

## Central Pattern Generators Optimization for Enhanced Robotic Locomotion with Integrated Sensors

### Context:

The EPFL Xplore Research Pole has the objective of building a legged robot. The robot is designed to autonomously navigate through challenging terrain using its on-board sensors. This semester project focuses on optimizing robotic locomotion by integrating Central Pattern Generators (CPGs) with already integrated sensors, including foot sensors and encoders.

### Project description:

The goal is to improve the adaptability and responsiveness of the robotic system through the synchronization of CPGs and sensor feedback. The project will involve refining CPG algorithms, optimizing sensor integration, and conducting real-world testing to validate the enhanced locomotion capabilities.

Furthermore, the student will be an integral part of the Xplore Legged Robot Team, actively participating in its weekly meetings and working sessions. This collaboration will facilitate close interaction with other team members, and the student is expected to share their findings and progress with the team regularly.

### Tasks:

The project involves a series of tasks, outlined below (note that this list is not exhaustive):

- Central Pattern Generator Refinement
- Sensor Fusion Optimization
- Integrated Control System Implementation
- Adaptability Algorithms
- Testing and Validation

### Expected Outcomes:

- Refined Central Pattern Generator algorithms for improved rhythmic pattern generation.
- Optimized integration of already integrated foot sensors and encoders for enhanced sensor feedback.
- Successful implementation of an integrated control system.
- Improved adaptability and responsiveness of the robotic system in real-world scenarios.

### Contact:

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