Bachelorarbeit

Studienarbeit

Intrumenting a test bench for a one-legged hopper

Themengebiete:	Dynamik mech. Systeme, Robotics, Computer Vision
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Vorkenntnisse:	Technische Mechanik, Computer Vision, MATLAB

Traditional legs for legged robotic systems are made from rigid segments that are connected through a number of discrete joints. In contrast to this established approach, we are currently working on novel robotic legs which are made from continuously deformable material. This design is similar to that of prosthetic legs made specifically for running. These lower leg prostheses are made from a bow-shaped carbon fiber element. To use such legs in robotic applications, we need to be able to precisely model their dynamic behavior.

In this project, you will work on a test-bench setup that allows us to conduct dynamic hopping experiments while carefully analyzing the deformation of a continuously compliant leg. Your task will be to instrument this test bench, such that we can track the motion of the hopper and measure the exact shape of the leg during deformation. To this end, you will develop a computer vision framework that extracts the deformed shape of the leg from videos and combine that information with data from an inertial measurement unit (IMU) that is mounted on the hopper's main body to track the position and velocity of the hopper. In your work, you will explore the capabilities of the MATLAB computer vision toolbox, you will evaluate different methods for measuring the behavior of the compliant leg, you will investigate different methods to represent the deformation in a model, and you will examine possible criteria for improvements of the leg design.

We investigate the dynamic behavior of continuously deformable legs, similar to the shown running prosthesis.

Test bench to analyze hopping motions with continuously deformable legs.

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