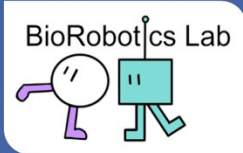


# Optimization and Biomechanics for Human Centred Robotics KIT BioRobotics Lab



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## Bachelor's or Master's Thesis: 4-engine flight control

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### Background

The human desire to fly is probably as old as humanity itself. To facilitate this, we want to investigate the feasibility of and strategies for a 4-engine humanoid/exoskeleton flight control system.



### Scope of the thesis

This thesis will focus on the modelling of such a 4-engine humanoid system and investigate strategies how to navigate it in different circumstances.

To do so, we want to use different Numerical Optimal Control approaches, such as Multiple Shooting, Collocation or Differential Dynamic Programming to facilitate and explore the respective strategies. The thesis can both focus on the modelling and system part with a simpler optimal control aspect as well as being lighter in modelling, but investigate one of or the difference between the different optimal control approaches to push for their respective strengths and limitations.

### Recommended knowledge

- experience in numerical optimal control or non-linear optimization
- experience in mathematical methods
- experience in robotic modelling and physics simulators such as Gazebo