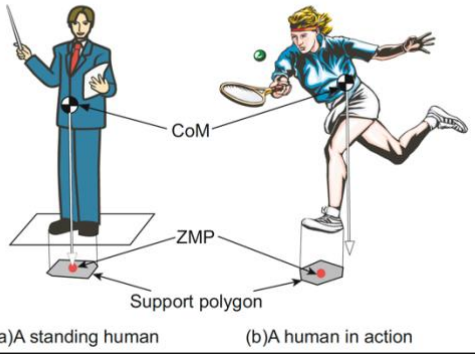
Prof. Dr. Katja Mombaur

Endowed Chair by Hector Foundation II
Institute for Anthropomatics and Robotics (IAR)

## PRAXIS DER FORSCHUNG SS 2024 – PROJECT PROPOSAL

# Experimental and Computational Analysis of Human Balancing: Exploring the Exploitation of the Support Polygon




S Kajita et al – Introduction to Humanoid Robotics

**Description:**

In this project, students will explore fundamentals of human balancing combining experimental biomechaniacal approaches and computational methods to analyze mechanical principles.
The support polygon (which is the convex hull of all contact points of a person with the ground, i.e. around their contact foot or feet) plays an important roll for evaluating the stability of a person. During standing, walking, balancing and other motions, the ground reaction force acts on the person at the center of pressure which can be measured by force plates. The question to be studied in this project is how far far the center of pressure can travel to the edge during bipedal and single legged balancing motions, investigating both successful balancing motions as well cases were balance is lost. Students will design and conduct an experiment with 6-8 participants, collect and process force plate data and categorize the findings. Students will be taught how to use the force plates and other related software from collection to post-processing.´

Related Technology:

- Bertec Force plates

Skills and knowledge required:

- Programming
- Signal processing (e.g. filtering raw data)
- Microsoft Excel
- Kinematics and Dynamics

Number of Students for this project: 2.3

**Contact**

Jan Lau - jan.lau@kit.edu
Prof. Katja Mombaur – katja.mombaur@kit.edu