VIRGINIA TECH

Solving Problems with Data Science at Virginia Tech

Summer REU 2024

Data Sciences Project:

Comparative biomechanics of animals (Socha Lab)

Project Description:

Our lab studies the biomechanics of animals. We focus on how animals interact with fluids, both in locomotion (e.g., flight) and internally (e.g., circulation). We are working on multiple projects, and REU students in the lab will get to focus on one while potentially contributing to others. Here are a few examples: Flying snakes are the only limbless animals that glide through the air. Despite a lack of limbs, these arboreal snakes take off by jumping, and then they glide through the air without using obvious control surfaces, maneuver, and safely land without injury. Our research focuses on how these snakes produce forces for these behaviors. We're currently working on how they change shape in the air, how they control their body in a long glide, and how they climb across gaps. We're also studying their close relatives, who are also tree snakes that live in Southeast Asia. Insects can be viewed as exquisite microfluidic systems: they pump air, blood, and food through their bodies, all within one small package. Compared to engineered systems, they are far smaller, controllable, and efficient than anything that humans have designed. How do insects produce these flows? We're currently studying the structure and function of the tracheal tubes that weave throughout their bodies. We're also working on how mosquitoes drink: do females that drink nectar and blood differ from males, which only drink nectar? What about species that don't drink blood at all?

Expected Qualifications of Students:

Students are expected to have a basic understanding of biology and engineering, but we will consider applicants from all STEM majors.

Faculty Bio:

Dr. Jake Socha is the Samuel Herrick Professor of Biomedical Engineering and Mechanics at Virginia Tech. He received his B.S. from the Duke University, and his Ph.D. from the University of Chicago.

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