

Mechanics Colloquium

Referent: Dr. Nelson Rosa

Datum: 26.01.2023

Uhrzeit: 15:45 Uhr

Ort: 10.81 Emil Mosonyi-Hörsaal (HS 62)

Titel: **The Use of Equilibria in Generating Families of Walking Gaits for Biped Robots**

Abstract

A fundamental motion task for biped robots is walking. Yet, there has not been a significant focus on studying a biped's gait space: the set of all gaits (periodic motions) in a biped's space of trajectories. In this talk, I will discuss how tools from the fields of nonsmooth and nonlinear dynamics, optimization, and numerical continuation methods can be used to better understand a biped's gait space and help advance the state of the art in bipedal gait generation. In particular, I demonstrate how current gait generation techniques can use the equilibria of a biped model as a generic seed value that can generate a continuous family of walking gaits. This improves upon the common approach of randomly sampling the trajectory space for a single walking gait. To show the applicability of these results, equilibria are used to generate gaits for several biped robots, including University of Michigan's MARLO and Boston Dynamics' Atlas bipeds.

References:

- [1] N. Rosa and K. M. Lynch, "A Topological Approach to Gait Generation for Biped Robots," in IEEE Transactions on Robotics, vol. 38, no. 2, pp. 699-718, April 2022, doi: 10.1109/TRO.2021.3094159.
- [2] M. Raff, N. Rosa and C. D. Remy, "Connecting Gaits in Energetically Conservative Legged Systems," in IEEE Robotics and Automation Letters, vol. 7, no. 3, pp. 8407-8414, July 2022, doi: 10.1109/LRA.2022.3186500.

You are cordially invited to take part in the event!
Prof. Dr.-Ing. Alexander Fidlin