Master 2 Systèmes Dynamiques et Signaux

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Title	Control of a Quadruped Robot
Keywords	Mobile robotic, quadruped robot, interval analysis, Unitree B1
Laboratory	LARIS, University of Angers
Team	Systèmes Dynamiques et Optimisation (SDO)

Context

Although wheeled vehicles have been used for more than thousands of years some steep environments still require legged transportation such as horses, mules. By the evolution through billions of years, the result of the natural selection on the motion mode of terrestrial animals has fully demonstrated the excellent adaptability, mobility and carrying capacity on rough terrain of quadruped mammals.
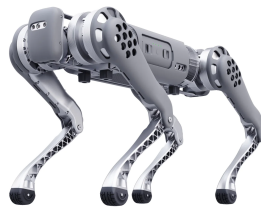
Objective

Polytech Angers recently acquires a B1 robot from Unitree. So far, only the *out of the box* controls have been used with the robot and it appears that the robot falls easily. The first step of the project presented here is to make a state of the art regarding the approaches for controlling a quadruped robot. The work done in [1] could be a starting point. Some of those approaches may be tested on a B1 simulator (unitree github repository) and on the actual robot.

A second step of this project will be to develop a new controller based on interval analysis [2] to prevent the robot from falling in a bounded error context.

Bibliography

[1] Chai, Hui, et al. "A survey of the development of quadruped robots: Joint configuration, dynamic locomotion control method and mobile manipulation approach." Biomimetic Intelligence and Robotics 2.1 (2022): 100029.

[2] Jaulin, Luc, et al. Interval analysis. Springer London, 2001.