



# SMSD SEMINAR SERIES

*Soft Materials Structures and Devices*

Thursday, February 27<sup>th</sup> 2020, 4pm, Room 3-370

## Drinking and Diving

**Prof. Sunghwan Jung, Cornell University**

Fluids are vital to all life forms, and organisms presumably adapted their behaviors or features in response to mechanical forces to achieve better performance. In this talk, I will discuss two biological problems in which animals exploit mechanics principles. First, we investigated how animals transport water into the mouth using an inertia-driven (lapping) mechanism. Dogs accelerate the tongue upward (up to 4 g) to create a larger water column while drinking, whereas cats use a tongue motion with relatively small acceleration. We found that, in order to maximize the water intake per lap, both cats and dogs close the jaw at the column break-up time governed by unsteady inertia. Second, we studied how birds with long slender necks plunge-dive and survive from the impact. Physical experiments of an elastic beam as a model for the neck attached to a skull-like cone revealed the limits for the stability of the neck during plunge-dive. We found that the small angle of the bird's beak and the strong muscles in the neck predominantly reduce the likelihood of injury during high-speed plunge-dive. In addition, elastic feathers can spread the force acting on the body.

**Dr. Sunghwan (Sunny) Jung** is an associate professor in the Department of Biological and Environmental Engineering at Cornell University. He received his PhD in Physics at the University of Texas at Austin and then a postdoc at the Courant Institute at NYU & a math instructor at MIT. Prior to Cornell, he was an assistant & associate professor at Virginia Tech. His research interest is to investigate a variety of mechanics problems emerging from the interaction of biological systems with surrounding environments.

*Seminar Host: Irmgard Bischofberger* ([irmgard@mit.edu](mailto:irmgard@mit.edu))

**Please join us for refreshments beforehand, outside Room 3-370**

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