Research Project

DYNAMIC RUNNING ROBOTS

Motivation
Natural selection started exploring the design space of locomotion by the use of legs long ago. As a result some or other legged creature has found its footing on nearly the entire land surface of our world. The ubiquity of legs among animals suggests they must be generally useful and the knowledge necessary to incorporate legs in human applications is probably worth having. This may have utility in agriculture, defence, entertainment and the exploration of earth and space. Also engineering advancements have and may continue to contribute to the scientific understanding of animal locomotion.

Objective
For practical legged machines designed to work outdoors, the ability to walk or run on rough terrain is a requirement. The aim of this research project is to contribute to the development of control algorithms which allow recovery from disturbances caused by rough, slippery, shifting or uncertain terrain. This will be achieved through simulation and analytical work as well as experimentation. Experimental work is currently being undertaken using a rig holding one of the legs of the ‘HyQ’ robot developed by IIT.

Future work
Challenges include: controlling the hydraulics of the leg to achieve the required motions; improving leg design to passively reject disturbances as well as allow energy to be stored and released from one step to the next; developing and testing a controller that can tolerate large terrain perturbations.

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