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## **Research Interests**

- Stability and stabilization of nonlinear systems
- Cooperative control of multi-agents systems
- Analytical aspects of autonomous systems and their control (application towards robotics)

## **Brief Summary of Research**

My research interest spans the area of systems and control theory, analytical mechanics, and robotics. I am interested in pursuing interdisciplinary research; my specialization lies in systems and their control approaches. In particular, my primary research goal is directed towards developing and applying efficient theoretical methods to study the stability of nonlinear control systems. This covers a wide range of engineering applications such as control of multibody aerospace or underwater or ground vehicles, locomotion of biological systems and electrical drives systems. A common thread in my research is in understanding the mechanics, the physics and the geometric properties of these systems and then by using control theoretic interpretations and mathematical tools to tackle synthetic design problems. This is crucial in designing control for complex nonlinear systems. The key feature in understanding the system is based on the systematic use of the modern geometric approach.



a) Prototype of a Segway<sup>1</sup>; b) Spherical Robot<sup>2</sup> mechanism; c) 3D path track by a quadrotor with suspended load

## Publications

<sup>1</sup>Gajbhiye, S., Banavar, R. N., Delgado, S. "Symmetries in the Wheeled Inverted pendulum mechanism". *Nonlinear Dynamics (2017)*, vol. 90(1), pp. 391-403, Springer publication, DOI: 10.1007/s11071-017-3670-3

<sup>2</sup>Gajbhiye, S., Banavar, R. N. "Geometric modeling and local controllability of a spherical mobile robot actuated by an internal pendulum". *International Journal of Robust and Nonlinear Control (2016)*, vol. 26(11), pp. 2436-2454, John Wiley and Sons publication, DOI: 10.1002/rnc.3457

**Gajbhiye, S.**, Banavar, R. N. "Geometric approach to tracking and stabilization for a spherical robot actuated by internal rotors", *In proceedings of 10th IFAC Symposium on Nonlinear Control Systems (NOLCOS)*, vol. 49(18), pp. 820-825, California, USA, August 2016.