

# "Hexaball" Robot Control

## Project Summary

Develop and program locomotion behavior for a hybrid hexapod/ball robot. First in simulation, then on the real thing. Choose between traditional control and learning-based methods.

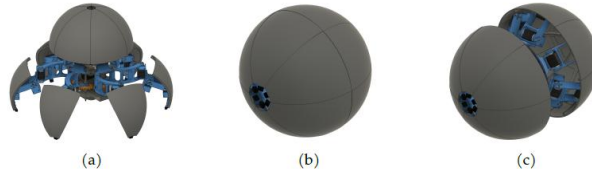


Figure 3.3: *HexaBall* in its three locomotion modes: (a) walking mode, (b) spherical rolling mode, and (c) capsule rolling mode.

## Project Type

- BA Thesis (3-6 months)
- MA Thesis (6 months)
- Praktikum/Internship (3 months)

## Required Qualifications

- Basic knowledge of control systems and/or robotics
- Experience with ROS, Python or C++

## Contact

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## Detailed Description

The *Hexaball* robot was built by one of our previous students at the IME. In its extended state it has six legs, making it a traditional hexapod. In its closed state, it forms a sphere that can roll by pushing outwards with its legs. There is documentation, CAD files and the physical robot already available. Your task is to make it move! Whether you choose more traditional control methods paired with inverse kinematics, or a learning-based approach such as Reinforcement Learning, is up to you. Beginning in simulation, you will develop a walking and/or rolling behavior that is ultimately deployed to the real robot.

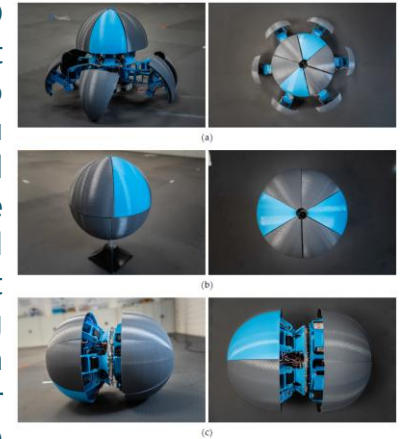


Figure 3.11: Assembled *HexaBall* in its three locomotion modes: (a) walking mode, (b) spherical rolling mode, and (c) capsule rolling mode.

## References

- M. Libak, "*HexaBall: Design and RL-based Control of a Morphing Hexapod Robot*", Masters Thesis 2024, UzL.
- J. Coelho, et al. "*Trends in the control of hexapod robots: a survey.*", in *Robotics 10.3* (2021), pp. 100.