

**Title:**

Walking gaits for the NUGus platform

**Supervisors:**

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**Background:**

The NUBots robocup team competes in the teen size division of the Robocup humanoid league. The current platform is a custom humanoid robot, adapted from the open-source igus platform<sup>[1]</sup>, called NUGus. A simulation environment for the robot has been developed in Gazebo<sup>[2]</sup>, using a library of standard components.

The scope of this project is to implement and compare a quasi-static walking routine and a dynamic walking routine. Implementation of these routines will result in greater control of the robot platform, improving the team's competitiveness in the robocup competition. The project will require system identification, control and optimization tools.

**Aim:**

Develop walking algorithms for use on the Nugus platform.

**Objectives:**

1. Develop a kinematic model (2D and 3D) for the walking robot and create a Matlab visualization.
2. Implement quasi-static walking routine on the Nugus platform (open-loop).
3. Implement zero-moment principle based dynamic walking on the Nugus platform (open-loop).
4. Utilise the arms to extend the region of stability of the walking gait.
5. Test the walking gaits on gazebo simulation.
6. Develop an interface to run open-loop trajectories on the nugus platform.
7. Explore the robustification of walking gait using arms and/or disturbance rejection.

**Links:**

[1] igus robot - <http://www.nimbro.net/OP/>

[2] Gazebo simulation environment - <http://gazebosim.org/>