermore, the UAV should be able to use its positional estimate to perform navigation in a precise manner to enable safe operation. The objective of this project is to develop hardware and software means to carry out the process of SLAM and autonomous navigation of UAVs in indoor environments.
Website: https://researchdirectory.uc.edu/p/kumarmu
Time requirement: Students should be open to dedicating 2 summer months, 20 hours per week to this project (maximum 250 hours total allowable)

9. **LANDER LAB:** The student will be involved in the characterization of trypanosome mutant cell lines to study signal transduction pathways in trypanosomes. In this regard, the intern will be trained in different cell and molecular biology techniques, such as cell culture, gel electrophoresis, DNA isolation, PCR, cell counting, media preparation, bacterial transformation, and other related techniques.
   Website: https://homepages.uc.edu/~landerlab/wordpress/about/
   Time requirement: Negotiated with the lab head and personnel. Preference for 6-9 h/week for one month

10. **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

11. **MOREHOUSE LAB:** The Morehouse Lab studies how animals see the world, with a focus on insects and spiders. The student would work on one or more projects related to jumping spider perception of color, motion and/or depth. Approaches would include field work, behavioral assays, gaze tracking, ophthalmoscopy, hyperspectral measurements, retinal histology and microspectrophotometry, and/or computational approaches to video analyses of animal behavior.
Website: https://homepages.uc.edu/~morehonn/
Time requirement: Number of hours per week: Negotiable depending on student availability, but a minimum of 10 hours per week. Total amount of time: 250 hours over up to 3 months.

12. **NOROUZI LAB:** My research is in video summarization; we try to represent video frames or shots using deep features and assign importance to the shots based on their visual, audio,...content. Tasks may include: 1. analyzing annotations and understanding dataset labels and consistencies - or work on exciting video subjects such as sport videos. 2. Generating video summaries based on ground truth importance scores; learning greedy and knapsack algorithms.
Website: https://researchdirectory.uc.edu/p/norouzmi
Time requirement: Preference for a student that can dedicate at least 2 month on their python programming skills and work with graduate students. (maximum 250 hours total allowable)

13. **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.

14. **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. You would be working in the lab for the month of August, multiple hours per day.