TIFR Centre for Interdisciplinary Sciences
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Seminar

Biomechanics and Bio-Inspired Solutions for Aerial Locomotion in Complex Environments

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The role of robotic systems including autonomous vehicles is expected to grow significantly in the near future. Current unmanned aerial vehicles are incapable of autonomously maintaining flight close to the Earth's surface where aerial locomotion is very challenging due to unsteady winds and complex terrain. Biological flyers, such as insects and birds, though equipped with only tiny sensory and motor systems, are capable of precision flight and navigating long distances through complex terrain. Thus insects and birds may be considered model organisms to study miniature flight and can offer solutions to the design on unmanned flying systems. Understanding the strategies employed by biological systems - on sensory, information processing and motor-control is vital in order to develop a general framework for their implementation on miniature robotic platforms. However, relatively little is known about how well flying animals can contend with complex, adverse airflows, or about the flight-control mechanisms employed to navigate through complex spatial environments. With recent advancements in high-speed imaging technology and cross-disciplinary approaches, we are now capable of probing the biomechanics of natural flight in realistic aerial conditions and translating this knowledge to the design of miniature flying robots. In this talk, I will be presenting on some of these investigations, in particular, I will be presenting on the flight dynamics of bumblebees through complex spatial and wind environments, and the implications for drone flight. I will also present on the mechanics of hummingbird flight through discrete and continuous aerial disturbances and elucidate on some bio-inspired flight control strategies.

Even if you are not into this stuff, do come along as there will be lots of cool high-speed videos!

Wednesday, Jun 22nd 2016

4:00 PM (Tea/Coffee at 3:45 PM)

Seminar Hall, TCIS