

## 6. **RAI 815: Legged Robotics**

### a. **Textbook**

- Legged Robots by Shuuji Kajita (Springer), Dynamically Stable Legged Locomotion by Marc Raibert (MIT University Press)

Handouts and research articles may also be used by the instructor.

### b. **Objective**

- Robots aim to reduce the gap in the integration of smart machines into human lives. The issue of mobility in all kinds of terrains remains yet an interesting challenge. Legged robots have the ability to traverse uneven and unstructured terrains and therefore are useful in a multitude of mobility applications. These applications vary from humanitarian search and rescue to assistive robotics. The concept of walking itself however is a tremendous feat for a robot to learn. It is therefore vital to teach this course to familiarize the students with the challenges and applications of legged locomotion in robotics to build versatile robots.

### c. **Pre-Requisite:** Nil

### d. **Course Outcome**

- During the course, students will learn the principles of legged locomotion and gain a detailed understanding of cutting-edge research in the design and control techniques of legged robots. Students will be encouraged to participate in the simulation and development of modules of legged robots for various applications.

### e. **Course Outline:** The course covers the popular techniques of optimizing a robot's agility, stability and energetics. As such, two important modelling and control techniques will be discussed. These techniques will be implemented in hypothetically designed robots which face different application requirements.

- Introduction to legged robots
- Gaits and Locomotion
- Passive Walkers
- Models of Robot Dynamics
- Leg Configurations
- Design and Simulation